320. BLASTING AND USE OF EXPLOSIVES

01. Scope

Blasting and use of explosives shall conform to all other applicable requirements of this standard, as well as the following provisions. Nothing in this standard shall be construed to prohibit better or otherwise safer conditions than specified herein. (7-1-97)

02. Definitions

For definitions of other terms used in this section, see sub-section 010 of this standard. (7-1-97)

a. Approved Storage Facility is a facility for the storage of explosive materials conforming to the requirements of this section. (0-0-00)

b. Blast Area is the area in which explosive loading and blasting operations are being conducted. (7-1-97)

c. Blasting Agent is any material or mixture consisting of a fuel and oxidizer used for blasting, but not classified as an explosive and in which none of the ingredients is classified as an explosive provided the furnished (mixed) product cannot be detonated with a number eight (8) test blasting cap when confined. (7-1-97)

d. Blasting Cap is a metallic tube closed at one end, containing a charge of one or more detonating compounds. (7-1-97)
e. Block Holing is the breaking of boulders by firing a charge of explosives that has been loaded in a drill hole. (7-1-97)

f. Bus Wire is an expendable wire, used in parallel or series, in parallel circuits, to which are connected the leg wires of electric blasting caps. (7-1-97)

g. Class A Explosives is an explosive possessing a detonating hazard, such as dynamite, nitroglycerin, picric acid, lead azide, fulminate of mercury, blast powder, blasting caps, and detonating primers. (7-1-97)

h. Class B Explosives is an explosive possessing a flammable hazard, such as propellent explosives, including some smokeless powders. (7-1-97)

i. Class C Explosives includes certain types of manufactured articles which contain Class A or Class B explosives, or both, as components, but in restricted quantities. (7-1-97)

j. Connecting Wire is an insulated expendable wire used between electric blasting caps and the leading wires or between the bus wire and the leading wires. (7-1-97)

k. Conveyance is any unit for transporting explosives or blasting agents, including but not limited to trucks, trailers, rail cars, barges, and vessels. (7-1-97)

l. Detonating Cord is a flexible cord containing a center core of high explosive which when detonated, will have sufficient strength to detonate another cap. (7-1-97)

m. Detonator is any of the following: blasting caps, electric blasting caps, delay electric blasting caps, non-electric blasting caps, and non-electric delay blasting caps. (7-1-97)

n. Electric Blasting Cap is a blasting designed for and capable of detonating by means of an electric current. (7-1-97)

o. Electric Delay Blasting Caps are caps designed to detonate at a predetermined period of time after energy is applied to the ignition system. (7-1-97)

p. Explosives are any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion; that is, with substantially instantaneous release of gas and heat. (7-1-97)

q. Fuse Lighters are special devices for the purpose of igniting safety fuse. (7-1-97)

r. Leading Wire is an insulated wire used between the electric power source and the electric blasting cap circuit. (7-1-97)

s. Magazine is any building or structure, other than an explosives manufacturing building, used for the storage of explosives. (7-1-97)
t. Misfire is an explosive charge which failed to detonate. (7-1-97)

u. Mud Capping is the blasting of boulders by placing a quantity of explosives against a rock, bolder, or other object without confining the explosive in a drill hole. (sometimes known as bulldozing, adobe blasting, or dobying) (7-1-97)

v. Non-Electric Blasting Cap is a blasting cap designed for and capable of detonation from the sparks or flame from a safety fuse inserted and crimped into the open end. (7-1-97)

w. Non-Electric Delay Blasting Cap is a blasting cap with an integral delay element in conjunction with and capable of being detonated by a detonation impulse or signal from detonating cord. (7-1-97)

x. Permanent Blasting Wire is a permanently mounted insulated wire used between the electric power source and the electric blasting cap circuit. (7-1-97)

y. Primary Blasting is a blasting operation by which the original rock formation is dislodged from its natural location. (7-1-97)

z. Primer is a cartridge or container of explosives into which a detonator or detonating cord is inserted or attached. (7-1-97)

aa. Safety Fuse is a flexible cord containing an internal burning medium by which fire is conveyed at a continuous and uniform rate for the purpose of firing blasting caps. (7-1-97)

bb. Secondary Blasting is the reduction of oversize material by the use of explosives to the dimension required for handling, including mud-capping and block-holing. (7-1-97)

c. Stemming is a suitable inert incombustible material or device used to confine or separate explosive in a drill hole, or to cover explosives in mud-capping. (7-1-97)

d. Springing is the creation of a pocket in the bottom of a drill hole by use of a moderate quantity of explosives in order that larger quantities or explosives may be inserted therein. (7-1-97)

ee. Water Gels or slurry Explosives are a wide variety of materials used for blasting. They all contain substantial preparations of water and high preparations of ammonium nitrate. (7-1-97)

