

CHANGES APPROVED DURING THE MEETING OF JUNE 28, 2018

PART H

AVALANCHE CONTROL

WAC 296-52-800 Avalanche control. (1) General.

(a) ~~During periods of high~~ Operations which are licensed for explosive avalanche ~~danger, areas in avalanche paths must not be opened for use until~~ control ~~shall~~ must have trained and designated personnel have ~~for the~~ evaluated ~~ion~~ conditions and ~~determined whether~~ of avalanche control work is necessary hazard. An avalanche control plan ~~must~~ describe the methods and procedures for such hazard evaluation and any mitigation.

Changes in (a) approved 6-28-2018

(b) ~~When~~The avalanche control plan ~~work is deemed necessary, areas in the potential avalanche path must be closed until the~~ ~~shall~~ must describe how potentially hazardous areas are managed to decrease risk of avalanches has been reduced to a level determined appropriate by ~~trained~~ to workers and the general public. These techniques may include: closure, hazard reduction, warning signs, and monitoring. Designated personnel ~~shall~~ must annually review and update plans, policies, and procedures. The plan will state the date last updated.

Define "periodically" or, bare minimum frequency? cjc

Changes in (b) approved 6-28-2018

~~shall~~ (c) ~~An avalanche must not be purposely released until the avalanche path and potential runout zone are clear of personnel and vehicles~~ Operational records must be kept which describe

the personnel, techniques, and outcomes, of all explosive hazard reduction activities. These records shall must be maintained for a minimum of three (3) years.

Changes in (c) approved 6-28-2018

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

Changes in (d) approved 6-28-2018

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

(2) Personnel and equipment.

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

(b) No person must 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 must only be conducted by fully qualified and fully equipped control crew members; or, trainees under direct supervision of fully qualified personnel.

Commented "And trainees under direct supervision of fully qualified personnel." 06-14-2018

Changes in (c) approved 6-28-2018

(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 two qualified members.

(e) Each avalanche control crew or team must 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 must be equipped for continuous two-way communications to the avalanche crew coordinators.

(g) The avalanche crew or teams must not be assigned to on-slope areas where they cannot 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 must ~~return directly to base via the safest route available~~ follow the operation's safety plan for loss of communication.

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

Per John Stimeris, "not always possible to return to base/may not have "base." 06-14-2018

Changes in (g) approved 6-28-2018

: Changes in (h) approved 6-28-2018

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

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

- ~~(i) Be competent skiers;~~
- ~~(ii) Have a current first aid card;~~
- ~~(iii) Be thoroughly trained in the rescue plan details;~~ Initial and

at least annual review by all avalanche control personnel, and the date last updated.

: Changes in (a) approved 6-28-2018

(b) ~~A specific list of required equipment~~ Training guidelines for rescue ~~crew personnel including~~ and operations.

- ~~(i) Probes;~~
- ~~(ii) Belaying rope;~~
- ~~(iii) Shovels;~~
- ~~(iv) Two-way communication radios;~~
- ~~(v) Electronic transceivers;~~

(c) Training, physical requirements, and required equipment for rescue responders.

(~~d~~) ~~A list of rescue e~~ Equipment cache locations and cache contents;

~~(d) Specific rescue procedures to be followed.~~ A portion of the plan must address integration with local emergency management systems and the potential emergency care and evacuation of victims.

██████████: Changes in (e) approved 6-28-2018

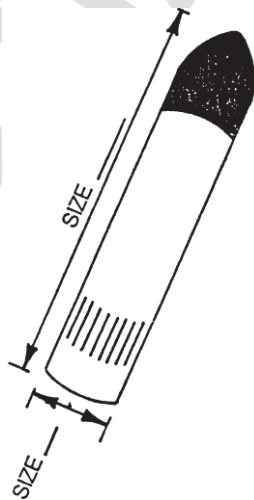
[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. WSR 17-16-132, § 296-52-800, filed 8/1/17, effective 9/1/17; WSR 06-19-074, § 296-52-800, filed 9/19/06, effective 12/1/06.]

