PART H
AVALANCHE CONTROL

WAC 296-52-800 Avalanche control.

(1) General.

(a) During periods of high avalanche danger, areas in avalanche paths shall not be opened for use until trained personnel have evaluated conditions and determined whether avalanche control work is necessary.

(b) When avalanche control work is deemed necessary, areas in the potential avalanche path shall be closed until the risk of avalanches has been reduced to a level determined appropriate by trained personnel.

(c) An avalanche shall not be purposely released until the avalanche path and potential runout zone are clear of personnel and vehicles.

(d) Avalanche guards, signs, and/or barricades shall be positioned at normal entrances to the avalanche path if there is any chance that personnel and vehicles will enter the danger zone during intentional release activities.

(e) During very unstable snow conditions, release of one avalanche may trigger sympathetic releases over a wide area. Avalanche workers shall consider such possibility and clear the appropriate areas of personnel and vehicles.

(2) Personnel and equipment.

(a) The avalanche control crew shall be adequately trained and physically capable for tasks which can be anticipated in their individual job assignments.

(b) No person shall accept or be given a job assignment which is beyond the individual's physical ability or training.

(c) On-slope assignments which include potential exposure to avalanche hazards shall only be conducted by fully qualified and fully equipped control crew members.

(d) The control crew may be split up into smaller groups (teams) to work on multiple areas simultaneously provided that each team consists of at least 2 qualified members.

(e) Each avalanche control crew or team shall have one or more designated rescue coordinators as is deemed necessary to maintain communications. Compliance with this requirement may be achieved by designating control crew teams to serve as each others' rescue coordinator provided that the teams are reasonably proximate to each other and do in fact maintain frequent communications.

(f) Each avalanche control crew member shall be equipped for continuous 2-way communications to the avalanche crew coordinators.

(g) The avalanche crew or teams shall not be assigned to on-slope areas where they can’t maintain communications with their designated coordinator. This requirement may be met by the use of a relay person; however, if any team completely loses communications, they shall return directly to base via the safest route available.

(h) Each person on an avalanche control team shall be equipped with a shovel and an electronic transceiver before commencing on-slope control work. The transceiver shall be in the transmit position whenever personnel are performing on-slope job assignments.

WAC 296-52-800 (Cont.)

(3) Avalanche rescue plan. All employers with avalanche control personnel shall have a written avalanche rescue plan. The plan shall require:

(a) All rescue personnel who will be assigned to on-slope activities shall:

(i) Be competent skiers;

(ii) Have a current first-aid card;

(iii) Be thoroughly trained in the rescue plan details;

(b) A specific list of required equipment for rescue crew personnel including:

(i) Probes;

(ii) Belaying rope;

(iii) Shovels;

(iv) 2-way communication radios;

(v) Electronic transceivers;

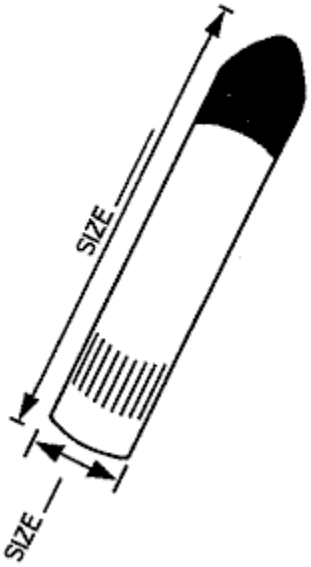
(c) A list of rescue equipment locations;

(d) Specific rescue procedures to be followed.

WAC 296-52-802 Acceptable warning signs for typical avalanche control devices (duds).

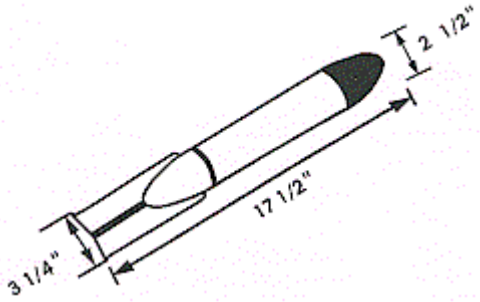
DANGER
EXPLOSIVES ON THE MOUNTAIN

Unexploded warheads, projectiles, or hand charges used in avalanche control may be found in target areas or in avalanche runout zones.