03. General Requirements: (7-1-97)

a. The employer shall permit only authorized and qualified persons to handle and use explosives. (7-1-97)

b. Smoking, firearms, matches, open flame lamps, and other fires, flame or heat producing devices and sparks shall be prohibited in or near explosive magazines or while explosives are
being handled, transported, or used. EXCEPTION: Law enforcement officials and persons carrying firearms for the protection of the explosives or explosive operation. (7-1-97)

c. No person shall be allowed to handle or use explosive while under the influence of intoxicating liquors, narcotics, or other dangerous drugs. (7-1-97)

d. All explosives shall be accounted for at all times. Explosives not being used shall be kept in a locked magazine, unavailable to persons not authorized to handle them. The employer shall maintain an inventory and use record of all explosives. Appropriate authorities shall be notified of any loss, theft, or unauthorized entry into a magazine. (7-1-97)

e. No explosives or blasting agents shall be abandoned. (7-1-97)

f. No fire shall be fought where the fire is in imminent danger of contact with explosives. All explosives shall be removed to a safe area and the fire area guarded against intruders. (7-1-97)

g. Original containers or Class II magazines, shall be used for taking detonators and other explosives from storage magazines to the blasting area. (7-1-97)

h. When blasting is done in congested areas or in proximity to a structure, railway, highway, or any other installation that may be damaged, the blasted shall take special precautions in the loading, delaying, initiation, and confinement of each blast with mats or other methods so as to control the throw of fragments, and thus prevent bodily injury to employees. (7-1-97)

i. Employees authorized to prepare explosive charges or conduct blasting operations shall use every reasonable precaution including, but not limited to, visual and audible warning signals, flags, or barricades, to ensure employee safety. (7-1-97)

j. Blasting operations shall be conducted between sunup and sundown. (7-1-97)

k. Due precautions shall be taken to prevent accidental discharge of electric blasting caps from current induced by radar, radio transmitters, lightning, adjacent power lines, dust storms, or other sources of extraneous electricity. (7-1-97)

l. Electric detonators shall be short-circuited/shunted until wired into the blasting circuit. The blasting wire shall be short-circuited/shunted until ready to be fired. (7-1-97)

m. The suspension of all blasting operations and removal of persons from the blasting area when an electric storm is within three (3) miles and during the progress of an electric storm. (7-1-97)

n. Adequate signs shall be prominently displayed warning against the use of mobile radio transmitters, on all roads within one-thousand (1,000) feet of blasting operations. Whenever adherence to the one-thousand (1,000) foot distance would create an operational handicap, a competent person shall be consulted to evaluate the particular situation, and alternative provisions may be made which are adequately designed to prevent any premature firing of electric blasting caps. A description of any such alternatives shall be reduced to writing and shall
be certified as meeting the purposes of this section by the competent person consulted. The description shall be kept at the job site during the duration of the blasting operations and shall be available to representatives of the Department upon request. See Figure 320.03-A for signs. (7-1-97)

**FIGURE 320.03-A**

![Orange diamond sign](image1)

![Rectangular yellow sign](image2)

Orange diamond sign w/black lettering  
Rectangular yellow sign w/black lettering

o. Mobile radio transmitters which are less than one-hundred (100) feet away from electric blasting caps, in other than original containers, shall be de-energized and effectively locked. (7-1-97)

p. Empty boxes, paper, and fiber packing materials, which have previously contained high explosives, shall not be used again for any purpose, but shall be destroyed by burning at an approved location. (7-1-97)

q. Explosives, blasting agents, and blasting supplies that are obviously deteriorated or damaged shall not be used. (7-1-97)

r. Delivery and issue of explosives shall only be made by and to authorized persons and into authorized magazines or approved temporary storage or handling areas. (7-1-97)

s. Blasting operations in the proximity of overhead power lines, communication lines, utility services, or other services and structures shall not be carried on until the operators and/or owners have been notified and measures for safe control have been taken. (7-1-97)

t. The use of black powder shall be prohibited as a blasting agent. (7-1-03)

u. All loading and firing of explosives shall be directed and supervised by competent persons thoroughly experienced in this field. (7-1-97)

v. All blasts shall be fired electrically with an electric blasting machine or properly designed electric power source, except as provided in sub-section 320.08 of this section. (7-1-97)
w. Warning signs, indicating a blast area, shall be maintained at all approaches to the blast area. Additionally, permanent blasting areas shall have signs at three-hundred (300) foot intervals around the perimeter of the blasting area. The sign shall meet the requirements for Danger signs in section 170 of this standard. The words Blasting Area shall be in four (4) inch black letters. See Figure 320.03-B. (7-1-97)

