

**OCCUPATIONAL SAFETY
AND HEALTH STANDARDS BOARD**

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**FINAL STATEMENT OF REASONS**

CALIFORNIA CODE OF REGULATIONS

TITLE 8: Chapter 4, Subchapter 7, Article 121, Sections 5349, 5350, 5351, 5352, 5353, 5354, 5355, 5355.1, 5356, 5357, and 5358 of the General Industry Safety Orders

Snow Avalanche Blasting**MODIFICATIONS AND RESPONSE TO COMMENTS RESULTING FROM
THE 45-DAY PUBLIC COMMENT PERIOD**

There are no modifications to the information contained in the Initial Statement of Reasons except for the following substantive, non-substantive and sufficiently related modifications that are the result of public comments and/or Board staff evaluation.

Section 5356. Transporting Explosives and Handcharges.Subsection (e)

Currently, there are no criteria in Article 121 for avalanche blasting packs. The proposed subsection (e) would establish criteria for avalanche blasting packs. Subsection (e)(1) would require that the pack is constructed of water resistant, non-sparking and non-conductive material, or must be treated to meet these requirements. However, the originally proposed subsection (e) does not contain specific performance requirements.

A modification is proposed to add language requiring that the needed antistatic treatment be in accordance with manufacturer's recommendations. These manufacturer's recommendations would specify the period of effectiveness and when re-treatment of the pack would be required. The proposed modification is necessary to provide a clear and effective performance standard that enhances worker safety and ensures the explosive material is continually protected from moisture and the buildup of static electrical charge.

Section 5357. Snow Avalanche Control Blasting.

Subsection (a)

Proposed subsection (a) would contain the general requirements for avalanche control blasting. Neither the current language nor the initial proposal in subsection (a) would contain provisions that limit deployment of charges based on site conditions.

A modification is proposed to add language in subsection (a)(6) to prohibit blasting where conditions prevent the blaster from discerning whether the fuse is lit and identifying the location where the charge is to be detonated. The modification is necessary to ensure safe deployment of the charges to the desired location.

Section 5358. Management of Misfires.

Subsection (h)

The proposed subsection (h) would establish a disarming method for handcharges suspected of not lighting before deployment to the target area. The proposed standard requires that disarming must be completed within 20 seconds from the time the igniter has been installed on the fuse and would maintain the minimum safety factor of 4.5 when igniting the safety fuse with a fuse length of a minimum 90-second burn time. Currently, there is no provision in Section 5358 for the disarming of misfired handcharges before they are deployed. The initial proposal in subsection (h) used the term “suspected misfire” when referring to the handcharge that did not light properly on the first attempt.

A modification is proposed to delete the word “suspected” from the phrase “suspected misfire.” The modification is necessary to provide consistency in the terms used in the standard. The term “misfire” used in the context of this subsection and in the proposed subsection (g) is defined in subsection (g).

A modification is proposed to add the phrase “After the capped fuse is removed from the cartridge pursuant to subsection (h)(2)” to subsection (h)(3). The modification is necessary to provide clarity to the blaster that the capped fuse is to be removed from the cartridge before the cap can be cut from the cap/fuse assembly as outlined in subsection (h)(3).

Summary and Response to Oral and Written Comments:

I. Written Comments

Comments were received from the following individuals and responded to in comment nos. 1 through 13:

No. 1, Mr. Christopher Lee, Acting Regional Administrator, Region IX, U.S. Department of Labor, Occupational Safety and Health Administration by letter dated March 26, 2007.

No. 2, Mr. Christopher Lee, Acting Regional Administrator, Region IX, U.S. Department of Labor, Occupational Safety and Health Administration by letter dated February 14, 2007.

No. 3, Mr. Len Welsh, Acting Chief, Division of Occupational Safety and Health by memorandum dated February 8, 2007

No. 4, Mr. Lon Santis, Manager of Technical Services, Institute of Makers of Explosives, by letters dated February 6, 2007, and February 14, 2007

No. 5, Mr. Robert Hopley, Powderman Consulting, Inc., by letter dated February 14, 2007

No. 6, Mr. Jeffrey L. Dean, CAE, Executive Director and General Counsel, International Society of Explosives Engineers, by letter dated February 8, 2007

No. 7, Mr. John T. Watson, General Manager DynoConsult/Technical Support, Dyno Nobel America, by letter dated February 9, 2007

No. 8, Mr. James Stuart, Ph.D., Franklin Applied Physics, Inc., by letter dated January 29, 2007

No. 9, Mr. Gary Kreller, Occupational Safety Officer, WorksafeBC, by facsimile dated February 5, 2007

No. 10, Mr. Dale Nies, Account Manager, Dyno Nobel America, by letter dated February 12, 2007

No. 11, Mr. Everett Clausen, CIL/Orion, by facsimile received February 5, 2007

No. 12, Ms. Janeen Smith, President, J. Smith & Associates, LLC, by letter dated February 6, 2007

No. 13, Mr. Charles T. Davey, Retired Engineer/Scientist, by letter dated February 9, 2007

Comment No. 1:

The Commenter No. 3 indicated that the proposal allowing pre-arming of explosives at the bottom of the ski run and subsequent long-distance transportation of armed charges by lift, tram, or other vehicular means is unacceptably hazardous.

Response:

The recorded blasting accidents occurred during or after the attempt was made to light the handcharge, not during arming or transporting, nor as a result of lightning storms. These accidents appeared to have been the result of the blaster not recognizing the fuse of the handcharge had lit during the fuse ignition operation and subsequently not deploying the lit charge in time to avoid the accident.

At the request of the Canadian Avalanche Association, a study was conducted by the Canada Centre for Mineral and Energy Technology (CANMET), of the Canadian Federal

Government's Energy, Mines and Resources Agency. The CANMET study was conducted in response to the British Columbia's Workers Compensation Board's concern regarding the practice of transporting of armed charges during avalanche blasting operations and concluded that "from the viewpoint of impact at both low and high velocities, pre-priming (*pre-arming*) cartridges does not appear to increase the hazard of the operation, provided that the charges are prepared so that the safety fuse assembly is securely inserted into the explosive cartridge."

The proposed avalanche blasting standard mirrors well established avalanche-blasting procedures that have been used for over 30 years and that were adopted by the International Society of Explosives Engineers (ISEE) Avalanche Control Task Force in 2001. The Task Force, consisting of representatives from ISEE, the Institute of Makers of Explosives (IME) Technical Committee, various state and federal explosives regulators, western state ski areas, and manufacturers of products used for avalanche control blasting recommended the following:

- The 90-second fuse length to be the safest and most practical for avalanche blasting,
- Prohibiting relighting of misfires,
- Disarming or deploying the handcharge within no more than 20 seconds, and
- Double capping to avoid misfires. (A practice discouraged in the Avalanche Handbook by USDA Forest Service, Agriculture Handbook 489).

The proposed avalanche-blasting standard contains all the Task Force recommendations as well as additional requirements to ensure and improve blaster safety. Hazards associated with avalanche blasting would be controlled and minimized by the proposed avalanche-blasting standard. It appears that the handcharge related accidents that have occurred in the past would have been prevented, had the proposed standards been followed.

Board staff believes no modification of the proposed language with regard to this specific issue is necessary.

Comment No. 2:

The Commenters Nos.3, 4, 5, 6, 7, 8, 9, 10 and 11 oppose the proposed pre-arming of explosives at the bottom of the ski run and subsequent long-distance transportation of armed charges by lift, tram, or other vehicular means because the practice violates a key tenet of standard blasting safety.

Response:

This comment pertains to the general blasting requirement that "primers must be assembled only at the time of use and as close to the blast site as conditions allow." This or similar language is found in numerous blasting standards including Section 5278(q) of

the General Industry Safety Orders (GISO), 30 Code of Federal Regulations (CFR), Section 77.1303(o), 30CFR, Section 75.1317(b), National Fire Protection Association (NFPA)-495.11, Section 10.3.7.1, and the proposed Section 5355(a)(1). These standards do not specifically mandate a maximum distance to the blasting site but imply an assessment must be made of the blasting site conditions to determine how close the assembly of primers can safely and correctly be accomplished. Additionally, a tunneling standard in Section 5257 mandates that when 30 or more primers are needed, primers must be assembled inside a primer house (arming room), away from the deployment or blast site inside the tunnel under construction. The fact that these primer houses were constructed outside the tunnels at considerable distance from the blast site, and the existence of transportation requirements for armed primers in accompanying sections clearly shows the intent and limits of the primer house requirement. The proposed avalanche standards for the arming and transportation of handcharges are consistent with the intent of the above standards.

The conditions at the deployment site that interfere with the effective arming process and the safety of the workers includes extreme high wind speeds, low temperatures, and precipitation (snow and/or rain) encountered at the mountain ridges where the avalanche blasters conduct much of their blasting activities. The proposed standard will enhance worker safety by reducing the time employees are exposed to the weather extremes and enhance the quality of arming the charge.

Employer's with the specialized resources and who work at ski resorts with topography that allows the use of military style howitzers or avalaunchers to control all of its avalanche dangers or who may use tracked snow vehicles to access the mountain ridges would not need the option of arming at the bottom of the slope and transporting the armed charges to the top of the slopes using ski lifts. However, employers and employees who rely primarily on manual deployment of handcharges at the ridge location, in most cases, would benefit from having the option to arm in a well-constructed arming facility at the bottom of the slope.

The Board believes no modification of the proposal is necessary.

Comment No. 3:

Commenters Nos. 3, 5 and 9 recommended the use of arming sheds at the top of the slope instead of the proposal to allow pre-arming of explosives at the bottom of the ski run. The commenters recommended a priming tent could also be used if working conditions were too severe to allow primer assembly at the blasting site.

