

Underground Blasting Safety Procedures

I PURPOSE

Control risks related to storage, transportation, handling and use of explosives, blasting accessories and agents.

2 SCOPE

This procedure applies to all underground operating areas and all employees and contractors.

3 DEFINITIONS

Authorized Personnel

Those employees that carry out blasting tasks handle explosives, transport explosives and who are duly authorized by the BATFE and by the COMPANY.

Blasting Accessories

Delays, detonators or blasting caps, booster, safety fuse, detonating cord and other explosives used for blasting procedure.

Blasting Agent

ANFO, emulsion and similar products.

Blasting Area/Zone

The area where the blasted material or fumes from an explosion may cause personal injuries, damages to property or losses in the process.

Blasting Blocker or Guard

Persons assigned to block the entry of vehicles and persons to the blasting area during detonation and subsequent inspection until the reentry to the area is allowed.

Blasting Safety Perimeter

A distance for equipment to be moved away from the blast will be determined by the Blasting Foreman.

The minimum distance for personnel to be from the blast area. For blocking procedures refer to the site specific standard operating procedures.

Blasting Schedule

Hours during which detonations are carried out in an area charged with explosives.

BATFE

Bureau of Alcohol, Tobacco, Firearms and Explosives.

Explosives

Chemical compounds or physical mixes, susceptible to sudden decomposition, that momentarily produce a large volume of gases at high temperatures and pressures with destructive effects.

Mixing Truck

A truck equipped with a mechanized mixer and loader of explosives, used to charge blast holes.

4 RESPONSIBILITIES

Blaster

Responsible for withdrawal, distribution and return of explosives and blasting accessories.

Properly handle explosives according to current procedures.

Prevent unauthorized persons from entering the blast site.

Maintain the magazine inventory (including documentation) and cleanliness.

Prohibit the entry of unauthorized personnel to the magazine.

Contractor Supervisor

Adhere to all federal and COMPANY Policies and Procedures

Ensure the proper operation of its explosive units.

Employees, Contractors and Visitors

Must be aware of the blasting schedule as well as the areas in which blasting will occur.

Must obey the orders of the Foreman or designee.

HSLP

Will provide support as required.

Must ensure currency of use and storage permit for explosives handling as issued by the BATFE.

Request Licenses, Authorizations, Inspections and others from the relevant authorities for the transportation and storage of explosive material. Furthermore, furnish such authorities with any documentation they may require according to the provisions set forth in the Law.

Inform the BATFE about the loss of any explosives, blasting agents or accessories.

Mine General Foreman

Ensure compliance of blasting safety procedures.

Operator of Explosive Transport Units

Ensure the optimum operating conditions and good repair of his unit (Explosives Truck) by inspecting the unit daily before operation (pre-op inspection).

Ensure only designated personnel are allowed to travel in a vehicle transporting explosives.

Supervisor

Ensure blast notification is communicated.

Verify that the established standards and procedures as well as the existing legal regulations are fulfilled.

Shall be responsible for any change in the blasting schedule subject to coordination with and approval by the General foreman or designee.

Will not allow any unauthorized persons to enter an area charged with explosives; much less allow them to handle explosives.

Periodically reassess the skills of blast personnel to handle explosives.

Determine location of the blasting blockers.

Handle and use explosives according to the safety standards and regulations.

Will inspect the magazines monthly to verify the safety conditions, reporting the deficiencies found and recording his/her observations in the magazines annex of the safety book.

Supply Chain

Keep records of purchases, the shipment and receipt of the explosives, blasting agents and accessories acquired by the mine for five years.

5 GENERAL GUIDELINES

Inventory

An accurate transaction inventory record must be kept at all times for the contents of each magazine on surface and underground. Each product in the magazine will have an explosive inventory record with:

Date of transaction

Amounts received into inventory

Quantities checked into and out of the mine

Ending balance each shift

A physical inventory count must be completed each month and documented on the magazine product record.