FIGURE 320.03-B

![Danger Blasting Area Sign]

04. Blaster Qualifications: (7-1-97)

a. A blaster shall be able to understand and give written and oral orders. (7-1-97)

b. A blaster shall be in good physical condition and not be addicted to narcotics, intoxicants, or similar types of drugs. (7-1-97)

c. A blaster shall be qualified, by reason of training, knowledge, or experience, in the field of transporting, storing, handling, and use of explosives, and have a working knowledge of Federal and State laws and regulations which pertain to explosives. (7-1-97)

d. Blasters shall be required to furnish satisfactory evidence of competency in the handling explosives and performing in a safe manner the type of blasting that will be required. (7-1-97)

e. Blasters shall be required to receive training, at least annually, in the handling of explosives and performing in a safe manner the type of blasting that will be required. (7-1-97)

f. The blaster shall be knowledgeable and competent in the use of each type of blasting method used. (7-1-97)

g. Persons destroying unserviceable explosives and explosive devices shall be required to furnish satisfactory evidence of competency and maintain currency through annual training. (7-1-97)

05. Transporting of Explosives: (7-1-97)

a. Transporting of explosives shall meet the provisions of Department of Transportation regulations contained in 49CFR. (7-1-97)

b. Motor vehicles or conveyances transporting explosives shall only be driven by, and be in charge of, a licensed driver who is physically fit. The driver shall be familiar with the local,
State, and Federal regulations governing the transportation of explosives. The driver shall be at least twenty-one (21) years of age. (7-1-97)

c. No person shall smoke, or carry matches or any other flame producing device, nor shall firearms or loaded cartridges be carried while in or near a motor vehicle or conveyance transporting explosives. EXCEPTION: Law enforcement officials and persons carrying firearms for the protection of the explosives. (7-1-97)

d. Explosives, blasting agents, and blasting supplies shall not be transported with other materials or cargoes. Blasting caps (including electric) shall not be transported in the same vehicle with explosives. (7-1-97)

e. Explosives, blasting agents, and blasting supplies shall not be transported in the same compartment with people. Blasting caps (including electric) shall not be transported in the passenger compartment of a vehicle. (7-1-97)

f. Vehicles used for transporting explosives shall be strong enough to carry the load without difficulty, and shall be in good mechanical condition. Vehicles used to transport explosives shall be inspected by the person in charge of the vehicle in order to determine that: (7-1-97)

i. Electric wires are insulated and securely fastened; the engine, chassis, and body are reasonably clean and free of excessive grease and oil; (7-1-97)

ii. The fuel tanks and fuel lines are securely fastened and not leaking; (7-1-97)

iii. Breaks, lights, horn, windshield wipers, and steering mechanism are functioning properly; (7-1-97)

iv. Tires are properly inflated and free from defects; (7-1-97)

v. The vehicle is in proper condition for transporting explosives. (7-1-97)

g. When explosives are transported by a vehicle with an open body, a Class II magazine or original manufacturer's container shall be securely mounted on the bed to contain the cargo. Open bodied vehicles transporting explosives shall have the cargo area covered with a flameproof and moistureproof tarpaulin or other effective protection against moisture and sparks. Packages of explosives shall not be loaded above the sides of an open body vehicle. (7-1-97)

h. All vehicles used for the transportation of explosives shall have tight floors and any exposed spark producing metal on the inside of the body shall be covered with wood, or other non-sparking material, to prevent contact with raw explosives or electrically initiated explosive devices. (7-1-97)

i. Every motor vehicle or conveyance used for transporting explosives shall be marked or placard on both sides, the front, and the rear with the appropriate D.O.T placards. (7-1-97)
j. Each vehicle used for transportation of explosives shall be equipped with two (2) fully charged ten (10) ABC rated fire extinguishers, in good condition. The driver shall be trained in the use of the extinguishers on the vehicle. (7-1-97)

k. Motor vehicles or conveyances carrying explosives, blasting agents, or blasting supplies, shall not be taken inside a garage or shop for repairs or servicing. (7-1-97)

l. No motor vehicle transporting explosives shall be left unattended. (7-1-97)

m. Every vehicle transporting explosives shall at all times be attended by the driver or other attendant. However, an explosive laden vehicle may be left unattended if parked within a securely fenced or wall area with all gates locked where parking of such vehicle is otherwise permissible, or at a magazine site established solely for the purpose of storing explosives. (7-1-97)

n. Vehicles transporting explosives shall avoid congested areas and heavy traffic. Where routes through congested areas have been designated by local authorities such routes shall be followed. (7-1-97)