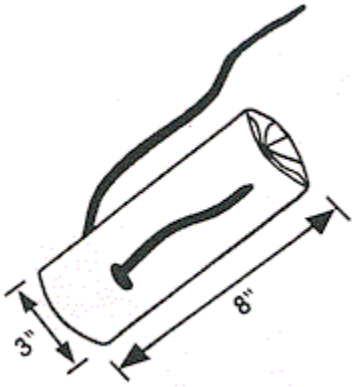


UNEXPLODED WARHEADS
WARHEAD MAY BE DISTORTED
FROM IMPACT.

WAC 296-52-802 (CONT.)



AVALAUNCHER PROJECTILE
RED OPAQUE BODY,
RED TRANSLUCENT FINS.



DYNAMITE HANDCHARGE
COLORED WRAPPING,
WILL USUALLY HAVE FUSE.

WAC 296-52-802 (Cont.)

If you find an unexploded (dud) charge, do the following:

1. Don't disturb or touch!
2. Mark the location within 5 to 10 feet.
3. Immediately report the location.

WAC 296-52-803 Storage, makeup, and use of explosives for avalanche control blasting.

(1) General.

(a) The storage, handling, and use of explosives and blasting agents used in avalanche control practices shall comply with this chapter and chapter 70.74 RCW.

(b) The minimum requirements published in chapter 296-52 WAC, Part H, shall be applicable to the storage, handling, and use of explosives and blasting agents in the endeavor of avalanche control.

(2) Management responsibility.

(a) Explosives and blasting agents shall not be stored in any regularly occupied areas or buildings except in compliance with this chapter.

(b) Explosives and blasting agents shall not be assembled or combined to form armed charges in any regularly occupied area or building except in compliance with this chapter.

(3) Personnel.

(a) Only fully qualified and licensed blasters shall be permitted to assemble or arm explosives components.

(b) Training shall include avalanche blasting experience so that the problems encountered in cold weather blasting are known factors.

(c) All training activities shall be conducted under the attended supervision of a fully qualified and licensed blaster.

(4) General requirements.

(a) Initiating systems for hand-placed or hand-thrown charges.

(i) The ignition system on single-unit hand-thrown charges shall consist of a nonelectric cap or shock tube and approved initiation system.

(ii) Multiple units combined to form a single hand-placed charge may use the above system, an approved detonating cord system or shock tube system. No other ignition system shall be permissible without specific approval by the department.

(iii) When using a shock tube system, after all charges are in place, connected to the shock tube trunk line and ready for initiation, the shock tube initiation tool shall be attached for firing.

(b) Multiple charge blasts.

(i) Detonating cord or shock tube system shall be used in lieu of blasting wire to connect multiple charge blasts.

(ii) When using detonating cord systems, after all charges are placed, connected to the detonating cord, and the charges are ready to be ignited, a safety fuse and cap shall be attached to the detonating cord. A fuse igniter may then be attached to ignite the safety fuse.

WAC 296-52-802 (Cont.)

(c) Blasting caps shall be no larger than No. 8 except when recommended by the explosives manufacturer for a particular explosive used within a specific application.

(d) Electric blasting caps aren't permitted.

(e) Safety fuse and shock tube.

(i) Only the highest quality safety fuse with excellent water resistance and flexibility shall be used.

(ii) Shock tube systems may be used in place of fuse cap and safety fuse systems.

(f) Fuse length.

(i) Safety fuse length shall be selected to permit the control team adequate escapement time from the blast area under all reasonable contingencies (falls, release of bindings, etc.)

(ii) In no instance shall a fuse length with less than 90 seconds burn time be permitted.

(iii) The burn time of each roll of safety fuse shall be checked prior to use.

(iv) Checked rolls shall be marked with the tested burn time.

(v) It's recommended that all hand charges be prepared for ignition with either one safety fuse and igniter or a double safety fuse and igniters.

Note: *Standard safety fuse burns at a rate of 40 to 55 seconds at 2500 meters elevation. This rate equates to approximately 24 inches fuse length for 90 second hand charge fuses at normal avalanche control elevations, but fuse burn rate should be checked before each use.*

(5) Explosives.

(a) Explosives chosen shall have a safe shelf life of at least one operating season in the storage facilities in which it will be stored.

(b) Explosives chosen shall have excellent water and freezing resistance.

(c) Industrial primers (or boosters) that consist mainly of TNT or gelatin are the recommended explosives.

(6) Transporting explosives and hand charges.

(a) Hand charges or explosives components shall be transported in approved type avalanche control packs, in United States Department of Transportation-approved shipping containers or in licensed magazines.

(b) Criteria for avalanche control packs.