Response:

Numerous ski resorts build and use sheds at the top of the slopes for the purpose of arming the handcharges. Although the sheds provide a means of shelter from the weather extremes,

the use of such sheds has proven to be problematic during avalanche control operations, based on the following issues:

- 1) A larger number of employees are exposed to the arming process because all blasters arm their own handcharges in the same arming shed. Only two or three blasters are exposed when arming at the bottom of the slope.
- 2) The quality of handcharges is often compromised because of the crowded, hurried conditions while the blasters assemble the handcharges in sheds.
- 3) Access to sheds is often difficult and requires manual snow removal because of routine snowfall and snow drifting experienced at mountaintop locations before arming of charges can start.
- 4) The sheds are often inaccessible because of large snow accumulations at the top of the mountain. In some cases, these sheds may be damaged or otherwise inaccessible due to heavy snowfall.
- 5) Extreme snow and wind loads often damage the arming sheds, and may create a hazardous worksite for the blasters.
- 6) Due to local building and environmental codes, constructing an arming shed is not always permitted at the higher elevations.

The recommendation by commenter No. 5 to use tents for mountain top arming is not practical due to the conditions commonly encountered.

Although the use of permanent and well-built arming facilities at the top of the slope is a valid option when conducting limited blasting operations, the use of such facilities for the large daybreak avalanche control operation is not advisable. The proposed option to arm in arming facilities at the bottom of the slope provides the avalanche blasters with a reasonable and safe arming procedure that avoids the problems encountered with mountaintop arming facilities and results in the highest possible quality armed handcharges.

The Board believes no modification of the proposal is necessary.

Comment No. 4:

The Commenters Nos. 3 and 4 indicated that pre-arming of explosives at the bottom of the ski run and subsequent long-distance transportation of armed charges by lift, tram, or other vehicular means are generally prohibited in other ski areas. Should the proposal go forward, California may be the only jurisdiction in the United States with standards that allow the dangerous practice of making primers in advance.

Response:

Ski areas throughout the Western United States utilize these procedures along with the option to arm at the deployment site when conditions are favorable. Washington and

Colorado have promulgated specific avalanche blasting standards to accommodate arming at the bottom of the slope and transporting the assembled/armed handcharges via the ski lifts. Additionally, ski areas in Canada utilize these procedures. Until recently, many California resorts safely utilized these procedures.

The Board believes no modification of the proposal is necessary.

Comment No. 5:

The Commenter No. 3 proposes Section 5355 language be changed to require that an arming facility be as close as feasible to the deployment area, and would prohibit arming of handcharges at the bottom of the slope, except when (a) deploying the armed charges from the ski lift, or (b) when the employer can demonstrate that there is a greater risk of accidental detonation if the handcharges are armed at the top of the slope. The commenters indicated that because armed charges can be subject to unintentional detonation from physical impact or static electricity, arming should be delayed until the charges have been brought either to the point of deployment or to an arming facility located at the top of the hill, near the blasting route of the ski patrol blasting crew.

Response:

Please see the response to comment no. 3 regarding the necessity to allow arming rooms at the bottom of the slope.

The hazard posed by static electricity during avalanche blasting operations is generally not an issue because the relative humidity at the slopes is usually in the range of 20% through 80% where clothing and the packs contain significant moisture, and any electrical potential or charge quickly dissipates into surrounding air. The requirement to use a non-sparking avalanche pack or one that is treated with anti-static agent provides an extra factor of safety. (See response to written comment no. 8 for greater detail.)

The Board believes no modification of the proposal is necessary.

Comment No. 6:

Commenter No. 3 proposes adding language to Section 5356(b) that would require explosive components to be transported separately in or on internal combustion vehicles, but would allow an exception when the employer can demonstrate that there is a greater risk of accidental detonation when charges are carried separately.

Response:

Please see the response to comment no. 1.

As indicated, the empirical data from the CANMET study and from years of safely transporting armed charges via snowmobiles, tracked vehicles and ski lifts show that explosives hazards for these operations are absent or controlled. The transportation requirements in Section 5356 are consistent with the intent of requirements governing the transportation of primers (armed charges) currently in Sections 5264 and 5268 of the GISO. The only difference between Section 5264 and the proposed Section 5356 is that Section 5264(d) requires the primers to be carried in a container separated from the others by a partition of nonmetallic material. In Section 5268, pertaining to manual transportation, primers do not have to be separated from the others by a partition of nonmetallic material. Because the blasters control the blasting packs during transport on vehicles similar to manually carrying the handcharges, and because the blasting packs confine and limit the movement of the handcharges within the blasting packs, additional buffering is not necessary.

The Board believes no modification of the proposal is necessary.

Comment No. 7:

Commenter No. 3 proposes changing Section 5356(c) to be consistent with a proposed change in Section 5355, limiting transporting of armed charges on ski lifts only when (a) deploying the armed charges from the ski lift, or (b) when the employer can demonstrate that there is a greater risk of accidental detonation if the handcharges are armed at the top of the slope.

Response:

Because the recommendation regarding the transportation of armed handcharges on ski lifts is not accepted for modification, this recommendation is not necessary and no modification is being proposed.

See responses to written comment nos.1, 2, 3, 5, and 6.

The Board believes that no modification of the proposal is necessary.

Comment No. 8:

Commenter No. 3 indicated that the proposed requirement in Section 5356(e)(1) to treat the avalanche packs and make them “non-sparking” is not practicable, since anti-static treatment is not reliable and may not be possible due to the intrinsic properties of the nylon fabric the packs are made of.

Response:

The anti static treatment to prevent the build-up of static electricity on nylon avalanche packs and the principles associated with such treatment has been proven effective and employs off the shelf technology. Static build-up can be of concern when extremely low relative humidity conditions exist where there is not enough moisture in the air to condense onto the fabric and therefore prevent the free exchange of electrons between the ambient air and the synthetic material (nylon) of the blasting packs. When a layer of hydrophilic (water attracting) silica-salt is applied to the surface of the nylon fabric of the blasting pack, the salt attracts even the slightest available ambient moisture and forms an artificial layer of condensate along the surface of the fabric. This artificial layer of moisture creates a conductive interface between the fabric of the pack and air that allows static charges to dissipate into the air similar to such action during more normal relative humidity conditions, thereby preventing static electricity from building up. To ensure the anti-static treatment remains effective it must periodically be reapplied according to manufacturer's recommendations.

A modification to the proposal has been made requiring that the anti-static treatment be used and in accordance with the manufacturer's recommendations.

Comment No. 9:

Commenter No. 13 indicated that an avalanche blasting accident was caused by a build-up of static charge set off by the non-electric blasting cap and the dynamite, killing the blaster. The commenter recalled the incident to have happened in Canada where a person carrying a substantial charge of dynamite stooped with the charge folded into his belly. Shortly after this accident it happened again. The commenter indicated that non-electric blasting systems are not entirely immune from electrostatic sources of initiation and people dressed for snow and ice with static producing clothing are potential victims as are those in close proximity to the blaster.

Response:

In researching and reviewing the avalanche blasting accident data for Canada and the United States, no accidents were identified that fit the conditions described by the commenter. However, two accidents that occurred at Mammoth Mountain Ski Area in the winter of 1973/74 are similar to the commenter's description. On December 27, 1973, a member of the Mammoth Mountain Ski Patrol was fatally injured and her partner seriously injured when she attached the fuse igniter prior to deployment and it ignited the fuse spontaneously, causing the charge to prematurely detonate. Then two weeks later, on January 11, 1974, another member of the Mammoth Mountain Ski Patrol was seriously injured when he attached the fuse igniter on the fuse of a handcharge prior to deployment. As happened two weeks earlier, the fuse appeared to have been spontaneously ignited.

The U.S. Forest Service commissioned the Naval Ordnance Laboratory at China Lake to study the Mammoth Mountain accidents and determine the possible cause. Because of the mysterious nature of the accidents, static electricity was suspected as the cause of both accidents. During the study it was discovered that the pull-wire igniters used by Mammoth Mountain were defective, where some of the fuse igniters would ignite the fuse when the igniter was slid on the end of the fuse without actuating the igniter. As a result of the study, the manufacturer redesigned the pull-wire igniter to eliminate the chance of accidental ignition of the fuse.

Since the redesign of the pull-wire igniters and the lighting procedure for handcharges were changed to include the 20-second rule, no such accidents have been reported.

During the China Lake study, cap-fuse assemblies were exposed to a standardized static electricity testing protocol to determine their sensitivity to static electrical shock. Because the fuse cap assemblies did not respond to the standardized test, they were submitted to increasingly higher voltages to determine the point a cap and fuse train would initiate detonation of a blasting cap. During this modified testing protocol that increased the current and duration of the exposure, the examiners were able to initiate detonation with a few samples.

Although it may be theoretically possible to have a static electricity initiated detonation during actual blasting operations, there is no evidence of such accidental detonation ever occurring. As discussed in the responses to written comment nos. 1 and 8, because the relative humidity at the slopes is usually in the 20% through 80% range the build-up of static electricity is not an issue during avalanche control operations as any electrical potential present in the packs dissipates quickly into surrounding air. The proposed requirement to treat the pack with anti-static agent provides an additional factor of safety.

In reviewing the data regarding the recorded accidents, accidents have been the result of the blaster not recognizing that the fuse of the handcharge had lit during the fuse ignition operation and subsequently did not deploy the charge in time to avoid the accident.

Comment No. 10:

The Commenters Nos. 3, 4, 5, 6, 7, 9, 10, 11 and 12 oppose disarming of the handcharges that do not light within 20 seconds from the time the igniter makes contact with the safety fuse. The commenters believe that it can be very difficult to determine if a fuse has successfully ignited. They contend that disarming of misfired handcharges must not be allowed, and instead the handcharge should be immediately deployed. It was stated that for an avalanche control worker to be able to tell that only 20 seconds has elapsed and

then pull the fuse assembly from the main charge is extremely dangerous and that the proposed disarming process caused a fatality in Montana in 1996.