06. Storage of Explosives and Blasting Agents: (7-1-97)

a. Explosives and related materials shall be stored in approved facilities. (7-1-97)

b. Blasting caps, electric blasting caps, detonating primers, and primed cartridges shall not be stored in the same magazine with other explosives or blasting agents. (7-1-97)

c. Smoking and open flames shall not be permitted within fifty (50) feet of explosives and detonator storage magazines. (7-1-97)

d. Ground around magazines shall slope away for drainage. The land surrounding magazines shall be kept clear of brush, dried grass, leaves, and other materials for a distance of at least twenty-five (25) feet. Combustible materials shall not be stored within fifty (50) feet of magazines. (7-1-97)

e. Class I magazines shall be required where the quantity of explosives stored is more than fifty (50) pounds. Class II magazines may be used where the quantity of explosives stored is fifty (50) pounds or less. (7-1-97)

f. Class I magazines shall be located away from inhabited buildings, passenger railways, and public highways and from other magazines in conformity with Table 320.06-A. (7-1-97)

<table>
<thead>
<tr>
<th>TABLE 320.06-A</th>
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<td>MINIMUM DISTANCES FOR BUILDINGS CONTAINING EXPLOSIVE MATERIALS</td>
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1The number of pounds (kg) of explosives listed is the number of pounds of trinitrotoluene (TNT) or the equivalent pounds (kg) of other explosive.

2The distance listed is the distance to property line, including property lines at public ways.

3Inhabited building is any building on the same property which is regularly occupied by human beings. When two or more buildings containing explosives or magazines are located on the same property, each building or magazine shall comply with the minimum distances specified from inhabited buildings, and, in addition, they should be separated from each other by not less than
the distances shown for "Separation of Magazines," except that the quantity of explosive materials contained in detonator buildings or magazines shall govern in regard to the spacing of said detonator buildings or magazines from buildings or magazines containing other explosive materials. If any two or more buildings or magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such two or more buildings or magazines, as a group, shall be considered as one building or magazine, and the total quantity of explosive materials stored in such group shall be treated as if the explosive were in a single building or magazine located on the site wall of any building or magazine of the group, and shall comply with the minimum distance specified from other magazines or inhibited buildings.

4Barricades shall effectively screen the building containing explosives from other buildings, public ways or magazines. When mounds or revetted walls of earth are used for barricades, they shall not be less than 3 feet (914 mm) in thickness. A straight line from the top of any side wall of the building containing explosive materials to the eave through the barricades.

5Magazine is a building or structure approved for storage of explosive materials. In addition to the requirements of the standard, magazines shall comply with the Fire Code and Building Code.

6The distance listed may be reduced by 50 percent when approved natural or artificial barriers are provided in accordance with the requirements in Footnote 4.

(7-1-97)

g. Except as provided in sub-section 320.06.h of this section, Class II magazines shall be located in conformity with Table 320.06-A. (7-1-97)

h. When used for temporary storage at a site for blasting operations, Class II magazines shall be located away from other magazines. A distance of at least one-hundred-fifty (150) feet shall be maintained between Class II magazines and work in progress when the quantity of explosives kept therein is in excess of twenty-five (25) pounds, and at least fifty (50) feet when the quantity of explosives is twenty-five (25) pounds, or less. (7-1-97)

i. Magazines for the storage of explosives and blasting caps shall be bullet resistant, weather resistant, fire resistant, and ventilated sufficiently to protect the explosive in the specific locality. (7-1-97)

j. The property upon which magazines are located shall be posted with Danger signs stating EXPLOSIVES - KEEP OFF, See Figure 320.06-A. (7-1-97)

FIGURE 320.06-A

![Danger Sign: Explosives Keep Off]
k. At the entrance to explosives storage sites, all access roads shall be posted with the following danger sign, see Figure 320.06-B. (7-1-97)

**FIGURE 320.06-B**

![Danger Sign]

l. Magazines requiring heat shall be heated by either hot water radiant heating within the magazine building; or air directed into the magazine building over either hot water or low pressure steam (fifteen (15) p.s.i.g.) coils located outside the magazine building. (7-1-97)

m. Magazine heating systems shall meet the following requirements: The radiant heating coils within the magazine shall be installed in such a manner that the explosives or explosives containers cannot contact the coils and air is free to circulate between the coils and the explosives or explosives containers. The heating ducts shall be installed in such a manner that the hot air discharge from the duct is not directed against the explosives or explosives containers. The heating device used in connection with a magazine shall have controls which prevent the ambient magazine temperature from exceeding one-hundred-thirty (130) degrees Fahrenheit. The electric fan or pump used in the heating system for a magazine shall be mounted outside and separate from the wall of the magazine and shall be grounded. The electric fan motor and controls for electrical heating devices used in heating water or steam shall have overloads and disconnects. All electrical switch gear shall be located a minimum distance of twenty-five (25) feet from the magazine. The heating source for water or steam shall be separated from the magazine by a distance of not less than twenty (25) feet when electrical and fifty (50) feet when fuel fired. The area between the heating unit and the magazine shall be cleared of all combustible materials. The storage of explosives and explosives containers in the magazine shall allow uniform air circulation so the temperature of explosives and explosives containers can be uniformly maintained. (7-1-97)