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

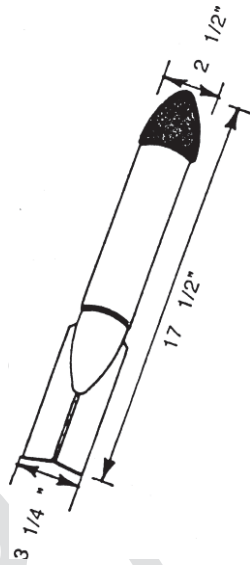
DANGER

EXPLOSIVES ON THE MOUNTAIN

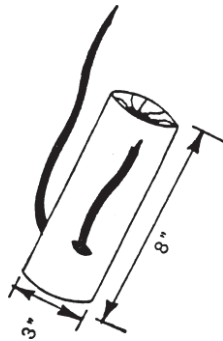
Unexploded warheads, projectiles, or hand charges used in avalanche control may be found in target areas or in avalanche runout zones.



UNEXPLODED WARHEADS
WARHEAD MAY BE DISTORTED
FROM IMPACT.



AVALAUNCHER PROJECTILE
RED OPAQUE BODY,
RED TRANSLUCENT FINS.



DYNAMITE HANDCHARGE

COLORED WRAPPING,

WILL USUALLY HAVE FUSE.

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

1. Do not disturb or touch!
2. Mark the location within 5 to 10 feet.
3. Immediately report the location.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060.
WSR 06-19-074, § 296-52-802, filed 9/19/06, effective 12/1/06.]

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 must comply with this chapter and chapter 70.74 RCW.

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

(2) Management responsibility.

2018/06-14-
Changes approved 6-28-2018

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

(b) Explosives and blasting agents must 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 must be permitted to assemble or arm explosives components.

(b) Training must include avalanche blasting experience so that the problems encountered in ~~old~~inclement weather blasting are known factors.

(c) All training activities must 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 must 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

“Inclement-cold and/or wet weather as encountered in the PNW” 6-14-2018
Changes in (b) approved 6-28-2018

tube system. No other ignition system must 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 ~~must~~may be attached for firing.

06-14-2018
Changes in (iii) approved 6-28-2018

(b) Multiple charge blasts.

(i) Detonating cord or shock tube system must 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 must be attached to the detonating cord. A fuse igniter may then be attached to ignite the safety fuse.

(c) Blasting caps must 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 are not permitted.

(e) Safety fuse and shock tube.

(i) Only the highest quality safety fuse with excellent water resistance and flexibility must 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 must 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 must a fuse length with less than ninety seconds burn time be permitted.

(iii) The burn time of each roll or lot of safety fuse must be checked prior to initial every use, or when assembling cap/fuse or at least annually.

Commented [REDACTED] "Check the burn time prior to every use, or when assembling cap/fuse?" 06-14-2018 [REDACTED] Changes approved 6-28-2018

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

(v) It is 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 ~~forty to fifty five~~ 40-55 seconds per foot at two thousand five hundred 2500 meters elevation. This rate equates to approximately twenty four inches fuse length for ninety second hand charge fuses at normal avalanche control elevations, b But fuse burn rate should be checked ~~before prior each to every~~ use.

Commented [REDACTED] "Checked prior to every use?" 06-18-2018 [REDACTED] Changes approved 6-28-2018

(5) Explosives.

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

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

(c) ~~Industrial primers (or boosters) that consist mainly of TNT or gelatin are the recommended~~ Explosives used for avalanche control shall be chosen for suitability and performance in their environment of use.

(6) Transporting explosives and hand charges.

██████████: Changes in (c) approved 6-28-2018

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

██████████: Changes in (a) approved 6-28-2018

(b) Criteria for avalanche control packs.

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

(ii) Packs must ~~be constructed with sufficient individual compartments to accommodate the separate~~ separation of hand charges or explosives components from tools or other equipment ~~or supplies which may be carried in the pack~~ by means of integrated compartments, or the use of separate compartments constructed of similar material.

██████████: Changes in (ii) approved 6-28-2018

(iii) Each compartment used for hand charges or explosives components must 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 must be attached to the outside of the exterior of the pack.

(c) Use of avalanche control packs.

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

: Changes in (i) approved 6-28-2018

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

(iii) Fuse igniters must 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 must not be stored or left unattended in avalanche control packs. Unused hand charges must be promptly disassembled at the end of individual control routes and all components returned to approved storage.