They contend that the proposal is contrary to the IME recommendations that the blaster must never attempt to remove the detonator (blasting cap) from the fuse it is crimped to, and must wait at least 30 minutes before returning to the blast area.

Response:

The proposed disarming procedure is accepted as a safe and reliable procedure as evidenced by the 2001 ISEE Avalanche Control Task Force recommendation. (See response to written comment no. 1.) The proposed disarming process provides a clear and specific procedure to disarm a misfired handcharge. Because the proposed standard would prohibit relighting of the misfired handcharge, the blaster has only two specific courses of action to choose from after the igniter is installed on the fuse of the handcharge; 1) either deploy the handcharge within 20 seconds or 2) disarm the handcharge within 20 seconds. During this 20 second time period, the blaster has complete control over the misfired handcharge and can safely remove the capped fuse from the misfired handcharge the blaster is already holding, which may take one or two seconds. On the other hand, once the misfired handcharge has been deployed, the blaster is exposed to a considerable hazard to regain control over the misfired handcharge before it can be disarmed.

To ensure the blaster is able to arm and then disarm a misfired handcharge within the 20 seconds, the proposal mandates in Section 5350(b)(6) that the blaster successfully complete timed practices of the disarming procedure to be aware of procedures, including timeliness. As a result of the comprehensive safety requirements of the proposed avalanche standard, the disarming procedure offers a safe and effective method to abate the danger posed by a misfired handcharge before it is deployed on the mountain slope. This also eliminates the need for the blaster to wait 30 minutes in often-extreme weather conditions before approaching the deployed misfire or losing the misfired charge in a snow slide or deep snow on the slope.

The assertion that the blasting fatality that occurred during an avalanche control operation in Montana in 1996 was due to the disarming process is inconsistent with subsequent analysis of that accident. The accident occurred because the blaster did not realize the fuse had lit after the blaster's first attempt to ignite the fuse and consequently held on to the lit handcharge in order to relight it. The resulting detonation caused the blaster's death and severely injured a coworker. The Montana accident and all other recorded handcharge related blasting accidents would have been prevented had the blasters followed the very simple, but specific procedures mandated in the proposed standard.

The Board believes no further modification of the proposal is necessary.

Comment No. 11:

The commenters Nos. 3, 4, 5, 6 and 7 stated that to prevent misfires and reduce the misfired charges on the ski slopes, the charges should be double-capped or high quality pre-manufactured fuse-cap assemblies should be used. The assertion was made that the practice of priming charges with two fuse cap assemblies dramatically reduces the probability of a failure to light or misfire.

Response:

Although the proposed standard permits the use of double capping to arm handcharges, it is a procedure that complicates the blasting process and doubles the effort at the deployment site without a significant reduction in misfire rate. The fact that double capping handcharges does not significantly decrease the misfire rate is supported by misfire data included in Commenter No. 4's comments. The misfire data was collected from six ski resorts that showed a failure-to-light rate of about 1 in 400 when deploying single capped handcharges and the failure-to-light rate of double-capped charges of 1 in 660, not the theoretical failure rate of 1 in 151,000 one might expect. It was noted that blaster training or deployment site conditions may be the dominant factors affecting misfire rates, where a person might make the same error lighting both fuses and that the deployment site conditions, such as blowing snow or rain, affect the function of both fuses. Also noted was that an F-test (statistical) analysis of the data showed a 66 percent probability that the variance in the data sets failure rates for single capped and double capped charges was not significantly different.

Double capping requires two pull wire igniters placed in succession on each fuse. Each fuse has one igniter slid on its end, and then each igniter needs to be actuated by pulling a wire trigger. Deployment of handcharges at the ridge tops are usually carried out under very windy conditions in drifting snow while the blasters wear thick gloves. The intent of the avalanche blasting procedure set forth in the proposal is to keep the deployment procedure as simple and uncomplicated as possible, because it is at this stage that the greater chance for errors exists and where historically the catastrophic accidents have occurred. The *Avalanche Handbook* by USDA Forest Service states that the blasting process should be kept as simple as possible, that blasters must ignite not more than one fuse at a time, and that double capping (double fusing) is an "unnecessary complication." With regard to the use of pre-manufactured fuse-cap assemblies, some of the commenter No. 3 recommended their use, whereas commenter No. 4 indicated that the IME does not recommend their use for avalanche control. The proposed standard permits its use along with onsite assembled fuse-cap assemblies. The proposal avoids using a prescriptive standard that would mandate the use of pre-manufactured fuse-cap assemblies and agrees that when fuse-cap assemblies are carefully and skillfully assembled onsite they can be equally reliable.

Comment No. 12:

The Commenters Nos. 4, 6, 7 and 12 oppose proposed language in Section 5353(d)(5) that would allow avalanche blasters to use fuse lengths less than 3 feet and have a minimum burn time of 90-seconds. It was stated that during the 2001 meetings with U.S. ski industry representatives on the issue of 90-second fuses, the IME determined that the justification for reducing the fuse length from 120 to 90 seconds was based on convenience and comfort only.

Response:

Although the 90 second fuse burn time is currently in the standard, and is not considered for amendment, the justification for the shorter fuse burn time for the avalanche blasting industry is based on the specific deployment process unique to avalanche blasting. The considerations supporting the shorter fuse length are:

- 1) The handcharge is tossed or thrown to the target area away from the blaster and therefore the 90 second fuse length provides for enough time for avalanche blasters to safely deploy the handcharges. General blasting operations require the blaster to move away from the blast site to a safe location.
- 2) The avalanche blaster is limited to lighting and deploying one handcharge at a time. The general blasting standards, requiring 120-second fuses, allow as many as 12 fuses to be lit during one deployment. When considering the time it takes to ignite the additional 11 charges, the general standard is less protective than the avalanche blasting standard with the 90 second fuse burn time.
- 3) The proposed standard will require the blaster to deploy charges within 20 seconds of ignition, giving the blaster a safety margin of at least 70-seconds.
- 4) The shorter fuse length limits the distance an ignited handcharge may travel when it is unintentionally carried down the slope in a snow slide before it detonates.

The 90-second fuse is generally accepted by avalanche blasting experts as the safest fuse length for avalanche blasting, considering all issues germane to the operation. It is supported by the ISEE Avalanche Control Task Force (see response to written comment no. 1) and is prescribed to in the U.S, Forest Service's Avalanche Handbook. Last year, Washington State amended their fuse length requirement from a minimum of 70 to the current 90-second burn time for avalanche blasting operations.

Comment No. 13:

The Commenter No. 7 stated that the proposal automatically endorses, and almost promotes, the use of a safety fuse. The commenter's opinion is that safety fuse has risks associated with its use and in most instances should not be used for these types of applications. The avalanche industry should consider alternative initiation products, given the user interface with the relatively short delay times provided and resulting risk to personnel safety.

Response:

The cap and fuse initiation system is very simple and provides the level of reliability well suited for this application as evidenced by the relatively low failure-to-light rates, even with the unfavorable blasting conditions so often encountered (see written comment no. 11).

Comments were received from the following individuals and responded to in comment no. 14:

No.14, Honorable Dave Cox, Senator, First District, by letter dated February 6, 2007

No.15, Mr. Bob Roberts, Executive Director, California Ski Industry Association, by letters dated February 5, 2007, and February 21, 2007

No.16, Mr. Bill Cockroft, Senior Vice President, Mammoth Mountain Ski Area, LLC, by letter received February 22, 2007

No.17, Mr. Charles Herbert, Former Compliance Safety Engineer, Division of Industrial Safety, via e-mail dated February 21, 2007

No.18, Mr. Stuart Campbell, MD, FACEP, Alpine Meadows Doctors Patrol, via e-mail dated February 21, 2007

No.19, Ms. Lisa Rapoport, MD, Resident Physician in Emergency Medicine, University of Chicago Hospitals, via e-mail dated February 21, 2007

No.20, Mr. Stephan Rosen, National Ski Patrol Member, Alpine Meadows National Ski Patrol, via e-mail dated February 22, 2007

No.21, Ms. Mackenzie Miller, Kirkwood National Ski Patrol, via email dated February 22, 2007

No.22, Mr. Michael Derby, National Ski Patrol Member, via email dated February 27, 2007

No.23, Mr. Kip L. McCarthy, Kirkwood National Ski Patrol Member, via email dated February 22, 2007

No.24, Mr. Frederick Newberry, Kirkwood National Ski Patrol Member, via email dated February 22, 2007

No.25, Mr. Brian Slusser, Alpine National Ski Patrol Member, via email dated February 22, 2007

No.26, Mr. Gary Murphy, National Ski Patrol Member, via email dated February 22, 2007

No.27, Mr. David Paradysz, Assistant Director, Kirkwood National Ski Patrol Member, via email dated February 22, 2007

No.28, Mr. Jason Hill, Alpine National Ski Patrol Member, via email dated February 22, 2007

No.29, Mr. Bill Keyes, Alpine Ski Patrol, via email dated February 22, 2007

No.30, Mr. Ken Bokelund, Alpine Ski Patrol, via email dated February 22, 2007

No.31, Mr. Thomas Raeth, Alpine Meadows National Ski Patrol, via email dated February 22, 2007

No.32, Mr. Rich Irvine, Proficiency Advisor, Alpine Meadows National Ski Patrol, via email dated February, 22, 2007