(i) The pack shall be constructed of water resistant material.

(ii) Packs shall be constructed with sufficient individual compartments to separate hand charges or explosives components from tools or other equipment or supplies which may be carried in the pack.

(iii) Each compartment used for hand charges or explosives components shall have an independent closure means.

(iv) If fuse igniters will be permitted to be carried on the avalanche control pack, a separate compartment with individual closure means shall be attached to the outside of the exterior of the pack.

WAC 296-52-803 (Cont.)

(c) Use of avalanche control packs.

(i) Packs shall be inspected daily, prior to loading, for holes or faulty compartment closures. Defective packs shall not be used until adequately repaired.

(ii) Tools or other materials shall not be placed in any compartment which contains hand charges or explosives components.

(iii) Fuse igniters shall never be placed anywhere inside the pack when the pack contains hand charges or other explosives components.

(iv) Fuse igniters may be carried in a separate compartment attached to the outside of the pack exterior but preferably in a compartment attached to the front of the carrying harness. Another acceptable alternative is to carry the igniters in a jacket pocket completely separate from the pack.

(v) Hand charges or explosives components shall not be stored or left unattended in avalanche control packs. Unused hand charges shall be promptly disassembled at the end of individual control routes and all components returned to approved storage.

(vi) Individual control team members shall not carry more than 35 pounds of hand charges in avalanche control packs.

(vii) A hand charge or cap and fuse assembly which has a fuse igniter attached shall never be placed in an avalanche control pack for any reason.

(d) Whenever explosives or explosives components are transported in or on any vehicle powered by an internal combustion engine, provisions shall be made to ensure that said explosives or containers can't come into contact with the hot exhaust system.

(e) Hand charges or explosives components shall not be transported in spark-producing metal containers.

(f) Hand charges shall not be transported on public roads and highways when such roads or highways are open to the public. Explosives components shall only be transported on public roads or highways in compliance with United States Department of Transportation regulations.

WAC 296-52-805 Hand charge makeup methods. General. The department shall recognize 2 permissible methods concerning hand charges for avalanche control blasting. The descriptions and requirements for each method are contained in this section.

Note: *A well-designed and constructed hand charge makeup room can enhance the correct assembly of explosive components and reduce the incidences of misfires from incorrect makeup or moisture.*

(1) Method I. Makeup at the blast site.

(a) The ignition system shall consist of a nonelectrical blasting cap and highest quality water resistant safety fuse, or detonating cord, assembled as recommended by the manufacturer.

(b) Detonating cord shall be used to connect separated multiple-charge blasts.

(c) No other ignition system shall be permissible on hand-placed or hand-thrown avalanche control charges unless variance is granted by the department.

(d) Caps shall be installed on correct length fuses prior to being transported out onto control routes.

(e) Caps shall only be crimped with a crimper tool approved for that purpose.

WAC 296-52-805 (Cont.)

(f) Assembling caps and fuses shall be done in a warm, dry, well-lighted environment. The location used for assembly shall not have flammable fuels, flammable gases, or explosives present where accidental detonation of the caps could create a secondary ignition or detonation hazard.

(g) Each cap shall be protected by a styrofoam shield or the equivalent before being placed in an avalanche control pack for transportation.

(h) A fuse igniter shall never be attached to a fuse until the fuse and cap assembly is installed in the hand charge at the blast site and the control crew is fully prepared to ignite the charge.

(i) All 1.1 explosives shall be attended as defined in this chapter at all times when the explosive is out of the Type 1 or 2 storage magazine.

(j) Disbursement of explosive charges from the Type 1 or 2 storage magazine into avalanche control packs shall be done outside the storage magazine. Records shall be maintained for all explosives disbursed.

(k) Caps, cap and fuse assemblies, armed hand charges, or fuse igniters shall not be carried into or stored in a Type 1 or 2 magazine which contains 1.1 explosives.

(2) Method II. Hand charge makeup room. This method is different from method I primarily in that the fuse and cap assembly is installed in the explosive charge while inside a special makeup room. The assembly procedure shall be as follows:

(a) Install caps on correct length fuses with an approved crimper tool before explosives are brought into the makeup room.

(b) The cap and fuse assemblies shall not be combined with explosives to form hand charges until just before the intended time of distribution.

(c) Only nonsparking skewers shall be used to punch holes in an explosives cartridge.

(d) The fuse shall be laced or taped in position after inserting the cap in the charge.

(e) Each hand charge shall be placed in an explosives box or avalanche control pack immediately after assembly is completed.