n. When lights are necessary inside the magazine, electric safety flashlight, or electric lanterns shall be used. (7-1-97)

o. Class I magazines shall be of masonry, wood, metal, or a combination of these types. Thickness of masonry units shall not be less than eight (8) inches. Hollow masonry units used in construction required to be bullet resistant shall have all hollow spaces filled with weak cement or well tamped sand. Wood constructed walls shall be bullet resistant, shall have at least a six (6) inch space between interior and exterior sheathing and the space between sheathing shall be filled with well tamped sand. Metal wall construction shall be bullet resistant, shall be lined with brick at least four (4) inches in thickness or shall have at least a six (6) inch sand fill between interior and exterior walls. Floors and roofs of masonry magazines may be of wood construction. Wood floors shall be tongue and groove lumber having a nominal thickness of one (1) inch. Roofs
shall be bullet resistant and shall be protected by a sand tray located at the line of eaves and covering the entire area except that necessary for ventilation. Sand in the sand tray shall be maintained at a depth of not less than four (4) inches. All wood at the exterior of magazines, including eaves, shall be protected by being covered with black or galvanized steel or aluminum metal of thickness of not less than Number twenty-six (26) gage. All nails exposed to the interior of magazines shall be well countersunk. Foundations for magazines shall be of substantial construction and arranged to provide good cross ventilation. Magazines shall be ventilated sufficiently to prevent dampness and heating of stored explosives. Ventilating openings shall be screened to prevent the entrance of sparks. Openings to magazines shall be restricted to that necessary for the placement and removal of stocks of explosives. Doors for openings in magazines shall be bullet resistant. Provisions shall be made to prevent the piling of stocks of explosives directly against masonry walls, brick lined or sand filled metal walls and single thickness metal walls; such protection shall not interfere with proper ventilation at the interior of side and end walls. (7-1-97)

p. Class II magazines shall be of wood or metal construction, or a combination thereof. Wood magazines of this class shall have sides, bottom, and cover constructed of two (2) inch hardwood boards well braced at corners and protected by being entirely covered with sheet metal of not less than Number twenty (20) gage. All nails exposed to the interior of the magazine shall be well countersunk. All metal magazines of this class shall have sides, bottom, and cover constructed of sheet metal, and shall be lined with three-eights (3/8) inch plywood or equivalent. Edges of metal covers shall overlap sides at least one (1) inch. Covers for both wood and metal constructed magazines of this class shall be provided with substantial strap hinges and shall be provided with substantial means for locking. Magazines of this class shall be painted red and shall bear lettering in white, on all sides and top, at least three (3) inches high stating Explosives - Keep Fire Away. Class II magazines where necessary due to climatic conditions shall be ventilated. (7-1-97)

q. Packages of explosives shall be laid flat with top side up. Black powder when stored in magazines with other explosives shall be stored separately. Black powder stored in kegs shall be stored on ends, bungs down, or on side, seams down. Corresponding grades and brands of explosives shall be stored together in such a manner that brands and grade marks show. All stocks shall be stored so as to be easily counted and checked. Packages of explosives shall be piled in a stable manner. When any kind of explosive is removed from a magazine for use, the oldest explosive of that particular kind shall always be taken first. (7-1-97)

r. Packages of explosives shall not be unpacked or repacked in a magazine nor within fifty (50) feet of a magazine or in close proximity to other explosives. Tools used for opening packages of explosives shall be constructed of non-sparking materials, except that metal slitters may be used for opening fiberboard boxes. A wood wedge and a fiber, rubber, or wood mallet shall be used for opening or closing wood packages of explosives. Opened packages of explosives shall be securely closed before being returned to a magazine. (7-1-97)

s. Magazines shall not be used for the storage of any metal tools nor any commodity except explosives, but this restriction shall not apply to the storage of blasting agents and blasting supplies. (7-1-97)
t. Magazine floors shall be regularly swept, kept clean, dry, free of grit, paper, empty used packages, and rubbish. Brooms and other cleaning utensils shall not have any spark producing metal parts. Sweepings from floors of magazines shall be properly disposed of. Magazine floors stained with nitroglycerin shall be cleaned according to instructions of the manufacturer. (7-1-97)