- No.33, Mr. Sean Morrissey, Proficiency Advisor, Alpine Meadows National Ski Patrol, via email dated February 22, 2007
- No.34, Mr. Hugh McGuigan, Member Alpine Meadows National Ski Patrol, via email dated February 22, 2007
- No.35, Mr. Sheldon Kay, Retired Volunteer Patrol, via email dated February 22, 2007
- No.36, Mr. Jack G. Bruner, M.D., via email dated February 21, 2007
- No.37, Mr. Greg Christian, via email dated February 22, 2007
- No.38, Mr. Allen K. Olston, National Ski Patroller at Alpine Meadows, Retired, via email dated February 21, 2007
- No.39, Mr. Rolf Fromm, via email dated February 21, 2007
- No.40, Mr. Samuel J. Houston, Retired member Alpine Meadows National Ski Patrol and former Far West Division Director of the National Ski Patrol, via email dated February 21, 2007
- No.41, Mr. Robert A. Morrey, Alpine Meadows National Ski Patrol, via email dated February 21, 2007
- No.42, Kirk J. Sachtler, Occupational Rehabilitation Specialist, via e-mail dated February 21, 2007
- No.43, Mr. Grant Griffanti, via email dated February 22, 2007
- No.44, Mr. William C. Johnson, Retired National Patrolman, via e-mail dated February 21, 2007
- No.45, Ms. Pamela Slocum, via email dated February 21, 2007
- No.46, Mr. John McGuigan, via email dated February 21, 2007
- No.47, Mr. Jeff McCracken, Member, Alpine Meadows National Ski Patrol, via email dated February 21, 2007
- No.48, Ms. Claire Milligan, Member, Alpine Meadows National Ski Patrol, via email dated February 21, 2007
- No.49, Mr. Robert Morrow, National Ski Patrol, Eastern Sierra Division, via email dated February 21, 2007
- No.50, Chris Welch, via e-mail dated February 21, 2007
- No.51, Mr. Carson Thomas, Kirkwood Professional Ski Patrol, via email dated February 21, 2007
- No.52, Mr. Steve Peterson, Alpine Meadows National Ski Patrol, via email dated February 21, 2007
- No.53, Mr. Dave Myers, Director of Mountain Operations, Kirkwood Mountain Resort, via email dated February 21, 2007
- No.54, Mr. Fritz Herbert, via email dated February 21, 2007
- No.55, Mr. John Hull, via email dated February 22, 2007
- No.56, Mr. Larry Hazard, SIOR, National Ski Patrol Member, via email dated February 22, 2007
- No.57, Ms. Jill Montaquila, National Ski Patrol Member, via e-mail dated February 22, 2007
- No.58, Mr. Greg Jellinek, Ski Patroller, via email dated February 21, 2007
- No.59, Mr. Daniel Howsepian, Ski Patroller, via email dated February 21, 2007
- No.60, Mr. Bernard J. Atkinson, Ski Patroller, via email dated February 22, 2007
- No.61, Mr. Duke Herrero, California Ski Patroller, via email dated February 22, 2007

No.62, Ms. Lynn M. Suter, Lynn M. Suter and Associates, via email dated February 22, 2007

No.63, W. E. Schimmelpfennig, Supervisor, Squaw Valley Ski Patrol, via facsimile dated February 22, 2007

No.64, Mr. Ralph Eschenbach, via email dated February 21, 2007

Comment No. 14:

The Commenters Nos. 14 through 64 support the proposed standard delineating specific safe practices that include arming of blasting charges at the bottom of the ski run in a safe, well-designed environment. The commenters state that the proposed avalanche-blasting standard provides for greater safety regardless of unfavorable weather conditions experienced at the deployment sites. The proposed standard is similar to the procedure that has proven to be both effective and safe for the blasters and the public in reducing the number of misfired charges being lost on the slopes. The methods described in the proposal provide for greater safety to the public and utilize explosives in a more controlled and effective process. The adoption of the proposed standards will clarify the current regulatory confusion, allow for the continued protection of the public using the State's ski areas and highways and provide safety to the State's avalanche workers. The commenters urge the Standards Board to approve the proposed standards.

Response:

The Board thanks the commenters for their participation in the rulemaking process and support of the proposed standard.

II. Oral Comments

Oral comments received at the February 15, 2007, Public Hearing in Oakland, California.

Mr. Bob Roberts, Executive Director of the California Ski Industry Association

Comment:

Mr. Roberts stated that the proposed avalanche standard is not a new idea but the result of 50 years of experience in avalanche control. The petition to amend the avalanche standard has been employee driven as they have actively participated in the development of the proposal by their involvement in the advisory committee process. Because of the large amount of snow California routinely receives with storms lasting several days and depositing 4 to 10 feet of snow, the danger of avalanches are a constant threat. Almost all of the ski resorts in California are in Forest Service land, which means the Forest Service has oversight of these avalanche blasting practices. All the resorts that handle the explosives must have Forest Service mandated annual operating plans including avalanche-blasting procedures outlined and approved by the Forest Service. The Forest Service has been instrumental in helping the avalanche control industry develop safe

procedures to manage avalanche danger. This proposal has come out of a long tradition of collaboration with those involved with the control of avalanche danger.

Response:

The Board thanks Mr. Roberts for his participation in the Board's rulemaking process and support of the proposed standard.

Jeff Goldstone, Ski Patrol and Snow Safety Director, Alpine Meadows Ski Area

Comment:

Mr. Goldstone stated that besides his work at Alpine Meadows Ski Area, he also does avalanche control work for CalTrans and Placer County. He indicated that winter storms frequently produce large amounts of precipitation accompanied by high winds which lead to optimum avalanche conditions that require the use of military weapons, avalauncher systems, and handcharges. Alpine Meadows has used explosives for more than 40 years with more than 300,000 charges initiated during avalanche control operation without incident. In contrast, avalanches have resulted in fatalities during the same time period at Alpine Meadows. On March 2, 1976, three people were killed in an avalanche. On March 31, 1982, seven people were killed in another avalanche, three were resort employees. This catastrophic avalanche also destroyed an employee building, damaged the lodge, and buried the parking lot under ten to 15 feet of debris. These accidents emphasize the severity of the avalanche danger in California, and underscore the need for the industry to do all it can to promote safety.

Mr. Goldstone, as a member of the advisory committee for this proposal, believes that the proposal takes great steps to ensure employee safety. The proposed standards will allow the avalanche blasters to continue the use of procedures and employee training requirements that have over the past 45 years proven a safe and effective avalanche blasting protocol for both the employees and the public. He stated that the Division's opposition to arming at the bottom of the slope and transporting armed handcharges on ski lifts would not benefit the safety of his blasters. Having to arm explosives on the ridge-tops in strong winds, cold temperatures, and poor visibility is far less safe than arming explosives in an arming room with a controlled environment. Mr. Goldstone stated that the Division's recommended practice of arming in a shed at the top of the slope requires all Alpine's blasting teams to arm simultaneously in a single location and exposes the entire crew to the arming process.

Use of an arming room at the bottom of the mountain in conjunction with the ability to transport armed explosives on the ski lift will expose only two employees to arm the charges, offering the safest environment for employees, and increases the quality of the armed handcharges. Mr. Goldstone expressed concern about the Division's opposition to disarming of handcharges that failed to light, and requiring the charges to be deployed. Mr. Goldstone stated that this will lead to greater numbers of undetonated armed charges

lost on the slopes, and expose blasters to dangers of unstable and steep terrain when recovering the misfires. The proposed standard would avoid these dangers and limit the blasters' exposure to weather extremes by allowing the blaster to immediately disarm the misfire.

Response:

The Board thanks Mr. Goldstone for his participation in the Board's rulemaking process and support of the proposed standard.

Question No. 1

Ms. Liz Arioto, Occupational Safety and Health Standards Board Member (Management)

Board Member Arioto asked Mr. Goldstone what the chances are of armed charges being detonated from either electricity or physical impact while blasters are riding on the ski lifts.

Response:

Mr. Goldstone stated that in his opinion, the chances are low. Asked to define "low" Mr. Goldstone responded that the chances are practically nonexistent. When the blasters are riding on the ski lift with the charges in an armed configuration, the blasting caps are inside of the charges and cushioned. He indicated that in the 20 years of doing this work, he has never seen a charge detonated by static electricity.

Question No. 2

Board Member Arioto asked Mr. Goldstone whether double-capped charges would eliminate misfires.

Response:

Mr. Goldstone stated that he did not think that misfires would be eliminated, but the possibility of a misfire might be reduced.

Question No. 3

Dr. Jonathan Frisch, Occupational Safety and Health Standards Board Member (Occupational Health)

Board Member Frisch asked what the differences are between the avalanche control practices of Alpine Meadows, CalTrans, and Placer County and specifically the process that is followed regarding pre-arming, and whether, prior to the Division's

reinterpretation of the standards, all three organizations followed the practice described in the proposal.

Response:

Mr. Goldstone responded that CalTrans uses the avalauncher system, in which a launching mechanism is taken to the site and the charges are armed immediately before firing the projectile. Placer County works with handcharges and the avalauncher. Prior to the Division's reinterpretation, handcharges were pre-armed and then taken to the site.

Question No. 4:

Board Member Frisch asked Mr. Goldstone to describe the working environment and the situations in which the blasters may find themselves when they are using handcharges.

Response:

Mr. Goldstone stated that the conditions vary greatly, depending on the weather. Avalanche blasting operations are often carried out during or right after significant storms when winds are relatively high, and snowfall, rain or sleet can be very heavy. Blasters try to perform the blasting tasks on very steep unstable terrain.

Question No. 5:

Mr. John MacLeod, Chairman, Occupational Safety and Health Standards Board Member

Chairman MacLeod asked Mr. Goldstone to respond to the comment that safety fusing should not be used in avalanche blasting, but that if it is used, the charge should be double-capped.