(f) No spark-producing metal tools shall be used to open explosives containers.

(g) Fuse igniters shall never be attached to a fuse or a hand charge until the hand charge is at the blast site and the control crew is fully prepared to ignite the charge.

(3) Makeup room requirements, procedures.

(a) Construction requirements.

(i) Makeup rooms located in accordance with the American Standard Quantity and Distance Tables for storage shall not require construction of reinforced concrete walls, floors, and doors. All other requirements of this chapter shall be applicable for such facilities.

(ii) Floors and walls. The floor and walls shall be constructed of reinforced concrete not less than eight inches thick. The rebar shall be not less than one-half inch diameter and shall be spaced on 12-inch vertical and horizontal centers. The rebar shall be bent at a 90 degree angle and extend a minimum of 24 inches into the adjoining floor or wall to secure each floor and wall joint.

WAC 296-52-805 (Cont.)

(iii) Roof. The roof isn't limited to specific materials but shall provide both weather protection and standard snow loading protection for the region.

(iv) Access door(s).

(A) If a hinged door mounting is utilized, the hinge shall be mounted on the inside so that the door opens into the makeup room. In the fully closed position, in position to be locked, the door shall be a minimum of 2 inches larger than the access opening on all sides.

(B) If a flush door mounting is utilized, the door shall be mounted with a 2-inch decreasing taper on all sides of both the door and the concrete access opening to form a wedge seal.

(C) If a sliding door mounting is utilized, the mounting apparatus shall be on the inside of the makeup room and the door shall be a minimum of 2 inches larger than the access opening when the door is fully closed.

(D) Makeup room door may be either:

(I) Constructed to the same structural integrity and mounting requirements of (A) through (C) of this subsection; or

(II) Constructed of plywood not less than 2 inches thick and overlaid on the outside with a steel plate not less than one-eighth inch thick.

(III) If a door which complies with (II) of this subsection is used, a berm or barricade shall be installed within 6 feet of the door. The berm or barricade shall extend at least as high as the top of the door and shall be a minimum of 2 feet wider than the door on both sides of the door.

(E) For security purposes, one steel padlock having at least 5 tumblers and a case hardened shackle of at least three-eighths inch diameter is sufficient for locking purposes. Hinges and hasps shall be attached so that they can't be removed from the outside when in the closed position and with the lock in place.

(v) Interior finish. The inside of all makeup rooms shall be finished and equipped to the following minimum requirements:

(A) Construction shall be fire resistant and nonsparking up to the top of the walls. Nails or screws shall be countersunk, blind nailed, or covered.

(B) Lighting shall be by N.E.C. explosion-proof rated fixtures and all wiring shall be in sealed conduit.

(C) Control switches shall be outside the makeup room.

(D) No electrical outlet boxes are permissible inside the room.

(b) Restrictions.

(i) Smoking, matches, open flames, or flame- or spark-producing devices shall not be permitted inside the makeup room.

(ii) Flammable liquids or flammable compressed gases shall not be stored in the makeup room.

(iii) Signs limiting entry to authorized personnel shall be posted on the door(s).

WAC 296-52-805 (Cont.)

(iv) A sign stating the occupancy rules shall be posted inside the makeup room where it's clearly legible upon entering the room. The sign shall post the following rules:

(A) Occupancy shall be restricted to specifically authorized personnel;

(B) Smoking, matches, flame- or spark-producing devices, tools or equipment shall not be permitted in the room at any time when explosives or explosive components are present; and

(C) Flammable fuels or compressed gases shall not be permitted inside the room nor stored within 50 feet of the room.

(v) Heating units shall be limited to:

(A) Forced air systems with the heating unit located outside the room.

(B) Steam systems of 15 psig or less.

(C) Hot water systems of 130°F or less.

(D) The radiant heating coils and piping for steam or hot water systems shall be protected so that explosives can't come into contact with them.

(E) Heating ducts shall be installed so that the hot air doesn't discharge directly on explosives.

(F) The heating system used in a makeup room shall have controls which prevent the ambient room temperature from exceeding 130°F.

(vi) The makeup room shall be equipped with a portable fire extinguisher of at least 2A-20BC rating.

Note: *For additional requirements relating to portable fire extinguishers see WAC 296-800-300.*

(vii) Ventilation.

(A) The makeup room shall be equipped with a ventilation system capable of maintaining a minimum rate of three air exchanges per hour during all times when explosives are present in the room.