(vi) Individual control team members must not carry more than thirty-five pounds of hand charges in avalanche control packs.

(vii) A hand charge or cap and fuse assembly which has a fuse igniter attached must 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 must be made to ensure that said explosives or containers cannot come into contact with the hot exhaust system.

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

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

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. WSR 17-16-132, § 296-52-803, filed 8/1/17, effective 9/1/17; WSR 06-19-074, § 296-52-803, filed 9/19/06, effective 12/1/06.]

WAC 296-52-805 Hand charge makeup methods. General. The department must recognize two 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 ~~1~~1. Makeup at the blast site.

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

Per John Stimberis "Does shock tube need to be added here?" 06-14-2018/4

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

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

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

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

(f) Assembling caps and fuses must be done in a warm, dry, well-lighted environment. The location used for assembly must 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 must be physically protected ~~by a styrofoam shield or the equivalent~~ from impact, crush and shock before being placed in an avalanche control pack for transportation.

(h) A fuse igniter must 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 must 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 must be done outside the storage magazine. Records must be maintained for all explosives disbursed.

(k) Caps, cap and fuse assemblies, armed hand charges, or fuse igniters must 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 must 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 must not be combined with explosives to form hand charges until just before the intended time of distribution.

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

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

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

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

(g) Fuse igniters must 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 must not require construction of reinforced concrete walls, floors, and doors. All other requirements of this chapter must be applicable for such facilities.

(ii) Floors and walls. The floor and walls must be constructed of reinforced concrete not less than eight inches thick. The rebar must not be less than one-half inch diameter and must be spaced on twelve-inch vertical and horizontal centers. The rebar must be bent at a ninety

degree angle and extend a minimum of twenty-four inches into the adjoining floor or wall to secure each floor and wall joint.

(iii) Roof. The roof is not limited to specific materials but must 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 must 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 must be a minimum of two inches larger than the access opening on all sides.

(B) If a flush door mounting is utilized, the door must be mounted with a two-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 must be on the inside of the makeup room and the door must be a minimum of two 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 two 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 must be installed within six feet of the door. The berm or barricade must extend at least as high as the top of the door and must be a minimum of two feet wider than the door on both sides of the door.

(E) For security purposes, 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. Hinges and hasps must be attached so that they cannot 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 must be finished and equipped to the following minimum requirements:

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

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

(C) Control switches must 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 must not be permitted inside the makeup room.

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

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

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

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

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

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

(v) Heating units must 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 must be protected so that explosives cannot come into contact with them.

(E) Heating ducts must be installed so that the hot air does not discharge directly on explosives.

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

(vi) The makeup room must 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 must 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 must be located outside the makeup room and must be of a type approved for this service.

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

(D) Exhaust ventilation must 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 is not greater in volume than seventy-two square inches;

(B) The combined number of duct openings must not exceed three;

(C) Duct openings must be located within twelve inches of the floor or ceiling;

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

(c) Practices and procedures.

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

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

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

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

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

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

(d) Storage of explosives.

(i) A makeup room must 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 must be constructed according to the requirements in WAC 296-52-70030 through 296-52-70040.

(A) A Type 3 storage facility must be fire resistant and theft resistant. It does not 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 must be constructed of not less than number twelve gauge metal and lined with a nonsparking material.

(C) Hinges and hasps must be attached so that they cannot 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 is not required to be equipped with a steel hood.

(e) Location.

(i) The makeup room must 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.

(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 are not 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 must 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 does not contain explosives the separation tables must 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 makeup explosives in avalanche control packs awaiting distribution are located behind separate concrete debris barrier walls which will ensure that detonation of these explosives will not 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 will not allow detonation of the explosives awaiting makeup and distribution should the referenced quantity of explosives detonate.

(III) Access from the makeup table to the area behind the concrete debris barrier walls must 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 must 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 cannot be used for storage.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. WSR 17-16-132, § 296-52-805, filed 8/1/17, effective 9/1/17; WSR 06-19-074, § 296-52-805, filed 9/19/06, effective 12/1/06.]

WAC 296-52-807 Avalanche control blasting. (1) ~~You~~The employer must ensure that all members of avalanche control blasting crews are ~~competent ski mountaineers~~ in good physical and mental condition.

