


## Memorandum

**Date:** December 28, 2015

**To:** Marley Hart, Executive Officer  
Occupational Safety and Health Standards Board  
2520 Venture Oaks Way, Suite 350  
Sacramento, CA 95833

**From:** Juliann, Sum, Chief   
Cal/OSHA

**Subject:** Request for Change in Title 8 section 5357 now Avalanche Control Blasting.

Cal/OSHA staff discovered that Title 8 section 5357, Avalanche Control Blasting, contains deficiencies detailed in the attached Form 9. In addition, Cal/OSHA is aware of 3 accidents in California which have occurred during avalanche control blasting. The accident summaries are also attached.

Although the number of employees in avalanche control blasting is estimated to be small, the job is highly hazardous. Employees may access areas with unstable snow and ice as well as handle, arm and deploy hand held explosives.

Attachments: Form 9-5357, Accident Summaries

## Cal/OSHA 9

State of California  
Department of Industrial Relations  
Division of Occupational Safety and Health

1. **Date:** 12/28/15  
2. **Eng/IH:** Eric Berg  
3. **Region/District/Unit:** Research & Standards Safety

### REQUEST FOR NEW, OR CHANGE IN EXISTING, SAFETY ORDER

4. **Industry:** Ski Resorts - General Industry
5. **Proposal for New Safety Order or Change in Existing Safety Order:**

This is a proposal for a change in an existing safety order (see part 2).

#### PART 1

##### NEW SAFETY ORDER

6. **Hazard Description (include process, condition, machinery, equipment or product involved):**  
N/A

7. **Recommended New Safety Order Language (Use any guidelines, standards or codes of work practices):**  
N/A

#### PART 2

##### CHANGE IN EXISTING SAFETY ORDER

8. **Reason(s) for request (employer's appeal granted, advice of Legal Unit Staff, Safety Order needs clarification or other):**

Avalanches are a serious hazard at recreational ski resorts. The falling snow and ice can strike and bury employees (and the general public) and cause serious injury or death. The recreational ski industry utilizes explosive devices, including hand deployed charges, to reduce the likelihood and severity of avalanches. The explosives are used to trigger smaller less hazardous avalanches and influence the structure of the layering of the snow pack to be less vulnerable to future large and highly destructive avalanches.

Employees who deploy explosive charges for avalanche control are required by Title 8 section 5357(b)(6) to seek a position of safety from the blast and resulting avalanche as follows:

*5357(b) (6). Avalanche blasting crewmembers shall seek a position of safety behind a pre-selected terrain barrier or a position not less than 100 feet from the ignited charge.*

In December 2012 at the Alpine Meadows Ski Resort, an avalanche was triggered by a hand held explosive deployed by the ski patrol team tasked with avalanche control. A member of the team was killed by the avalanche. No one on the team sought a position behind a pre-selected terrain barrier after deployment of explosive charges.

The central issue for the appeal centered on the requirement in section 5357(b) that employees be at least 100 feet from an ignited charge if they are not protected by a pre-selected terrain barrier. It is not clear from the regulatory language of where the 100 feet is measured from. The Division maintains that the 100 feet is measured from the point where the employee is standing when he/she ignites the charge. The distance the charge covers when thrown and/or where the charge lands is not a factor in the calculation from the Division's perspective. The ski industry does not agree with Division's interpretation.

Alpine Meadows and the ski industry are of the opinion that the 100 foot measurement begins where a hand deployed charge lands after being thrown by the crewmember. If a crewmember ignites a charge and throws it 60-feet where it lands in the snow, the crewmember only needs to be 40-feet away from where the charge was thrown. This will put employees in serious danger when the charge does not land where anticipated.

The proposed changes to Title 8 are needed to clarify the distance that employees must be from explosive charges to prevent serious injuries or death.

Additional changes to Title 8 are also needed to address the highly hazardous work conducted by employees involved in blasting operations to prevent avalanches. The employees work involves:

- 1) Accessing and moving in areas which may consist of unstable snow and ice vulnerable to avalanches
- 2) Manually handling explosives
- 3) Manually igniting explosives and immediately throwing the explosives
- 4) Immediately evacuating to a safe location after throwing the explosives, but to the explosives detonating. The location must be safe from the explosive blast as well as the ensuing avalanche.

Errors committed during avalanche prevention blasting expose the employee and co-employees to likely serious injury or death. Due to the inherent danger in the work, written procedures for handling and deploying explosives as well

as training specific to the handling and deploying of explosive are necessary.

**9. Section/Subsection reference to existing Title 8 Safety Order: remove text in strikeout**

Subchapter 7. General Industry Safety Orders  
Group 18. Explosives and Pyrotechnics  
Article 121. Snow Avalanche Blasting  
Section 5357. Snow Avalanche Control Blasting

§5357. Snow Avalanche Control Blasting.