(B) Fans and controls shall be located outside the makeup room and shall be of a type approved for this service.

(C) The lighting circuit control shall also activate the ventilation fan and the ventilation fan shall be operated whenever personnel are in the room.

(D) Exhaust ventilation shall be arranged to discharge into outside air, not into an enclosed structure.

(viii) The floor or exterior walls may be constructed with duct openings for heating and ventilation purposes provided that:

(A) Each duct opening isn't greater in volume than 72 square inches;

(B) The combined number of duct openings shall not exceed 3;

(C) Duct openings shall be located within 12 inches of the floor or ceiling;

(D) The exhaust duct opening shall not be located on the wall above the makeup workbench.

WAC 296-52-805 (Cont.)

(c) Practices and procedures.

(i) When explosives are present in the makeup room, entry into the makeup room shall be restricted to trained and authorized personnel.

(ii) The access door(s) to the makeup room shall be kept locked or bolted from the inside while employees are assembling explosives.

(iii) The entire makeup room shall be kept clean, orderly, and free of burnable rubbish.

(iv) Brooms and other cleaning utensils shall not have any spark-producing metal parts if used when explosives are present.

(v) Sweepings and empty explosives containers shall be disposed of as recommended by the explosives supplier.

(vi) Repair activities which utilize spark-producing tools shall not be conducted on any part of the makeup room while explosives are present.

(d) Storage of explosives.

(i) A makeup room shall not be used for the unattended storage of 1.1 explosives.

(ii) A makeup room which meets all requirements of this chapter may contain a Type 3 storage facility, for one thousand or less blasting caps.

(iii) A Type 3 storage facility shall be constructed according to the requirements in WAC 296-52-70030 through 296-52-70040.

(A) A Type 3 storage facility shall be fire resistant and theft resistant. It doesn't need to be bullet resistant and weather resistant if the locked makeup room provides protection from weather and bullet penetration.

(B) Sides, bottoms, and covers shall be constructed of not less than number 12 gauge metal and lined with a nonsparking material.

(C) Hinges and hasps shall be attached so that they can't be removed from the outside.

(D) One steel padlock having at least five tumblers and a case-hardened shackle of at least three-eighths inch diameter is sufficient for locking purposes. The lock and hasp isn't required to be equipped with a steel hood.

(e) Location.

(i) The makeup room shall be located in accordance with the American Quantity and Distance Separation Tables as adopted in chapter 70.74 RCW, Washington State Explosives Act and this chapter except under conditions as indicated in this section.

(ii) Where locating the makeup room in accordance with the quantity and distance separation table is impractical because of bad weather accessibility, rough terrain, or space availability:

(A) Upon application the department will issue a variance enabling location of the makeup room, by mutual agreement, at the safest possible location within the limitation of the individual base area.

WAC 296-52-805 (Cont.)

(B) The safest possible location will be the location most isolated from assembly areas and buildings that are inhabited with application of additional protection measures such as:

(I) Berming.

(II) Locating natural obstructions or buildings that aren't inhabited between the makeup room and assembly areas and buildings that are inhabited.

(III) Limitations on the total quantity of explosives in the makeup room at any one time.

(iii) Makeup rooms designed to hold the boxes of explosives awaiting makeup and the madeup explosives in avalanche control packs awaiting distribution may be located using the total quantity of explosives allowed at the makeup table at any one time as the referenced quantity of explosives provided.

(A) The makeup room is located in accordance with the American Quantity and Distance Separation Tables as adopted in chapter 70.74 RCW, Washington State Explosives Act and this chapter for the referenced quantity of explosives at the makeup table.

(I) This separation shall apply only to human proximity to the makeup room and only at such time as there are explosives in the makeup room.

(II) When the makeup room doesn't contain explosives the separation tables shall not apply.

(B) The concrete walls of the room are designed to withstand the explosion of the total amount of the referenced explosives.

(I) The concrete walls must be constructed in accordance with specifications designed and certified by a licensed engineer; or

(II) The concrete walls must be constructed to the specifications of Department of the Army TM5-1300 "Structures to Resist the Effects of Accidental Explosions" designed to produce walls which will withstand explosion of the referenced quantity explosives.

(C) The boxes of explosives awaiting makeup and the madeup explosives in avalanche control packs awaiting distribution are located behind separate concrete debris barrier walls which will ensure that detonation of these explosives won't occur if the explosives at the makeup table detonate.