Transportation

Explosives will never be transported from the underground to the surface without authorization of the General Foreman.

Explosive material will be transported without undue delay to the underground magazines and to the blasting areas as close to blasting times as practical. Explosives must not be left unattended.

Closed non-conductive containers with tight fitting lids will be used to carry explosives and detonators to and from blast sites. Separate containers will be used for explosives and detonators.

Explosive material and detonators will not be transported on the same vehicle unless they are separated by 4 inches of hardwood and the detonators are kept in closed non-conductive container. The hardwood partition must be fastened to the vehicle or conveyance.

The vehicles used to transport explosives will be:

Equipped with two 5 lb. multi purpose fire extinguishers or one such extinguisher and an automatic fire suppression system.

Posted with warning signs that indicate the contents and are visible from all four sides. The signs must be removed when explosive material is not being transported.

Equipped with side and end enclosures higher than the explosive material being transported.

Equipped with a cargo space that has no sparking material exposed in the compartment.

Explosive material must never be transported in the operator compartment.

Occupied only by persons necessary for handling the explosive material.

Attended at all times while explosives are present.

Park equipment in accordance with the Vehicles and Mobile Equipment Procedure. If the vehicle is parked on a grade (as evidenced by movement of the vehicle when it is in neutral), chocks, "ribbing" or chock ditches must be used when vehicle/equipment is unattended. A single chock on the down hill side is sufficient.

When **transporting explosives by hand** separate closed non-conductive containers must be used to carry explosives and detonators.

Training

Every person handling explosives must be task trained, have a signed 5000-23 form on file and have completed and submitted a BATFE explosives possessor questionnaire.

Only people trained and experienced in the handling and use of explosives will be permitted to do so.

Trainees and inexperienced persons will only work in the presence of persons trained and experienced in the handling and use of explosive material.

Loading

All preparations for loading must be completed prior to bringing explosive material to the blasting area.

To ensure the safety of personnel during the loading process backs, faces, and ribs shall be examined for loose rock and barred down if necessary in accordance with the Underground Operations Ground Control Procedure prior to the commencement of loading.

The blast site shall be attended, barricaded and posted with EXPLOSIVE warning tape or an Explosive sign when explosive material is present at a blast site.

Until loading begins:

- Explosives and ANFO will be kept separated from detonators (25 feet) or by 4 inches of hardwood or the equivalent.
- Explosive material will be protected and kept in closed non-conductive containers.
- Primers should not be made up ahead of time.

Once loading begins only work associated with the loading of the round may be done in the blast site area.

Before loading, blast holes will be checked and whenever possible, cleared of obstructions.

The non-electric caps will be placed completely within the powder or securely within the cap well of the booster or stinger.

Never tamp directly on the primer. Instead, place another stick of powder in the hole and tamp it. Powder poles must be wooden or other nonconductive non-sparking materials.

Grounding of pneumatic prill loaders will be accomplished by putting stab jacks down on mobile equipment or by placing the metals legs of the prill loader on the ground.

Hearing protection must be worn when using a pneumatic prill loader

When using pneumatic prill loaders, the loading hose must be semi-conductive to prevent buildup of static electricity.

Always return excess explosive material and ANFO to the proper magazine immediately after completion of loading. ANFO will be placed in plastic non-conductive containers with a lid and powder will be placed back in a closed powder box. These products shall be used in another blast or returned to the manufacturer if the product is not usable.

Loading will be continuous, except where adverse conditions prevent its completion. If the blast cannot be fired before the end of the shift:

The shift foreman **must** be notified of the situation,

The round **must not** be wired in.

A sign and barricade must be placed at all entrances to the blast to warn of the hazard.

All explosive material and ANFO not loaded in the holes must be returned to the proper magazine before the end of the shift.

Before Shooting a Round

Complete a visual check of the circuit to insure that the components are properly aligned and connected. Also make sure all components are not cut, kinked, sharply bent, or damaged in any way.