u. When any explosive has deteriorated to an extent that it is an unstable or dangerous condition, or if nitroglycerin leaks from any explosives, then the person in possession of such explosive shall immediately proceed to destroy such explosive in accordance with the instructions of the manufacturer. Only experienced persons shall be allowed to do the work of destroying explosives. (7-1-97)

v. When magazines need inside repairs, all explosives shall be removed therefrom and the floors cleaned. In making outside repairs, if there is a possibility of causing sparks or fire the explosives shall be removed from the magazine. Explosives removed from a magazine under repair shall either be placed in another magazine or placed a safe distance from the magazine where they shall be properly guarded and protected until repairs have been completed, then they shall be returned to the magazine. (7-1-97)

w. Smoking, matches, open flames, spark producing devices, and firearms (except firearms carried by guards and law enforcement officers) shall not be permitted inside of or within fifty (50) feet of magazines. (7-1-97)

x. Magazines shall be in the charge of a competent person at all times and who shall be held responsible for the enforcement of all safety precautions. This person shall be at least twenty-one (21) years of age. (7-1-97)

y. Explosives recovered from blasting misfires shall be placed in a separate magazine until competent personnel has determined from the manufacturer the method of disposal. Caps recovered from blasting misfires shall not be reused. Such explosives and caps shall then be disposed of in the manner recommended by the manufacturer. (7-1-97)

z. Magazines containing explosives shall be inspected at intervals of not greater than seven (7) days to determine whether there has been an unauthorized entry or attempted entry into a magazine, or unauthorized removal of a magazine or its contents. (7-1-97)

aa. Magazine doors shall be kept locked when the magazine is unattended. (7-1-97)

bb. Magazines for the storage of explosives shall be kept locked with two (2) separate locks meeting the following requirements: mortise locks; padlocks fastened in separate hasps and staples; or a combination of a mortise lock and a padlock. Locks shall be steel having at least five (5) tumblers. Padlocks shall be steel and have at least a three-eighths (3/8) inch diameter case hardened shackle. Padlocks shall be protected by not less than one-fourths (1/4) inch steel hoods constructed in a manner which prevents sawing or lever action on the locks, hasps, and staples. (7-1-97)
cc. Magazines for the storage of explosives shall as a minimum have a twenty (20) ABC fire extinguisher. (10-1-06)

07. Loading of Explosives or Blasting Agents: (7-1-97)

a. Procedures that permit safe and efficient loading shall be established before loading is started. (7-1-97)

b. All drill holes shall be sufficiently large to admit freely the insertion of the cartridges of explosives. (7-1-97)

c. Tamping shall be done only with wood rods or plastic tamping poles without exposed metal parts, but non-sparking metal connectors may be used for jointed poles. Violent tamping shall be avoided. The primer shall never be tamped. (7-1-97)

d. No holes shall be loaded except those to be fired in the next round of blasting. After loading, all remaining explosives and detonators shall be immediately returned to an authorized magazine. (7-1-97)

e. Drilling shall not be started until all remaining butts of old holes are examined for unexploded charges, and if any are found, they shall be refired before work proceeds. (7-1-97)

f. No person shall be allowed to deepen drill hole which have contained explosives or blasting agents. (7-1-97)

g. No explosives or blasting agents shall be left unattended at the blast site. (7-1-97)

h. Machines and all tools not used for loading explosives into bore holes shall be removed from the immediate location of holes before explosives are delivered. Equipment shall not be operated within fifty (50) feet of loaded holes. (7-1-97)

i. No activity of any nature other than that which is required for loading holes with explosives shall be permitted in a blast area. (7-1-97)

j. Power lines and portable electric cables for equipment being used shall be kept a safe distance from explosives or blasting agents being loaded into drill holes. Cables in the proximity of the blast area shall be de-energized and locked out by the blasted. (7-1-97)

k. Holes shall be checked prior to loading to determine depth and conditions. Where a hole has been loaded with explosives but the explosives have failed to detonate, there shall be no drilling within fifty (50) feet of the hole. (7-1-97)

l. When loading a long line of holes with more than one loading crew, the crews shall be separated by practical distance consistent with efficient operation and supervision of crews. (7-1-97)
m. All blast holes in open work shall be stemmed to the collar or to a point which will confine
the charge. (7-1-97)

n. A bore hole shall never be sprung when it is adjacent to or near a hole that is loaded.
Flashlight batteries shall not be used for spring holes. (7-1-97)

o. Drill holes which have been sprung or chambered, and which are not water filled, shall be
allowed to cool before explosives are loaded. (7-1-97)

p. No loaded holes shall be left unattended or unprotected. (7-1-97)

q. The blasted shall keep an accurate, up to date record of explosives, blasting agents, and
blasting supplies used in a blast and shall keep an accurate running inventory of all explosives
and blasting agents stored on the operation. (7-1-97)