(I) The concrete debris barrier wall must be constructed in accordance with specifications designed and certified by a licensed engineer; or

(II) The concrete debris barrier wall must be constructed to the specifications of Department of the Army TM5-1300 "Structures to Resist the Effects of Accidental Explosions" to produce a barrier which won't allow detonation of the explosives awaiting makeup and distribution should the referenced quantity of explosives detonate.

WAC 296-52-805 (Cont.)

(III) Access from the makeup table to the area behind the concrete debris barrier walls shall not be doored. The concrete debris barrier walls will be designed so that the access way from the makeup table to the area behind the concrete debris barrier wall will deflect debris from an explosive blast by inherent design.

(D) The roof shall be designed so that the resistance to an interior explosive blast will be negligible.

(iv) A full containment makeup room may be located anywhere and must meet the following requirements:

(A) The makeup room must be constructed in accordance with a licensed explosive engineer's approved design.

(B) The total amount of explosives in the room at any time must not exceed the design limit of the room.

(C) The makeup room can't be used for storage.

WAC 296-52-807 Avalanche control blasting.

(1) The employer shall ensure that all members of avalanche control blasting crews are competent ski mountaineers in good physical and mental condition.

(2) Each avalanche control blasting crew or team shall consist of a qualified and licensed blaster and at least one trained assistant.

(3) Untrained personnel may accompany blasting crews for training purposes but shall not participate in actual firing of charges until trained and authorized.

(4) The blaster in charge of each crew or team shall be responsible for all phases of preparation and placement of charges.

(5) Avalanche control blasting should be conducted during daylight hours whenever possible.

(6) Escape route.

(a) The avalanche control crew or team shall preplan the escape route before igniting any charge.

(b) The escape route shall be as safe and foolproof as possible and shall culminate behind a terrain barrier or at least 100 feet from the blast site by the time of detonation.

(7) Hand-thrown charges.

(a) A blaster shall only work with one charge at a time.

(b) Before attaching the igniter, the blaster must:

(i) Be at the start of the escape route;

(ii) Check the runout zone for personnel;

(iii) Check the blast area for personnel.

WAC 296-52-807 (Cont.)

(c) After the blaster attaches and activates the igniter:

(i) The blaster shall check to see that the fuse is ignited;

(ii) If the fuse did not ignite, no attempt shall be made to relight it. The blaster shall immediately remove the fuse cap from the charge to sidearm it. The fuse cap shall be treated as a misfire and be put in an appropriately safe place separate from all other explosive components. It shall not be approached for at least 30 minutes, after which time it shall be properly disposed of;

(iii) The practice of double fusing hand charges shall be allowed. An attempt shall be made to light both fuses. If only one of the 2 fuses lights, the charge shall be deployed as normal;

(iv) As soon as the fuse is ignited, the blaster shall promptly throw the charge into the target area;

(v) All personnel shall be in a safe place when the charge detonates.

(d) Where hand-thrown charges will slide down the hill on hard frozen snow or ice surface, charges shall be belayed with light cord.

(8) Hand charges thrown from ski lifts or trams.

(a) The number of charges thrown from ski lifts or trams shall be kept to a minimum.

(b) The lift operating crew shall be informed of the blasting plans.

(c) The lift crew shall stand by for emergency procedures such as transfer of lift onto auxiliary power, evacuation, etc.

(d) The lift crew and the blaster in charge shall be in direct radio contact at all times during the blasting operations.

(e) Only the avalanche control blasting crew and the essential lift operating personnel shall be on a lift or tram during blasting operations.

(f) The avalanche control blasting crew shall be traveling up slope when a charge is thrown.

(g) A charge shall always be thrown down slope and to the side, away from towers, haulropes and other equipment or facilities.

(h) The minimum distance from the blast target to the closest point of the lift shall be 60 feet.

(i) Hand charges shall not exceed 4.5 pounds of TNT equivalent.

(j) Fuses shall be timed and cut to such length that all personnel on the lift will have moved a minimum of 300 feet from the blast target by the time of detonation.

(k) Precautions shall be taken to avoid tossing charges into any of the lift equipment, moving chairs, cables, towers, etc.

(9) Aerial avalanche control blasting.

(a) Blasting from aircraft shall require a written program approved by the Federal Aviation Administration and the director, or designee of the department of labor and industries.

(b) A written program shall include the following:

(i) Written procedures to be followed including provisions for safety in the avalanche runout zone and emergency rescue plans.

(ii) Hand charge makeup and handling procedures.

WAC 296-52-807 (Cont.)

(iii) The type of explosives to be used.