Care must be taken to prevent the possibility of any blast damage to utilities and equipment.

Two people must be present when lighting safety fuse.

Warn others in the area of your intention to blast including everyone whose ventilation will be affected.

All access to the blast site must be physically guarded including manways/escapeways.

After the Blast

No work will resume in the blast area until a post-blast examination has been completed. This examination will include:

Checking to ensure adequate ventilation exists,

Examining the face and muck pile for misfires,

Evaluating ground conditions and the existing ground support in the area.

When a misfire is suspected, **persons will not enter the blast area for 30 minutes.**

When misfires occurs, only work necessary to remove the misfire and protect the safety of miners engaged in the removal will be permitted in the affected area until the misfire is disposed of in a safe manner. Upon discovery of the misfire, the shift foreman must be notified.

When a misfire cannot be disposed of safely, the area must be signed and barricaded to warn others of the hazard and prevent entry. The shift foreman must then be notified immediately of the situation.

Accepted Guidelines for Handling of Misfires

Gently try to pull the misfire from the hole by hand.

If the misfire cannot be removed from the hole, attempt to wash it out of the hole with a stream of water from a water hose.

Re-prime the misfire and shoot it.

Never attempt to wash or blow out a misfire hole with a blowpipe.

Do not attempt to dig the misfire out of the face with shovels, fin hoes, loading spoons, spud wrenches, muckers, etc.

Supplemental Information

Storage of Explosives (surface storage)

- Explosives shall only be stored in type (2) magazines authorized by the BATFE & the COMPANY and which shall only be used for this purpose.
- All explosives, blasting agents, blasting caps and other accessories shall be stored in separate magazines.
- The explosives shall be stored in their own containers (boxes) which will be destroyed after use.
- Explosive material will be stored to facilitate use of oldest stock first and stacked in a stable manner, but not more than eight (8) feet high.
- Magazines shall be secured in accordance with BATFE and MSHA regulations. At the end of a scheduled blasting shift the lead blaster or blasting foreman will lock and secure the powder magazine area.
- Magazine sites must be labeled with appropriate warning signs that indicate the contents and are visible from each approach. The signs shall be placed so that a bullet passing through them will not strike the magazine.

- Only explosive material and essential non-sparking equipment used for the operation of the magazine may be stored in the magazines.
- A copy of the current explosives license/permit will be posted in each magazine.
- Metal magazines will be grounded and equipped with electrical bonding connections between all conductive portions so the entire structure is at the same electrical potential.
- All explosive material must be stored in approved magazines.
- Drop trailers containing blasting agents must be kept locked with a single lock except when persons are present at the trailer.
- Explosive materials will be stored in the following magazines:
- Bagged blasting agents will be stored in approved trailers or magazines.
- Powder, detonating cord, stingers, and boosters will be stored in the explosive magazine.
- Non electric caps will be stored in the cap magazine.
- The areas around the storage facilities must be clear of rubbish,
- Brush, dry grass, and trees for 25 feet in all directions. Other combustibles will not be allowed to accumulate within 50 feet of these magazines. This is the responsibility of the Blasters and the Blast Foreman.
- Magazines must be a sufficient distance from power lines so that the power lines, if damaged, would not contact the magazine.

Clearing of Charged Blast Areas

- A safe distance zone will be determined by the blast foreman or his designee, based on type of material, number of holes, location and other safety considerations.

Blasting

- For initiation procedures refer to the site specific standard operating procedures.

Unplanned Detonation Procedures

In the event of an unplanned detonation:

Evacuate and secure the area. Do not re-enter the area except to rescue an injured person and then only if safe to re-enter (if possible, efforts should be made to locate a member of the mine rescue team).

Immediately notify the General Foreman and HSLP.

The Mine Operations Manager, Underground Functional Manager and the Underground Health, Safety and Loss Prevention Manager must be notified.

The Underground Health, Safety and Loss Prevention Manager or designee will immediately notify the appropriate state and MSHA officials.