Response:

Mr. Goldstone stated that he has been using safety fuses during his entire career and that he has never had a problem with them. They have been very reliable, and misfires do not happen very often. When a misfire does occur, another charge will be thrown onto the slope. It is preferable to land the second charge next to the first and detonate it that way, but that is not always possible. The second charge will detonate and create the avalanche that carries the misfire down the slope in a large amount of snow. The blasters will then search for the misfired charge, but it is sometimes physically impossible to do so due to

the amount of snow involved in the avalanche. Mr. Goldstone stated that all handcharges at Alpine Meadows are single-capped, which simply means that a single cap-and-fuse assembly is used. The double capping procedure requires two separate cap-fuse assemblies to be installed through punctures made in the hand charge, that both need to be lit. Double capping is problematic, in that the blasters are required to install and initiate double the number of cap-fuse assemblies and pull-wire igniters in order to light the fuses of the handcharge and consequently takes longer than lighting single capped charges. Mr. Goldstone expressed his belief that the “dud” rate is very low, and that double capping does not affect it one way or the other.

Question No. 6:

Chairman MacLeod asked Mr. Goldstone’s perspective on the proposed 30-minute wait time before approaching a misfire as opposed to the one-hour wait-time currently required in Title 8.

Response:

Mr. Goldstone stated that he believed the wait-time prescribed in Title 8 had once been 30 minutes but had been changed to one-hour.

Response to Comments:

The Board thanks Mr. Goldstone for his participation in the Board’s rulemaking process and support of the proposed standard.

Ms. Lel Tone, California Licensed Blaster, Pro Patroller at Squaw Valley

Comment:

Ms. Tone stated that she was speaking on behalf of 52 men and women working in the Squaw Valley Ski Patrol. Ms. Tone stated that her fellow employees agree with the proposed standards. The proposed changes will allow them to perform their job duties safely, smoothly, and most importantly, efficiently. The proposed changes would make training new employees more manageable and consistent with the practices of the last 50 years. Without the proposed changes, and in compliance with the Division’s current interpretations of the standards, it would expose avalanche technicians to more risk. The changes set forth by the advisory committee are necessary to clarify the practical procedures and to help perpetuate an impeccable safety record.

Question No. 7:

Chairman MacLeod asked Ms. Tone to elaborate on her statement that the Division’s “redefinition” of the standards creates more risk and makes her job more complicated.

Response:

Ms. Tone responded that she was referring primarily to the arming of the charge at the deployment site, which would be unsafe, given the extreme conditions that often exist at the top of the ridge, as opposed to a controlled environment such as an arming room.

Response to Comments:

The Board thanks Ms. Tone for her participation in the Board's rulemaking process and support of the proposed standard.

Mr. C. Duane Niesen, Retired Cal/OSHA Blasting Program Administrator, OSHSB
Petition File No. 476, (Petitioner) on behalf of the California Ski Industry Association

Comment:

Mr. Niesen stated that because of unique work conditions and applications some industries, including avalanche blasting, are given special exceptions from the explosives safety orders in Title 8 for conventional blasting. Mr. Niesen stated that these considerations for avalanche blasting include:

- A 15-minute waiting period (currently 60 minutes) after a suspected misfire, as opposed to 60 minutes.
- Lighting the fuse first and then placing the charge, as opposed to placing the charge before lighting the fuse.
- A 70-second fuse (currently 90 seconds), as opposed to three feet (approximately 120 seconds).

These considerations have been developed over the past 50 years to make the operations safer and more efficient. The proposed standards are unique to avalanche blasting and include specific procedures for arming, disarming and transporting methods that reduce the unique hazards associated with avalanche blasting and include hazards associated with arming at the deployment site, handling misfires, and the presence of unfired explosives on the slope where they may be recovered by tourists, children, or suspected terrorists. These same processes have been followed by avalanche blasters in California for years as well as similar exceptions for the transportation and use of primers. Currently, Title 8 safety orders permit primers to be transported similar to what is proposed for handcharges in the proposed avalanche standard. Mr. Niesen stated that since his retirement in 2003, the Division has reinterpreted the avalanche standard to prohibit arming in arming rooms at the bottom of the slope and transporting of armed handcharges via ski lifts.

Mr. Niesen indicated that the OSHSB Petition No. 476 submitted on behalf of the California Ski Area Association has developed into one of the most detailed vertical standards for avalanche control in the United State that will provide increased safety to the employees, better efficiency to the blasting process, and better protection to the

public. These same procedures were endorsed at meetings of the ISEE Avalanche Control Task Force during 2000 and 2001. (See response to written comment no. 1)

Mr. Niesen stated that the Division has raised the issue of static electricity, which is present everywhere and can present a theoretical potential hazard in explosive use, most especially in electric initiation systems. Mr. Niesen stated that the fuse initiation system, exclusively used by avalanche controllers, is the least sensitive to detonate explosives of all initiation systems. Mr. Niesen stated that one of the China Lake study's main investigations looked into the sensitivity of the handcharges to static electricity charges. A close reading of that study revealed that they could not get a cap/fuse assembly to detonate using static electricity as it occurs in nature. Mr. Niesen stated that this finding is underscored by the fact that after more than three million charges have been deployed in the Western United States in avalanche control over the last 50 years not one accidental detonation can be attributed to static electricity.

Mr. Niesen noted that the proposed transportation and arming standard for handcharges provides greater employee safety and limits access to public and extraneous employees during such transport and arming activities. The proposed standard was recognized in the Cal/OSHA's blaster's examination for avalanche controllers and is consistent with the United States Forest Service avalanche handbook, which is considered the authority of avalanche control. Mr. Niesen urged the Board to adopt the standard as proposed.

Question No. 8:

Mr. Art Murray, Occupational Safety and Health Standards Board Member
(Occupational safety)

Board Member Murray asked Mr. Niesen whether he was aware of any state or federal agency that prohibits arming the charges at the bottom of the slope outside of British Columbia.

Response:

Mr. Niesen stated that arming at the bottom of the slope is the accepted standard and that almost every state allows it. British Columbia will allow it if an application for provisional exception is filed. Colorado has a very strict standard because of the fatality in Montana in 1996. Although Mr. Niesen did not know the exact wording of the Colorado standard, he believes that it is allowed, as it is standard practice in the Western United States and Canada.

Question No. 9:

Board Member Arioto asked Mr. Niesen his opinion about the 90-second and the 120-second fuse.

Response:

Mr. Niesen responded that California originally allowed 70 seconds, which was shorter than anybody else in the world, and probably too short. Colorado argued for 120 seconds because that allowed a little more time. Most avalanche blasters recommend against it because the longer the fuse is the more likely it will entangle either with other fuses or around someone's hands. Mr. Niesen emphasized that the avalanche blasters are experts at what they do and that 90 seconds provides enough time to determine whether the fuse is lit and if not, to handle the charge in the safest possible manner as outlined in the proposed standard. States requiring the 120-second fuse for avalanche blasting reacted to the fatal accident in Montana in 1996 despite the fact that the longer fuse would most likely not have saved the victim in that accident.

Question No. 10:

Mr. Steven Rank, Occupational Safety and Health Standards Board Member (Labor)

Board Member Rank asked whether Mr. Niesen had ever dealt with the Institute of Makers of Explosives (IME) during his 30-year career.

Response:

Mr. Niesen responded in the affirmative.

Question No. 11:

Board Member Rank stated that the IME had recommended that hand-thrown avalanche charges be double-capped if a handcharge is used, and he asked Mr. Niesen whether he concurred with that position.

Response:

Mr. Niesen responded that he did not agree with that position. The IME is an association of manufacturers of explosives, and they are the most conservative organization connected with explosives that exists. The IME always supports the absolutely safest method, as they see it and are primarily concerned with liability protection. Mr. Niesen stated that double capping has, by certain studies, reduced but not eliminated the number of misfires. However, it complicates the arming and deployment process having two fuses to install, to trim, and to actuate two pull-wires igniters. (See also response to written comment no. 11)

Question No. 12:

Board Member Rank asked for Mr. Niesen's opinion about the statement by IME that the fuse cap initiation system is inherently unreliable.

Response:

Mr. Niesen stated that there are three initiation systems, 1) the cap and fuse initiation system, which is susceptible to kinking and other physical damage, 2) the electric initiation system, which is susceptible to static electricity, and 3) the non-electric shock tube initiation system, which is used to detonate approximately 85% of all the explosives used in the United States. The cap and fuse method is subject to water, tainting, and physical damage; however, the proposed standard addresses these issues by requiring that the fuse be dry and protected from physical damage. Because charges cannot be thrown while attached to a couple hundred feet of electrical wire or non-electric shock tube there is no other viable detonation system for use in avalanche control as it is practiced today. The avalanche control industry uses the cap and fuse initiation system almost exclusively, and handles it with a great deal of respect to minimize the inherent dangers.

Question No. 13:

Chairman MacLeod asked Mr. Niesen about the IME indicating that it would recommend that if users do not follow manufacturers' instructions, the members should refuse to supply the explosive materials.

Response:

Mr. Niesen stated that there is no fuse manufacturer in the United States over which the IME has any influence. Most of the manufacturing of fuses is handled by offshore companies. The IME wants to do away with the use of fuses because it is an archaic system, in their opinion. However, currently there is not any practical, safe way of initiating handcharges other than with the use of safety fuse.

Question No. 14:

Chairman MacLeod asked Mr. Niesen about the comment from a gentleman in Colorado who expressed concern that safety fuse would not be available, that there are only two or three suppliers, and the IME seems to have control over them.

Response:

Mr. Niesen responded that he did not think that the IME was international in scope and that there are no fuse manufacturers in the United States. There is a Canadian company that strongly recommends a shunted fuse and cap assembly, primarily because they manufacture and sell them. Mr. Niesen stated that it would be nice if someone would develop a reasonably priced, foolproof detonation system, but no one has.

Question No. 15:

Board Member Rank asked Mr. Niesen whether he supported the position by several commenters that the initiation of double-capped handcharge takes too long.

Response:

Mr. Niesen responded that double capping complicates the operation and takes more time.