(a) General Requirements.

(1) The employer shall develop and implement effective written procedures for avalanche control blasting to ensure the safety of avalanche blasting crewmembers during all phases of avalanche control blasting. The procedures shall be reviewed and updated as often as necessary to ensure that they reflect current, safe operating practices.

(A) The procedures shall include at a minimum:

1. Recognition of avalanche and blast hazards

2. Access to deployment zones and communication among avalanche blasting crewmembers

2. Pre-selection of terrain barriers and safe locations

3. Explosive handling, arming and deploying

4. Emergency response and rescue

(B) The employer shall provide for the effective participation of avalanche control blasting crew members in the development of safe avalanche blasting procedures.

(C) The employer shall ensure that all avalanche control blasting crewmembers are competent in the avalanche blasting procedures.

(D) The employer shall provide effective training on the avalanche control blasting procedures to avalanche blasting crew members at least annually.

1. The training shall be conducted prior to the first blasting operation of each snow season.

2. The employer shall provide an opportunity for interactive questions and answers on avalanche blasting procedures with a licensed avalanche blaster knowledgeable and experienced with the procedures.

Exception to annual training: If no blasting occurs during the entire snow season, then training on the procedures is not required for that season.

(1)(2) All avalanche blasting shall be conducted under the attended supervision of the blaster in charge who is a licensed avalanche blaster, certified by the Division to perform such blasting activities.

(2)(3) When avalanche blasting is deemed necessary, slopes and trails in the potential avalanche path (run out zone) and ski lifts shall be closed to the public and non-essential personnel and not be opened until the work is completed.

(3)(4) To insure a dry powder train is exposed to the igniter, at least 1 inch of fuse shall be cut from the fuse prior to attaching the igniter. A cutter with sharp blades shall be used to prevent smearing of tar over the powder train.

(4)(5) Charges shall be placed, thrown or propelled to the desired location from a safe position by one of the following methods:

(A) Hand deployed pursuant to subsection (b);

(B) Deployed from a ski lift or tram pursuant to subsection (c) if there is no safe approach to the desired location from the ground;

(C) Deployed from helicopters pursuant to subsection (d) if there is no safe approach to the desired location from the ground;

(D) Deployed from an avalauncher/launcher pursuant to subsection (e);

(E) Deployed from such remote control devices accepted by the Division as providing equivalent safety to the remote control devices allowed under subsection (e).

(5)(6) Avalanche blasting shall be conducted during daylight hours, except during emergency operations.

(6)(7) Avalanche blasting shall not be conducted during conditions where the blaster cannot determine whether the fuse is lit, or clearly identify the location of the target area for the detonation of the charge.

(b) Hand Deployed Charges.

\* \* \* \* \*

(4) Before attaching the igniter, the blaster shall:

(A) Determine the deployment target location where the handcharge is intended to land;

(B) Pre-select a terrain barrier or, if a terrain barrier is not available, a position of safety at least 100 feet from both the location where the handcharge is intended to land and the location where the blaster will be positioned when the blaster ignites and throws or releases the charge.

~~(B)~~(C) Check the run out zone for personnel;

~~(C)~~(D) Check the blast area for personnel;

(E) Orally alert all crewmembers each time a charge will be ignited and thrown or released.

(5) When the blast area and run out zone are clear of personnel, the igniter shall be attached to the safety fuse and immediately activated blaster shall attach the igniter onto the safety fuse, immediately activate the igniter to ignite the charge, and deploy the charge within 20 seconds of attaching the igniter onto the fuse.

(6) ~~Avalanche blasting crewmembers shall seek a position of safety behind a pre-selected terrain barrier or a position not less than 100 feet from the ignited charge.~~ Only a licensed avalanche blaster, certified by the Division to perform such avalanche blasting activities, or a person trained in accordance with paragraph (a)(1)(D) who is being directly supervised by a licensed avalanche blaster shall ignite or deploy a handcharge.

(7) Prior to any handcharge being ignited, avalanche blasting crewmembers not involved in igniting or deploying the charge shall move behind the pre-selected terrain barrier or to the other position of safety described in paragraph (4)(B). Each crewmember shall orally report to the crew supervisor or blaster-in-charge the crewmember's position of safety, and the crew supervisor or blaster-in-charge shall orally acknowledge the report or, when necessary, re-direct the crewmember to another position of safety.

(8) Immediately following the deployment of a charge, the avalanche blasting crewmember responsible for deploying the charge shall move behind the pre-selected terrain barrier or to the other position of safety described in paragraph (4)(B).

~~(7)~~(9) At the completion of individual avalanche control routes, unused charges shall be deployed or disarmed pursuant to Section 5358(h)(1) and all components transported and returned to approved storage magazines pursuant to requirements in Article 121.

Exception: Unused charges that are immediately required for deployment at another location.