: Changes in (1) approved 6-28-2018

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

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

(4) The blaster in charge of each crew or team must be responsible for all phases of preparation and placement of charges. The blaster in charge must keep a record of each blast with the following:

- (a) Name of blaster
- (b) Location of blast
- (c) Date and time of blast
- (d) Type of explosive
- (e) Type of initiation

[REDACTED]: Changes in (4) approved 6-28-2018

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

[REDACTED]: Changes in (5) approved 6-28-2018

(6) Escape route.

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

(b) The escape route must be as safe and foolproof as possible and must culminate behind a terrain barrier or ~~at least one hundred feet from the blast site by the time of detonation~~out of the area of influence.

[REDACTED]: Changes in (b) approved 6-28-2018

(7) Hand-thrown charges.

(a) A blaster must 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.

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

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

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

(iii) The practice of double fusing hand charges must be allowed.

An attempt must be made to light both fuses. If only one of the two fuses lights, the charge must be deployed as normal;

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

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

[REDACTED]: Changes in ii) approved 6-28-2018

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

Change of "will" to "may" approved 6-28-2018

: Change from "must" to "should" NOT approved. Further discussion needed. 6-28-2018.

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

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

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

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

(d) The lift crew and the blaster in charge must 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 must be on a lift or tram during blasting operations.

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

(g) A charge must 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 must be sixty feet.

(i) Hand charges must not exceed ~~4.5~~5 pounds of TNT equivalent.

Commented: "Change to 5 pounds to accommodate 5lb cast boosters" 06-14-2018 Changes in (i) approved 6-28-2018

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

(k) Precautions must 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 will 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 must 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.

(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 must be established consisting of (at minimum) a pilot, a blaster in charge and an observer/controller.

(d) Blasting from an aircraft must 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 is determined that conventional methods are not the safest means to mitigate the existing avalanche hazard.~~ introduces additional complexity and exposure to other potential hazards than conventional methods. Careful consideration of these additional factors should be included in the decision to use aerial blasting.

██████████: Changes to note approved 6-28-2018

(10) Avalauncher requirements.

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

- (i) All operating instructions;
- (ii) Safety precautions;
- (iii) Emergency procedures;
- (iv) Securing requirements for the equipment.

(b) You must have a list of authorized operators listed on a posted operator's list.

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

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

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

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

(g) Operators must 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) must be recorded.

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

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

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

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

(m) Firing of explosive avalauncher rounds must only be conducted when personnel are not in the target area.

(n) The avalauncher apparatus must be stored in a nonfunctional condition when not in use. This must 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 must be accomplished before the gun is considered operable:

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

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

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

(11) Cornice control ~~requirements~~.

(a) Cornice ~~buildup~~ hazards ~~must~~may be ~~evaluated regularly by qualified personnel, particularly after heavy snowfall periods which are accompanied by high wind or other snow transport weather conditions~~mitigated using explosive control methods.

(i) Control teams for explosive cornice control shall follow best practices for avalanche control teams outlined in other sections of this document and have training and experience specific to cornices and their characteristics.

[REDACTED]: Changes in "a" approved 6-28-2018

[REDACTED] Changes in "i" approved 6-28-2018

(ii) Charges may be placed on the cornice, belayed into a position below the cornice using appropriately sized material, or buried in the cornice.

██████████: Changes in "ii" approved 6-28-2018

(iii) Multiple charges may be linked to detonate together provided best practices for cornice safety, blast site control, make-up methods, and ignition procedures are followed. Special attention should be paid to ensuring all charges are accounted for in the case of a misfire due to the possibility that the falling cornice could move a charge downhill.

██████████: Changes in "iii" approved 6-28-2018

~~(b) Cornice hazards must be controlled whenever the buildup appears to offer potential hazard to areas accessible by personnel~~ work should be conducted during daylight hours and under favorable weather conditions whenever practical. As a minimum, clear visibility should exist for the section of cornice under question and the runout zone below.

██████████: Changes in "b" approved 6-28-2018

(c) The control team must 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 must 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 must retreat back from the breakline to change work positions rather than traverse along the breakline.

(g) The following factors must 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 must 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 must stay off the cornice roof and must be protected by a secure belay when working near the suspected breakline;

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

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

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

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

(D) Safety fuse length must be sufficient to permit adequate escapement time for all personnel from the area influenced by the blast.