Question No. 16:

Board Member Rank asked Mr. Niesen how much time it takes to initiate the first fuse and check to see that it is lit.

Response:

Mr. Niesen responded that it was probably less than five seconds.

Question No. 17:

Board Member Rank then extrapolated that it would take ten seconds, at the most, to light and check two fuses.

Response:

Mr. Niesen agreed with Mr. Rank's statement, but that the use of the double-capped handcharge is more complicated and would leave less time to throw the charge. Mr. Niesen indicated any problems getting the two pull-wire igniters properly and timely installed on the fuse ends and actuated could lead to critical delays in deployment which is probably what happened in the Montana accident. Based on his studies regarding the double capping, Mr. Niesen does not believe that it reduces the percentage of misfires to the extent that it would be worth the extra complication.

Question No. 18:

Board Member Frisch stated that having experienced lighting the fuse with a pull-wire igniter and deploying the handcharge at the top of the hill in a 45 mile per hour (mph) wind, it is not as easy as it may sound. He further stated that when lighting the fuse of a handcharge it is obvious when the fuse is lit. However, when the fuse does not light properly, when the wind is blowing in a direction so a blaster cannot smell the smoke, or when the blaster selects the wrong piece of ground or snow against which to test the fuse, it may not be quite so clear. Board Member Frisch recognized that while double capping may ensure that the charge detonates, it places a greater burden on the blaster who must spend more time "fiddling" with the charge in the wind while wearing cumbersome gloves. This added burden creates a more stressful situation for the blaster, as the blaster has to get rid of the charge in a timely manner. Board Member Frisch stated that there are good arguments for and against double capping, however the comments received that support double capping do not appear to reflect the work environment that avalanche blasters are exposed. Board Member Frisch asked for Mr. Niesen's reaction to this statement by the IME: "Should the proposal go forward, California may be the only jurisdiction in the United States with regulations that allow the dangerous practice of making primers in advance. The state should not permit making primers at the bottom of the slope in the proposed regulation."

Response:

Mr. Niesen stated that the letters opposing the proposal appeared to be written by individuals who did not have experience in avalanche blasting. He stated that many of the avalanche standards, such as the fuse length and double capping requirements, were

written by regulators who did not understand the conditions and had never actually performed the work. Mr. Niesen stated that the proposed standard mirrors the consensus recommendation of the Avalanche Control Task Force, which have proven to be successful in providing safety for the blasters and the public because the procedures were developed by avalanche controllers. Mr. Niesen stated almost every avalanche control operation that he had ever had association with in the country make their charges in advance of deployment. Because avalanche-blasting operations at resorts routinely require the assembly/arming of 150 to 300 charges, the arming rooms have traditionally been the best way to ensure quality and provide reasonable logistics to accomplish the blasting operations, other than attempting to arm the charges in blizzard conditions.

Question No. 19:

Board Member Frisch asked for Mr. Niesen's response to a comment from John Watson, General Manager of Dyno Nobel America, which makes reference to the proposal's language regarding disarming suspected misfires. Mr. Watson states in his letter that "this increases the risk of injury to unacceptable levels and should never be attempted by blasters." Board Member Frisch stated that while he understood the principle, having seen the process, it did not strike him as a particularly safe activity.

Response:

Mr. Niesen stated that Board Member Frisch was correct. However, misfires do occur occasionally with any kind of explosive use, and must be disarmed somehow. The procedure outlined in the proposal is a specific method for handling misfires and is far more stringent and provides greater detail than what is currently in Title 8. The current avalanche standard allows relighting of misfired charges; however, the industry has recognized that the hazards associated with relighting the misfired handcharges are unacceptable and recommended prohibiting such practices in the proposed standard. Additionally, blasters have long recognized the hazards associated with disarming the deployed misfired handcharges, where the blaster has to venture out in unstable and treacherous terrain to recover the charge. Disarming the handcharge before it is deployed avoids these dangers, eliminates the need for the blasters to wait 30 minutes to start searching for the misfire, often in extreme weather, and prevents unexploded charges from being lost on the slopes. The proposed disarming procedure is a safe and reasonable process to disarm charges that did not light. The proposed disarming procedure involves removing the capped fuse assembly from the explosive cartridge and tossing it a safe distance from the secondary explosive and the blaster when the fuse has burned no more than four or five seconds. The Division's recommendation to deploy such misfires for later recovery increases the hazards to the blaster and public. The proposed disarming proposal was also endorsed by the ISEE Avalanche Control Task Force and is a well-established disarming procedure. The objections of the IME and the Division appear to be based on traditional blasting practices that do not apply directly to avalanche control.

Question No. 20:

Chairman MacLeod asked for Mr. Niesen's response to the comment from the IME's letter that there is no such thing as a suspected misfire, and to allow the notion of a suspected misfire to exist in the standard would be a step backwards for explosive safety.

Response:

Mr. Niesen stated that he agreed with the IME. Although the term "suspected misfire" has been the language in Title 8 for at least 35 years, Mr. Niesen recommends deleting the word "suspected" from the text because the Title 8 definition of misfire clearly includes suspected misfires.

Question No. 21:

Chairman MacLeod asked Mr. Niesen if a pack was available for purchase meeting the criteria for an "avalanche blasting pack," stated in the proposal to be "constructed of water-resistant, non-sparking and non-conductive material or treated to meet these requirements.

Response:

Mr. Niesen stated that one probably would not find anything called an "avalanche blasting pack," because this is the first time that such a pack has been standardized. Packs or bags that are constructed of material that meet the standard are available at REI or similar stores. One of the concerns, with all kinds of clothing, is the generation of static electricity because of dissimilar materials. Nylon can be treated to reduce the possibility of the generation of static electricity.

Question No. 22:

Chairman MacLeod stated that he was sure water-resistant packs were available, however he questioned if non-sparking or non-conductive packs were available.

Response:

Mr. Niesen stated that "non-sparking" is a poor term; a better one would be "static resistant material," one that does not lend itself to generate static. Mr. Niesen indicated that spray products are available that reduce static cling and is a known technology. This method will greatly reduce static build up when properly applied.

Response to Comments:

The Board thanks Mr. Niesen for his participation in the Board's rulemaking process and support of the proposed standard. The Board believes that the recommendation by Mr. Niesen to remove or change the term "suspected misfire," describing handcharges that failed to light properly before being deployed, has merit. Therefore, a modification to the proposed language deletes the word "suspected" from the phrase "suspected misfire." The modification would provide consistency in the terms used in the proposed standard since the term "misfire" used in the context of this subsection and in the proposed subsection (g) would be defined in subsection (g). Board staff considered Mr. Niesen's comment that the phrase "non-sparking" in the proposal is poor terminology. However, because "non-sparking" is used throughout the explosive standard to denote "static electricity resistant" and meets the consistency and clarity standard, no such modification to the proposal is made.

Mr. Larry Heywood, Snow and Ski Safety Consultant, 610 Park Avenue, Homewood, CA

Comment:

Mr. Heywood disagreed with the Division's assertion that the pre-arming and transportation of armed charges and the 90-second fuse have led to fatal blasting accidents in the past. Mr. Heywood stated that the two incidents in the 1970s were both associated with a faulty pull-wire igniter, where the pull-wire igniter ignited the fuse prematurely. The more recent avalanche blasting accident in Montana in 1996 occurred because the blaster thought that the charge had not lit on activating the pull wire igniter and attempted to relight it when it exploded. Mr. Heywood stated that in the later 1990s the avalanche blasting industry was in turmoil, partly because of the Montana accident, the controversy over avalanche blasting practices, and problems with availability and quality of product because suppliers' were reluctant to sell to avalanche blasters. To address these issues, the Avalanche Control Task Force was convened by the national office of the ISEE bringing together the interested parties that included regulators, representatives from the ISEE, the IME, ski area operators and manufacturers that included technical directors from Dyno Nobel and Boston Powers. As stated in response to oral comment no. 1, the recommendations that came out of the task force meeting are similar to the proposed standard to ensure safety to employees and the public and included:

1. no relights,
2. users have no more than 20 seconds to disarm a charge or release it,
3. the use of the 90 second fuse, and
4. double-capping is an option that may continue to be used to avoid misfires.

As a result of these Task Force recommendations the industry adopted these elements into their blasting procedures. The 20-second rule is practiced through training exercises to develop an internal timing mechanism to ensure compliance.

Mr. Heywood disagreed with the Division's assertion that other ski areas generally prohibit the proposed pre-arming of charges and transporting via ski lifts, and estimated that at least 90% of the ski areas in the United States use these procedures. They are the accepted practices in the United States and minimize the hazards such as steep, unstable terrain, cliffs, and the fierce weather conditions mentioned previously.

The issue of the quality of the arming out in the field as opposed to in the controlled environment of an arming room must also be taken into account when considering the best method to arm the charges. Mr. Heywood stated that the public and the Division's comments opposing disarming of a suspected misfire look at this process from the standpoint of general blasting operations and that the severity of the weather had been ignored or at best highly understated. He stated that the 45 mph winds experienced by Board Member Frisch were mild for this type of work. Winds of 65 mph, 75 mph, and 85 mph are more common, and it often snows so hard that breathing is difficult. Visibility is extremely limited, and the gloves necessary to prevent frostbite are cumbersome and make movement clumsy.

Mr. Heywood stated that another concern is having armed explosives lost on the mountain slopes. To have ten, fifteen, or twenty unaccounted-for explosives on the hill is a big problem for the avalanche controllers and the ski resorts because of the hazards they pose to workers and the public, and the possibility of the explosives falling into the hands of individuals who may intentionally or unintentionally cause death and destruction. It is important to prevent the deployment of misfires, or if they occur, to retrieve them from the slopes. The Division's proposal to set misfires aside for a later retrieval is not as simple as it sounds because of weather conditions and unstable snow and there is a high probability that they will not be found again after the waiting period.