(iv) The qualifications of all avalanche control personnel involved in aerial blasting must meet the requirements of WAC 296-52-64030.

(v) The specific locations where aircraft blasting is to take place.

(c) An aerial avalanche control team shall be established consisting of (at minimum) a pilot, a blaster in charge and an observer/controller.

(d) Blasting from an aircraft shall require the blaster in charge to be a licensed avalanche blaster with an endorsement for aerial blasting. The blaster in charge will be on board during each aerial blasting mission.

Note: *Blasting from aircraft should only be used when it's determined that conventional methods aren't the safest means to mitigate the existing avalanche hazard.*

(10) Avalauncher requirements.

(a) Management shall develop a written training program and ensure that every person who will be authorized to work on an avalauncher firing team is thoroughly trained. Training shall include:

(i) All operating instructions;

(ii) Safety precautions;

(iii) Emergency procedures;

(iv) Securing requirements for the equipment.

(b) Each employer shall have a list of authorized operators listed on a posted operator's list.

(c) Only trained and authorized personnel shall be permitted to point and fire an avalauncher with explosive rounds.

(d) During firing of explosive loaded rounds, the firing team shall consist of 2 qualified operators and not more than one adequately trained helper.

(e) Operators must have a current state blasting license.

(f) Each operator shall individually check the elevation, pointing and pressure settings of the gun before each shot is fired.

(g) Operators shall attempt to determine and record whether or not each round which is fired actually explodes on contact.

(h) The approximate location of all known misfired explosives (or duds) shall be recorded.

(i) Initial shooting coordinates for each avalauncher mount shall be made during periods of good visibility.

(j) Testing shall include test firing in various wind conditions.

(k) The correct coordinates for the various conditions encountered shall be carefully recorded.

(l) When spotter personnel are used in the target area, shooting shall be conducted with nonexplosive projectiles.

(m) Firing of explosive avalauncher rounds shall only be conducted when personnel aren't in the target area.

WAC 296-52-807 (Cont.)

(n) The avalauncher apparatus shall be stored in a nonfunctional condition when not in use. This shall be accomplished by:

(i) Locking out the firing mechanism or gas source in accordance with the lockout requirements of this chapter; or

(ii) Disassembly of functional components rendering the gun inoperable and separate storage of components removed; or

(iii) Removal of the entire gun to secure storage.

(o) With established avalauncher mounts, each autumn when reinstalling guns, the following procedures shall be accomplished before the gun is considered operable:

(i) All components shall be carefully inspected by qualified personnel;

(ii) After assembly and installation, the gun shall first be test fired using a nonexplosive projectile;

(iii) The established firing coordinates shall be checked by test firing.

(11) Cornice control requirements.

(a) Cornice buildup hazards shall be evaluated regularly by qualified personnel, particularly after heavy snowfall periods which are accompanied by high wind or other snow transport weather conditions.

(b) Cornice hazards shall be controlled whenever the buildup appears to offer potential hazard to areas accessible by personnel.

(c) The control team shall establish the tension breakline of the cornice roof as accurately as conditions permit before starting any other control work on the cornice.

(d) The tension breakline shall be marked when necessary.

(e) Small lightly packed cornices may be kicked off with a ski, ski pole, or shovel by an unbelayed control team member if the ridgeline can be clearly established and all work can be done from the safe side of the ridgeline.

(f) When working along an anticipated cornice breakline, control team members shall retreat back from the breakline to change work positions rather than traverse along the breakline.

(g) The following factors shall be given careful consideration before commencing control activities on any relatively larger cornice:

(i) The older and larger a cornice becomes, the more densely it compacts. Densely packed cornices release into larger blocks offering a higher level of danger to an extended runout zone. The control team leader shall therefore take highest level of precautions to assure that the runout zone is clear of personnel;

(ii) Larger size cornices result in increased suspended weight and leverage which may cause the breakline release fracture to occur behind the actual ridgeline. The actual ridgeline may also be obscured by the simple mass of larger cornices. Control team members shall stay off the cornice roof and must be protected by a secure belay when working near the suspected breakline;

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(iii) All large cornices shall be released by explosives. Explosives shall be transported, made up and fired in accordance with the following requirements:

(A) The ignition system for single hand charge blasts shall be safety fuse and cap or a system approved by the department.

(B) Detonating cord or shock tube shall be used to connect multiple charge blasts.