~~Safety fuse must be not less than three feet long, approximately two minutes and twenty and must not be less than 90 seconds, in all instances.~~

(e) The use of shock tube is also acceptable from a safe location.

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

(12) Belaying practices.

(a) ~~During avalanche control ropes, Belay rope must be standard 11 mm mountaineering rope or the equivalent techniques, and appropriate~~

██████████: Per John Stimberis "In many cases the control team is initiating the shot from a safe location. It seems like a 90-sec fuse is adequate. The use of shock tube is also a viable option from a safe location" 06-14-2018 ██████████
██████████ Changes in "D" approved 6-28-2018

hardware must~~ay~~ be used to provide safety for team members while engaged in belaying activities~~performing their duties~~. Team members engaged in such practices ~~shall~~must have training and experience specific to these activities.

[REDACTED]: Changes in "a" approved 6-28-2018

(b) Belay rope and hardware ~~shall~~must be mountaineering type or the equivalent, sized appropriately to the task and the fall exposure.

[REDACTED] Changes in "b" approved 6-28-2018

(i) ~~Belay r~~Ropes must be inspected ~~at not less than thirty day intervals and maintained in excellent condition~~for defects and damage before, during, and after each use. Ropes must be removed from service immediately upon discovery of defect or damage that compromises the integrity of the rope.

[REDACTED]: Changes in "i" approved 6-28-2018

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

[REDACTED] Changes in "ii" approved 6-28-2018

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

[REDACTED] Unsure if this is to be removed, or changed to "c" and all items updated based upon new "b" added.

(c) ~~The b~~Belay anchors ~~position must be as near to ninety degrees from the tension breakline as the terrain conditions will permit.~~

[REDACTED] Changes to strike text in "b" approved 6-28-2018

[REDACTED]: Changes in "c" approved 6-28-2018

(i) Natural; such as healthy trees of appropriate size, stable rocks or rock outcroppings.

[REDACTED] Changes in "i" approved 6-28-2018

(ii) Artificial; such as snow pickets, dead-man anchors, pitons, expansion bolts, or other mountaineering tools used as intended and with best practices.

[REDACTED]: Changes in "ii" approved 6-28-2018

(iii) Positional; such as when the belayer uses terrain and body mechanics to create a stable belay position.

[REDACTED]: Changes in "iii" approved 6-28-2018

(d) With either a natural belay anchor or human belay anchor, the belay line must 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 must 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 must establish the anchor position as far back away from the cornice as conditions permit;

(ii) The anchor person must 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.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. WSR 17-16-132, § 296-52-807, filed 8/1/17, effective 9/1/17; WSR 06-19-074, § 296-52-807, filed 9/19/06, effective 12/1/06.]

WAC 296-52-809 Retrieving misfired explosives (duds). (1) The following requirements must 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 must note whether or not the charge actually detonates.

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

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

(ii) Any area which contains a misfired explosive must 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 has not released), the procedures used must be consistent with ~~good mountaineering~~ industry best practices.

(d) A hand charge misfire must not be approached for at least thirty minutes.

[REDACTED]: Per John Stimberis, "Industry best practices is more applicable than mountaineering practices. (06-14-2018)/cjc
[REDACTED]: Changes in "c" approved 6-28-2018

(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 must not be moved. They must 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 must be maintained for every explosive device which does not detonate.

(b) Misfired explosives records must 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 five hundred detonating attempts.

(b) All employers who do not maintain a misfired explosive frequency below one misfired explosive per five hundred detonation attempts must

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 must display warning, information placards and/or signs as found in this chapter, Part H.

(b) Signs must 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 are not limited to:

- (i) Ticket sales and lift loading areas;
- (ii) Food and beverage service facilities;
- (iii) Restrooms and locker rooms;
- (iv) Safety bulletin boards;
- (v) Along general access routes.

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

(d) Signs must be maintained in legible condition.

(e) Signs must 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 must conclude with specific instructions to be followed by anyone who locates an unexploded explosive device.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. WSR 17-16-132, § 296-52-009, filed 8/1/17, effective 9/1/17; WSR 06-19-074, § 296-52-809, filed 9/1/06, effective 12/1/06.]

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