Regarding the threat from a Dyno Nobel employee that they will withhold product from avalanche blasters, Mr. Heywood stated it is an idle threat coming from someone who is detached from Dyno Nobel policy making. Dyno Nobel is the single largest explosives supplier to the avalanche blasting industry, selling to all of the ski areas that do exactly what is detailed in the proposal. Mr. Heywood stated that Dyno Nobel was actively involved on the ISEE's Avalanche Control Task Force and supported these procedures.

Regarding the suggestion from one of the commenters to use other ignition methods, Mr. Heywood stated that the ski industry in North America has performed exhaustive searches for other detonation methods and have financially sponsored research and development projects. Nothing has been proven to be as reliable as cap and fuse initiation for avalanche blasting.

Regarding the concern expressed by commenters over static electricity, Mr. Heywood stated that the industry has a procedure for dealing with static electricity which is written into every avalanche control plan that he is aware. Avalanche control is never performed if there are thunderclouds. If there is the sense of static electricity, as one might feel with

carpets, the blaster would ground him or herself, abandon his or her pack, and return for it later.

Mr. Heywood stated that the comment from the owner of C.I.L. Orion, who makes pre-manufactured cap and fuse assemblies, suggesting that avalanche blasters should all switch to manufactured cap and fuse assemblies, is very self-serving. Mr. Heywood stated that pre-manufactured cap and fuse assemblies have not proven any more reliable than cap and fuse assemblies put together manually by the avalanche controllers.

Mr. Heywood then addressed the issue of double-capping. He stated that although it may sound simple, it is a very complicated procedure to perform little things in bad weather, and that double-capping does not significantly reduce the number of misfires.

Mr. Heywood closed by strongly urging the Board to adopt the proposal, and feels they are well defined safe procedures that will alleviate the confusion caused by existing standards. The Association of Professional Patrollers and the Association of Western Ski Area Professional Ski Patrol are the closest things to labor groups that exist. They have endorsed the proposed standards, as have the American Avalanche Association.

Question No. 23:

Board Member Arioto asked why the avalanche blasters are up on the ridge while the wind is blowing at hurricane force and the snow is blinding.

Response:

Mr. Heywood responded that avalanches must be controlled as early as possible, and that in many cases, the avalanches that need to be controlled can run into the base area ski areas or onto highways or into facilities. In addition, while conditions may be that bad up at the ridge-top, there could actually be reasonable skiing conditions just one-half mile down from the ridge-top.

Question No. 24:

Board Member Arioto asked Mr. Heywood whether there would be a problem if the charges were double capped during the pre-arming procedure.

Response:

Mr. Heywood responded that it was not an issue of the pre-arming, but rather of the application of the pull-wire igniter at the deployment site, where it complicates the deployment process.

Question No. 25:

Board Member Frisch asked whether there were other regulatory bodies that would have input should an arming room or shed be constructed closer to the blasting sites, and whether such approval would be likely.

Response:

Mr. Heywood responded that it was likely that county and other local building authorities would want input into the construction of such a facility, and that obtaining such approval and permits was notoriously difficult.

Question No. 26:

Chairman MacLeod pointed out that, despite the section of their letter quoted by Mr. Heywood, the ISEE had come out in opposition to the standard, stating that “it is inconsistent with the NFPA and the IME,” in spite of the fact that they had an Avalanche Control Task Force.

Response:

Mr. Heywood responded that the man who authored that letter was the legal counsel of the ISEE, and he responded as a lawyer would to require adherence to any possible standard that may exist in spite of the historical, time-tested procedures currently in use. Mr. Heywood went on to state that the author of that letter led the discussion, in part, during the Avalanche Control Task Force, and there was a consensus of that group, with no objection from him, the ISEE, the IME or the suppliers. It was Mr. Heywood’s guess that they had changed their position.

Response:

The Board thanks Mr. Heywood for his participation and support of the proposed standard.

Mr. Stan Rhyu, Senior Safety Engineer, Former Blasting Program
Administrator, Mining and Tunneling Unit, Division of Occupational Safety
and Health.

Comment:

Mr. Rhyu stated that the Explosive Safety Orders are different from other safety orders. When an accident occurs, it is usually difficult to know exactly what went wrong, and therefore it can only be surmised. Despite the years of experience and the training of any of the avalanche control technicians, accidents are not predictable. The Explosives Safety Orders try to ensure that those accidents do not happen by separating ignition

sources and explosives. Simply because there have been so few accidents from the procedures used by avalanche controllers is not an excuse to violate the Explosives Safety Orders.

Question No. 27:

Board Member Frisch asked Mr. Rhyu for his definition of the term “ignition source” and for an explanation of his concept of separating the ignition source from the explosive.

Response:

Mr. Rhyu responded that an ignition source could be many things, such as friction or impact.

Question No. 28:

Board Member Dr. Frisch asked whether an unlit fuse was an ignition source.

Response:

Mr. Rhyu responded that static could ignite an unlit fuse.

Response:

The Board thanks Mr. Rhyu for his comments. With regard to Mr. Rhyu’s response that static could ignite an unlit fuse; the issue of static electricity has been discussed in the response to written comments nos. 8 and 9.

Mr. Steve Hart is the Principal Engineer for the Division of Occupational Safety and Health’s Mining and Tunneling Unit.

Comment:

Mr. Hart stated that the people who perform avalanche control blasting in California perform a very important function, and under extreme circumstances. Mr. Hart disputed the avalanche blasting industry’s contention that the Division had changed its interpretation of the existing standards. He stated that he concurs with most of what appears in the proposal, and noted that it is consistent for the most part with similar standards in other states.

Mr. Hart stated that the Division is prepared to accept the proposal with only two reservations. Mr. Hart stated that the ski industry convinced him that a 30-minute waiting period was necessary to retrieve the charges as quickly as possible before they are covered by snow. Therefore, the 30-minute waiting period was a balance between public safety and employee safety.

Mr. Hart stated the Division believes that arming at the top of the slope is the safest way to do things, and pointed out that Mammoth Mountain in Southern California does not pre-arm the charges until the blasters get to the point of deployment. The cap fuse and the explosive are always transported separately. Another thing done at Mammoth is double-capping. The Division believes that double-capping is the way to prevent misfires being on the ski slope where anyone can ski over them. Mammoth also inserts a static shunt into all of their fuse cap assemblies to prevent static electricity. Mr. Hart stated that there is ample evidence to support the fact that avalanche blasters are not the only people who have to go out in adverse conditions. The procedures should not be made less safe as a result of that. The Division contends that it is unsafe to arm at the bottom of the hill and disarm a charge that may not be lit. Those practices cause the snow avalanche industry to be less safe and he has found no valid reason for authorizing these changes.

Mr. Hart referred to the 1978 Helms Tunnel Disaster, in which an avalauncher was pre-armed. When the safety pin was removed, the charge blew up in the middle of the four blasters, and all four were killed. Mr. Hart urged the Board to keep in mind that caps might go off, but when a cap goes off it is a little bit bigger than a firecracker. However, when a cap that is inserted into an explosive charge goes off, everybody dies. The proposal calls for the blasters to be able to carry 90 pounds of armed explosives on each lift chair. If a tower goes down, everybody on that lift is going to go down with it. The larger ski resorts routinely have 15 or 20 blasting teams on the lift at one time. This means that if a tower goes down, there is the potential of losing 15 or 20 people as opposed to one or two.

Mr. Hart stated that the Division does not object to pre-arming when it is performed in a place where the wind is not blowing, that is away from everybody, and up near the top. However, the Division believes that arming next to the cafeteria or in close proximity to the grooming crews that keep the ski runs groomed is inappropriate. The cardinal rule of blasting is to expose as few people as possible to the hazards at any one time. The current concept, as mentioned by Mr. Heywood, of having 20 people pre-arming all at once in a little shack at the top of the hill is not safe either. The Division is confident that the ski industry will develop better methods if pre-arming at the bottom of the hill is prohibited.

The Division objects to safety fuse as a delivery mechanism because it is the oldest initiation system and there are many variations that could be used. There is the argument that the state has allowed pre-arming of fuses and a primer make-up house for many years. It was used by a number of tunnels in which archaic initiation systems were used, but that rule is no longer needed.

Mr. Hart stated that static electricity comes from many sources. In the middle of the fuse is black powder, and a spark will detonate black powder instantly. It is very sensitive to sparks. That is one of the Division's chief concerns about carrying armed explosives.

The Division believes that three of the seven deaths listed in its written comments were due to attempts to disarm explosives. Once the cord is pulled, the blaster should get rid of the charge as quickly as possible.

Question No. 29:

Board Member Murray asked Mr. Hart how many states had a prohibition against arming at the bottom of the hill.

Response:

Mr. Hart responded that Washington State has allowed pre arming at the bottom of the slope, and that they have not had any accidents. He also stated that he has spoken to people in Colorado, and he has been told two different things. He cannot honestly say whether or not Colorado allows pre-arming. He stated that Gary Cruller, who runs the British Columbia program, has told him that if he ever sees anybody transporting live or armed charges by ski lift, he would shut the ski area down. Mr. Hart stated that Montana, which lost a young girl due to an explosion, has no avalanche blasting standards at all. He also knows that federal OSHA states that the California proposal is more effective than the federal standard, but there is no federal standard for avalanche blasting. The federal standards never allow long-distance transportation of armed charges, nor do they allow disassembly of armed charges before the appropriate waiting period for a misfire. Federal OSHA has disputed California's tunnel standards for many years, stating that those standards should be changed.

Question No. 30:

Dr. Frisch asked whether arming the charges in the Snow Cat was considered appropriate.

Response:

The Division does not object to their arming inside a Snow Cat. The Division does not object to arming in a shack pulled on a sled, because the very next thing done is to start skiing along the avalanche control route.