08. Electric Blasting:

a. Electric blasting caps shall not be used where sources of extraneous electricity make the use of
electric blasting caps dangerous. Blasting cap leg wires shall be kept short circuited (shunted)
until they are connected into the circuit for firing. Electric firing lines shall be kept short
circuited (shunted) until they are connected into the circuit for firing. (7-1-97)

b. Before adopting any system of electrical firing, the blasted shall conduct a thorough survey for
extraneous currents, and all dangerous currents shall be eliminated before any holes are loaded.
(7-1-97)

c. In any single blast using electric blasting caps, all caps shall be of the same style or function,
and of the same manufacture. (7-1-97)

d. Electric blasting shall be carried out by using blasting circuits or power circuits in accordance
with the electric blasting cap manufacturer's recommendations, or the calculations of a
competent person. (7-1-97)

e. When firing a circuit of electric blasting caps, care shall be exercised to ensure that an
adequate quantity of delivered current is available, in accordance with the manufacturer's
recommendations. (7-1-97)

f. When firing electrically, the insulation on all firing lines shall be adequate and in good
condition. (7-1-97)

g. A power circuit used for firing electric blasting caps shall not be grounded. (7-1-97)

h. When firing from a power circuit, the firing switch shall be locked in the open or "OFF"
position at all times, except when firing. It shall be so designed that the firing lines to the cap
circuit are automatically short circuited when the switch is in the "OFF" position. Keys to this
switch shall be entrusted only to the blasted. (7-1-97)
i. Blasting machines shall be in good condition and the efficiency of the machine shall be tested periodically to make certain that it can deliver power at its rated capacity. (7-1-97)

j. When firing with blasting machines, the connections shall be made as recommended by the manufacturer of the electric blasting caps used. (7-1-97)

k. The number of electric blasting caps connected to a blasting machine shall not be in excess of its rated capacity. Furthermore, in primary blasting, a series circuit shall contain no more caps than the limits recommended by the manufacturer of the electric blasting caps in use. (7-1-97)

l. The blasted shall be in control of the blasting machines, and no other person shall connect the firing lead wires to the blasting machine. (7-1-97)

m. Blasters, when testing circuits shall use only blasting galvanometers equipped with a silver chloride cell especially designed for this purpose. (7-1-97)

n. Electric blasting caps shall be tested for electric continuity before use. (7-1-97)

o. The entire electric blasting circuit shall be tested for electric continuity before the firing lines are connected to the firing power circuit or blasting machine. (7-1-97)

p. Whenever the possibility exists that a firing line or blasting wire might be thrown over a live power line by the force of an explosion, care shall be taken to see that the total length of wires are kept too short to hit the lines, or that the wires are securely anchored to the ground. If neither of these requirements can be satisfied, a nonelectric system shall be used. (7-1-97)

q. In electrical firing, only the person making firing wire connections shall fire the shot. All connections shall be made from the bore hole back to the source of firing current, and the firing wires shall remain shorted (shunted) and not be connected to the blasting machine or other source of current until the charge is to be fired. (7-1-97)

r. After firing an electric blast from a blasting machine, the firing wires shall be immediately disconnected from the blasting machine, the firing wires shall be immediately disconnected from the machine and short circuited (shunted). (7-1-97)

09. Use of Safety Fuse: (7-1-97)

a. Safety fuse shall only be used where sources of extraneous electricity makes the use of electric blasting caps dangerous. The use of safety fuse that has been hammered or injured in any way shall be forbidden. (7-1-97)

b. The hanging of a fuse on nails or other projections which will cause a sharp bend to be formed in the fuse is prohibited. (7-1-97)

c. Before attaching a blasting cap to safety fuse, a six (6) inch length of safety fuse shall be cut from the end of the supply reel so as to assure a fresh cut in each blasting cap. (7-1-97)
d. After a six (6) inch length of safety fuse has been cut, a three (3) foot length of safety fuse shall be cut from each new roll of safety fuse and test burned and timed to determine its rate of burning. (7-1-97)

e. Only a cap crimper of approved design shall be used for attaching blasting caps to safety fuse. Crimpers shall be kept in good repair and accessible for use. (7-1-97)

f. No unused caps or short capped fuse shall be placed in any hole to be blasted; such unused detonators shall be removed from the working place and destroyed. (7-1-97)

g. No fuse shall be capped, or primers made up, in any magazine or near any possible source of ignition. (7-1-97)

h. No one shall be permitted to carry detonators or primers of any kind on their person. (7-1-97)

i. The minimum length of safety fuse to be used in blasting shall be not less than six (6) feet. (7-1-97)