(C) When detonating cord is used, one end shall be securely anchored where premature cornice collapse won't disturb the anchor. The fuse and cap shall be attached to the free end of the detonating cord after all charges are connected to the detonating cord.

(D) Safety fuse length shall be sufficient to permit adequate escapement time for all personnel from the area influenced by the blast. Safety fuse shall be not less than three feet long, approximately 2 minutes and 20 seconds, in all instances.

(h) Cornice control work on large cornices shall be conducted during daylight hours and preferably during favorable weather conditions. As a minimum, clear visibility shall exist across the full length of any cornice which the control team is attempting to release.

(12) Belaying practices.

(a) Belay rope shall be standard 11 mm mountaineering rope or the equivalent.

(i) Belay rope shall be inspected at not less than 30-day intervals and maintained in excellent condition.

(ii) Defective belay rope shall not be used for belaying purposes.

(b) Adequate trees or other suitable natural belay anchors shall be used in preference to a human belay anchor when such natural anchors are available.

(c) The belay anchor position shall be as near to ninety degrees from the tension breakline as the terrain conditions will permit.

(d) With either a natural belay anchor or human belay anchor, the belay line shall be tended to keep slack out of the line.

(e) When either the belayed person or belay anchor needs to change position, the belayed person shall retreat back from the cornice to a safe position until the belay anchor is reestablished.

(f) When a human belay anchor is used:

(i) The belay anchor person shall establish the anchor position as far back away from the cornice as conditions permit;

(ii) The anchor person shall remain in a seated position with their legs pointed toward the belayed person until such time as the belayed person has retreated back from the cornice to a position considered to be safe.

WAC 296-52-809 Retrieving misfired explosives (duds).

(1) The following requirements shall apply to all kinds of avalanche control blasting:

(a) Each person who ignites a charge or propels a charged projectile with any kind of apparatus shall note whether or not the charge actually detonates.

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(b) A conscientious effort shall be made to promptly retrieve any misfired explosives.

(i) If conditions make it impractical or dangerous to promptly retrieve a misfired explosive, a search shall be conducted as soon as conditions permit.

(ii) Any area which contains a misfired explosive shall be closed to entry to all personnel except the search team until such time as the area has been searched and pronounced safe by the designated search leader.

(c) When searching for a misfired explosive on an uncontrolled avalanche slope (a slope which hasn't released), the procedures used shall be consistent with good mountaineering practices.

(d) A hand charge misfire shall not be approached for at least 30 minutes.

(e) A hand charge or avalauncher misfired explosive may be blown up with a secondary charge where they are found or may be disarmed at that location by fully trained and qualified personnel.

(f) Military warhead misfired explosives shall not be moved. They shall be blown up where they are found by secondary charges except that trained military personnel may disarm and transport such misfired explosives when approved by the governmental branch having jurisdiction.

(2) Records.

(a) Accurate records shall be maintained for every explosive device which doesn't detonate.

(b) Misfired explosives records shall include the following information:

(i) The suspected location;

(ii) A description of the misfired explosive;

(iii) The date the misfired explosive was lost;

(iv) The date the misfired explosive was found and disposed of.

(3) Misfired explosive frequency.

(a) Misfired explosive frequency should be maintained below one misfired explosive for every 500 detonating attempts.

(b) All employers who don't maintain a misfired explosive frequency below one misfired explosive per 500 detonation attempts shall investigate all aspects of the blasting program and take prompt corrective actions as indicated.

(4) Misfired explosives warning signs.

(a) Requirements for warning signs. Ski area operations which use any form of explosive device for avalanche control shall display warning, information placards and/or signs as found in this chapter, Part H.

(b) Signs shall be posted at readily visible locations and in such a manner as to give both employees and the public ample opportunity to be informed of the potential existence of misfired explosive avalanche charges. Locations may include but aren't limited to:

(i) Ticket sales and lift loading areas;

(ii) Food and beverage service facilities;

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(iii) Restrooms and locker rooms;

(iv) Safety bulletin boards;

(v) Along general access routes.

(c) Signs shall be distinctive in appearance from the surrounding background where they are posted.

(d) Signs shall be maintained in legible condition.

(e) Signs shall include the following information:

(i) The word "WARNING" or "DANGER" at the top of the sign in the largest lettering on the sign;

(ii) The words "EXPLOSIVES ON THE MOUNTAIN";

(iii) A colored pictorial illustration which also provides information on dimensions of each type of explosive device used in the area;

(iv) The sign wording shall conclude with specific instructions to be followed by anyone who locates an unexploded explosive device.