Question No. 31:

Board Member Frisch asked Mr. Hart to clarify his references to arming in the cafeteria, because in his experience at Sugar Bowl, the arming room was a great distance from the cafeteria and other public areas.

Response:

Mr. Hart responded that he had mentioned that because it was one of the alternatives stated during the advisory committee. He does not want anybody arming their charges at the bottom of the hill, and that was the point he was trying to make.

Question No. 32:

Chairman MacLeod asked whether the avalanche controllers had to adhere to the IME distance requirements.

Response:

Mr. Hart responded that there were requirements that they must perform the arming a specified distance from occupied buildings. However, the point was made in the advisory committee that at the time the pre-arming is performed, around 4:00 a.m., those buildings are not occupied and are, therefore, safe.

Question No. 33:

Chairman MacLeod asked whether pre-arming in the vicinity of an unoccupied building that would be used by the public during normal operating hours would adhere to the standard.

Response:

Mr. Hart responded that there are still a lot of people working at that time of day, such as the cook preparing soup for the day at 3:00 a.m. and the grooming crews. He stated that the goal is to minimize the number of people exposed to the hazard. He is not comfortable with allowing that practice.

Question No. 34:

Board Member Arioto asked whether there was data on static electricity directly causing detonation.

Response:

Mr. Hart responded that he was unable to provide statistical data on that issue. Much of the research done by the U.S. Bureau of Mines back in the 1920s and 1930s, when safety fuse was commonly used, has now been discarded. Mr. Hart stated that he had about five reports and none of them said that static electricity would set off a fuse. Recently, he asked the manufacturer of safety fuse assemblies for Canada for data on the use of a static shunt in a three-foot fuse to prevent a static electricity detonation. His basic response was that the information was proprietary, but that they do use it and think it is necessary.

Question No. 35:

Chairman MacLeod asked Mr. Hart to confirm that the biggest problems the Division has with the proposal as it is currently written are the pre-arming and transport procedure, as well as the disarming procedure.

Response:

Mr. Hart responded that that was correct. Mr. Hart stated that the Division would not object to an arming shack at the top of the ridge, and such a structure was also supported by both the IME and the ISEE.

Response to Comments:

With regard to the static shunt of cap and fuse assemblies in response to question no. 35 by Board Member Arioto, Board staff spoke with the manufacturer of safety fuse assemblies in question and was told that the static shunt in the cap and fuse assembly is required by Canadian government. The static shunt requirement was the result of an accident at a factory during the manufacturing of cap and fuse assemblies where static electricity build up in the manufacturing equipment was believed to have caused an explosion. The manufacturing processes of explosive materials have long been recognized as vulnerable to accidental detonation of the explosives materials being made, and have special safety standards to minimize such occurrences. Mr. Hart's comments about the proposed standard were also provided in the Division's memorandum dated February 8, 2007, by Mr. Len Welsh, Acting Chief, as summarized above, and have been addressed in responses to written comments nos. 1 through 11.

Mr. Len Welsh, Acting Chief, Division of Occupational Safety and Health

Mr. Welsh stated that each employer has unique worksite conditions and its own variations of standard avalanche blasting procedures. The employers are in a position to know where to safely arm the charges. Mr. Welsh expressed confidence that if the employers were to develop a blasting plan based on sound safety reasoning, the Division would likely go along with it. Thus, the Division is willing to support pre-arming on an employer-by-employer basis, if the employer can establish that pre-arming is safe.

Mr. Welsh stated that it was not the pre-arming and transporting of handcharges, but the unfettered discretion to pre-arm and transport it that the Division opposes.

Question No. 36:

Board Member Arioto asked Mr. Welsh whether there was any data on accidental detonation.

Response:

Mr. Welsh responded that the Division had submitted everything it had and that one of the most difficult things about this proposal was that the known incidents appear to be few and far between, though severe, so they had to go back to basic safety practices for handling explosives because those are the ones that are known to work.

Response to Comments:

Avalanche blasting is unique in its approach, and is the only blasting operation that is permitted to ignite a charge while the blaster holds it and the only operation to allow throwing the charge. Therefore, the basic safety principles applicable to avalanche blasting are often not the same as the basic safety practices for other blasting operations. The avalanche blasting accidents of the past have led to the changes in basic procedures to prevent the reoccurrence of the unsafe conditions that led to the blasting accidents. The proposed standard reflects these unique procedures and necessities as addressed in responses to written comments nos.1 through 13.

MODIFICATIONS AND RESPONSE TO COMMENTS RESULTING FROM THE 15-DAY NOTICE OF PROPOSED MODIFICATIONS

No further modifications to the information contained in the Initial Statement of Reasons are proposed as a result of the 15-day Notice of Proposed Modifications mailed on June 4, 2007.

Summary and Response to Written Comments:

Mr. Charles T. Davey, Retired Engineer/Scientist, by letter dated June 8, 2007

Comment No. 1:

Mr. Davey indicated that although he could not identify a specific problem with the proposal, the possible build-up of static electricity on the body of the helicopter when used to deploy explosives was a cause for concern.

Response:

Board staff agrees with the commenter that static electricity build-up on the body of the helicopter during flight is a common occurrence. Because the charge will be distributed equally throughout the helicopter and its content, no electrical potential exists between

the explosives, the blaster and the body of the helicopter. There is no danger of static-electricity-caused premature detonations of the explosive during helicopter avalanche blasting operations.

Board staff believes no modification of the proposed language with regard to this specific issue is necessary.

The Board thanks Mr. Davey for his participation in the rulemaking process.

Mr. Lon Santis, Manager of Technical Services, Institute of Makers of Explosives (IME) by email dated June 22, 2007

Comment No. 2:

Mr. Santis continues to oppose 1) the proposed pre-arming of explosives at the bottom of the ski run and subsequent long-distance transportation of armed charges, 2) disarming of misfired handcharges before the 30-minute waiting period and 3) the use of safety fuse with less than 120 seconds burn time and shorter than 3 feet.

Response:

As stated in response to initial written comments nos. 1, 2 and 4, the proposed avalanche blasting standard mirrors well established avalanche-blasting procedures that have been used for over 30 years, and that were adopted by the International Society of Explosives Engineers (ISEE) Avalanche Control Task Force in 2001. Hazards associated with avalanche blasting would be controlled and minimized by the proposed avalanche-blasting standard. It appears that the handcharge related accidents that have occurred in the past would have been prevented had the proposed standards been followed.

Board staff believes no modification of the proposed language with regard to these specific issues is necessary.

The Board thanks Mr. Santis for his participation in the rulemaking process.

Mr. Alan Traenkner, Acting Regional Administrator, Region IX, U.S. Department of Labor, Occupational Safety and Health Administration by letter dated June 20, 2007

Comment No. 3:

Mr. Traenkner stated that the proposal is not as effective as the federal standards in protecting employees engaged in avalanche blasting because of the following:

- 1) The proposal does not address the fact that the manufacturer's instructions for the pull-wire igniter indicates the igniter should never be used where static electricity might be a factor in effecting a premature detonation of explosives.

- 2) The proposal would allow the use of explosives that might not be recommended for avalanche blasting because the text states that explosives shall have either excellent weather resistance or shall be recommended for avalanche control by the manufacturer.

Response:

Section 3203 of the General Industry Safety Orders mandates that every employer ensure employees comply with safe and healthy work practice. This safety order mandates the control of hazards posed by static electricity, and if such control would not be possible, it would require the cessation of all blasting operations. The proposed blasting standard does not relieve the employer of this requirement. Additionally, Section 5245 in Group 18, Explosives Materials, in the General Industry Safety Orders, mandates that blasting operations be stopped and all persons in the blasting area withdrawn when an electrical storm approaches. Therefore, the proposed avalanche standard and other applicable standards within Title 8 address the manufacturer's recommendation fully.

With regard to item 2 in comment no. 3, Section 5352(b) requires the use of explosives that have excellent weather resistance or that are recommended for avalanche control by the manufacturer. Few if any manufacturers provide specific recommendations or guidance to the user as to what industry or environment their explosives are to be applied. The proposal sets a quality standard to ensure that the explosive material used will remain viable during weather conditions to which it would routinely be exposed during avalanche blasting operations. The standard does not provide the blaster the option to use explosives contrary to manufacturer's recommendations.

Board staff believes no modification of the proposed language with regard to these specific issues is necessary.

The Board thanks Mr. Traenkner for his participation in the rulemaking process.

Mr. Wesley L. Bender, Blasting Consultant, Board of Directors, ISEE (Retired), by letter dated June 15, 2007

Comment No. 4:

Mr. Bender supports the proposed standards and urges the Board to adopt them.

Response:

The Board thanks Mr. Bender for his participation in the rulemaking process and support of the proposed standard.

ADDITIONAL DOCUMENTS RELIED UPON

1. Avalanche Handbook, U.S. Department of Agriculture, Forest Service, July 1978, Agriculture Handbook 489, pages 117 through 130.
2. Sensitivity Testing of Hand Charges Used In Avalanche Control CANMET, Canada Centre for Mineral and Energy Technology Energy, Mines and Resources, Canada.

Copies of these documents are available for review Monday through Friday from 8:00 a.m. to 4:30 p.m. at the Standards Board Office located at 2520 Venture Oaks Way, Suite 350, Sacramento, California.

ADDITIONAL DOCUMENTS INCORPORATED BY REFERENCE

None.

DETERMINATION OF MANDATE

These standards do not impose a mandate on local agencies or school districts as indicated in the Initial Statement of Reasons.

ALTERNATIVES CONSIDERED

The Board invited interested persons to present statements or arguments with respect to alternatives to the proposed standard. No alternative considered by the Board would be more effective in carrying out the purpose for which the action is proposed or would be as effective as and less burdensome to affected private persons than the adopted action.