j. At least two (2) qualified persons shall be present when multiple cap and fuse blasting is done by hand lighting methods. (7-1-97)

k. Not more than twelve (12) fuses shall be lighted by each blasted when hand lighting devices are used. However, when two (2) or more safety fuses in a group are lighted as one (1) by means of igniter cord, or other similar fuse lighting devices, they may be considered as one (1) fuse. (7-1-97)

l. The so called drop fuse method of dropping or pushing a primer or any explosive with a lighted fuse attached is forbidden. (7-1-97)

m. Cap and fuse shall not be used for firing mud-cap charges or any other charges unless the charges are separated sufficiently to prevent one charge from dislodging other shots/charges. (7-1-97)

n. When blasting with safety fuses, consideration shall be given to the length and burning rate of the fuse. Sufficient time, with a margin of safety, shall always be provided for the blasted to reach a place of safety. (7-1-97)

10. Use of Detonating Cord: (7-1-97)

a. Care shall be taken to select a detonating cord consistent with the type and physical condition of the bore hole and stemming and type of explosives used. (7-1-97)

b. Detonating cord shall be handled and used with the same respect and care given other explosives. (7-1-97)
c. The line of detonating cord extending out of a bore hole or from a charge shall be cut from the supply spool before loading the remainder of the bore hole or placing additional charges. (7-1-97)

d. Detonating cord shall be handled and used with care to avoid damaging or severing the cord during and after loading and hooking up. (7-1-97)

e. Detonating cord connections shall be competent and positive in accordance with approved and recommended methods. Knot type or other cord to cord connections shall be made only with detonating cord in which the explosive core is dry. (7-1-97)

f. All detonating cord trunk-lines and branch-lines shall be free of loops, kinks, or angles that direct the cord back toward the oncoming line of detonation. (7-1-97)

g. All detonating cord connections shall be inspected before firing the blast. (7-1-97)

h. When detonating cord millisecond delay connectors or short interval delay electric blasting caps are used with detonating cord, the practice shall conform strictly to the manufacturer's recommendations. (7-1-97)

i. When connecting a blasting cap or an electric blasting cap to detonating cord, the cap shall be taped or otherwise attached securely along the side or the end of the detonating cord, with the end of the cap containing the explosive charge pointing in the direction in which the detonation is to proceed. (7-1-97)

j. Detonators for firing the trunk line shall not be brought to the loading area nor attached to the detonating cord until everything else is in readiness for the blast. (7-1-97)

11. Firing the Blast: (7-1-97)

a. A code of blasting signals equivalent to Table-320.11-A, shall be posted on one (1) or more conspicuous places at the operation, and all employees shall be required to familiarize themselves with the code and conform to it. Danger signs shall be placed at suitable locations. See sub-section 320.03 and Figure 320.03-B of this section. (7-1-97)

<table>
<thead>
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b. Before a blast is fired, "Fire In The Hole" shall be shouted, a loud warning signal shall be given by the blasted in charge, who has made certain that all surplus explosives are in a safe
place and all employees, vehicles, and equipment are at a safe distance, or under sufficient cover. (7-1-97)

c. Flaggers shall be safely stationed on highways which pass through the danger zone so as to stop traffic during blasting operations. (7-1-97)

d. It shall be the duty of the blasted to fix the time of blasting. (7-1-97)

12. Inspection After Blasting: (7-1-97)

a. Immediately after the blast has been fired, the firing line shall be disconnected from the blasting machine, or where power switches are used, they shall be locked open or in the "OFF" position. (7-1-97)

b. Sufficient time shall be allowed for fumes to leave the blasted area before returning to the shot. (7-1-97)

c. The person who initiated the shot shall inspect the blast site for explosives or explosive residue. (7-1-97)

13. Misfires: (7-1-97)

a. If a misfire is found, the blasted shall provide proper safeguards for excluding all employees from the danger zone. (7-1-97)

b. No other work shall be done except that necessary to remove the hazard of the misfire and only those employees necessary to do the work shall remain in the danger zone. (7-1-97)

c. No attempt shall be made to extract explosives from any charged or misfired hole; a new primer shall be put in and the hole reblasted. If refiring of the misfired hole presents a hazard, the explosives shall be removed by washing out with water or, where the misfire is under water, blown out with air. (7-1-97)

d. Where the misfire involves a cap and fuse, all persons shall remain away from the charge for at least one (1) hour. (7-1-97)

e. Misfires shall be handled under the direction of the person in charge of the blasting. (7-1-97)

f. All wires shall be carefully traced and a search made for unexploded charges. (7-1-97)

g. No drilling, digging, or picking shall be permitted until all missed holes have been detonated or the authorized representative has approved that work can proceed. (7-1-97)

321.--329 (RESERVED)