OCCUPATIONAL SAFETY
AND HEALTH STANDARDS BOARD
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Title 8, Snow Avalanche Blasting and Remote Avalanche Control Systems (RACS) Sections 5349, 5350, and 5357

Advisory Committee Meeting Minutes

November 14, 2024
9:00 am- 4:00 pm

Zoom Meeting

Chair
Kevin J. Goddard, Senior Safety Engineer

Analyst
Tishara Ann Davis, Regulatory Analyst

Board Staff
Millicent Barajas, Executive Officer
Michelle Iorio, Attorney
Amalia Neidhardt, Principal Safety Engineer
Simone Sumeshwar, Senior Safety Engineer
Marlo Miura, Regulatory Analyst

Participants

Name	Organization
Adam Ikemire	Kirkwood Mountain Ski Resort
Amy Armstrong	Avalanche Artillery Users of North America Committee (AAUNAC)
Andy Richard	Caltrans
Becs Hodgetts	United States Forrest Services (USFS)
Bobby Park	Cal/OSHA
Braden Schmidt	CIL Explosives
Brenden Cronin	Avalanche Infrastructure Management
Brian Slusser	Palisades Tahoe
Chuck Megivern	Mammoth Mountain Ski Resort
Daniel Flynn	Mammoth Mountain Ski Resort
Darrin Williams	Operating Engineers Local 3
Elmer Lizardi	California Federation of Labor Unions

Name	Organization
Eric Murakami	Snowbird Resort
Greg Cunningham	Kirkwood Mountain Ski Resort
Jamie Yount	Wyssen USA
James Wittry	Cal/OSHA Minning and Tunneling
Janelle Walker	US Forrest Service
Jason Denning	Cal/OSHA
Jeff Goldstone	National Ski Area Association Explosives Committee (NSAA)
Kenneth Bokelund	Avalanche Risk Solutions
Mark O' Green	Union Pacific Railroad
Mike Ferrari	Mt. Rose
Mike Reitzell	Ski California
Robert Bickor	Caltrans
Scott Prather	Cal/OSHA Amusement Rides & Tramway Unit
Scott Quisfeld	Mammoth Mountain Ski Resort
Simon Trautman	National Avalanche Center (NAC), United States Forrest Service (USFS)
Yancy Yap	Cal/OSHA

Summary of Rulemaking Topic
Amend Title 8, General Industry Safety Orders, Sections 5354 (Scope), 5350 (Training), 53557 (Snow Avalanche Control Blasting), regarding snow avalanche blasting to allow remote control deployment of avalanche charges (explosives), also known as Remote Control Systems (RACS).

The Occupational Safety and Health Standards Board (OSHSB) granted Petition 575, requiring convening a Snow Avalanche Control Blasting advisory committee. The decision is available on the OSHSB website: Petition File No. 575.

Additionally, the AC considered the regulatory language developed by the 2018 AC for Snow Avalanche Control Blasting that was convened to address provisions requiring written Avalanche Blasting Control Procedures and requirements for safe distance when deploying handcharges.

Economic Impact/ Request for Cost Information
The advisory committee participants will provide written economic impacts to the Chair.

US Forrest Service (USFS) Artillery Program Presentation
Presenter(s)
Simon Trautman, US Forrest Service, Director of USFS National Avalanche Center
Janelle Walker, US Forrest Service, Mountain Program Manager
Summary of Presentation
The USDA Forest Service (FS), in conjunction with seven ski areas around the US, uses US Army howitzers and ammunition to mitigate snow avalanches. While there is an ample supply of ammunition, these howitzers are aging and the weapons are no longer supported by the US Army. There is no equivalent newer weapons system. Therefore, the program is not sustainable. The Army and the FS are working to transition ski areas away from Artillery for avalanche mitigation. Although modern alternatives to howitzers are costly, they are readily available. The majority of these alternatives are classified as Remote Avalanche Control Systems, or 'RACS'. These systems are used effectively in Colorado, Wyoming, Utah, Washington, and Arkansas. Ski areas in California need access to these systems in order to safely, and effectively, transition away from artillery.

Discussion
Section (§) 5349. Scope.

1) **Do the definitions "deploy" and "position of safety" reflect operating procedures?**
   a. Proposed Text
      §5349(a) Definitions
      Deploy. The act of throwing, placing, tethering or propelling a charge into position for detonation.
      Position of Safety. A location where an employee is isolated or protected from hazards of blasting or the ensuing avalanche.

   b. Proposed Amendments
      Jason Denning, Cal/OSHA: Add dropping to the definition of deploy.

      Mark O'Green, Union Pacific Railroad: Add remote to the definition of deploy.

      Yancy Yap, Cal/OSHA: Relocate the proposed definitions of deploy and position of safety to §5237.

      Mark O'Green, Union Pacific Railroad: Notate "avalanche specific" in parentheses for definitions that may confuse blasters.

   c. Comments
      Jeff Goldstone, NSAA: The new definitions should remain within the new §5349 for training purposes and clarity. (Consensus from CIL Explosives)

      Jason Denning, Cal/OSHA: Relocating the definitions to §5237 would not affect the regulations. Regulations commonly have definitions in one section.

Outcome: §5349 will be amended.

Action Item: OSHSB will determine the ideal location for the definition of deploy and position of safety.

2) **Should a definition for remote avalanche control systems (RACS), or can RACS be defined as an explosive-based system?**
   a. Proposed Text
      §5349(a) Definitions.
      A definition for RACS may be added. Please refer to the proposed amendments and comments.

   b. Proposed Amendments
      James Wittry, Cal/OSHA: Add a broad definition for RACS.

   c. Comments
      Kenneth Bokelund, Avalanche Risk Solutions: Could RACS be called an explosive-based system?

      Jason Denning, Cal/OSHA: NFPA defines explosive as 'if the detonation produces a supersonic faster than the speed of sound".

      Braden Schmidt, CIL Explosives: RACS is an explosive, but not by the NFPA definition.

      Outcome: §5349(a) definitions will be amended.

      Action Item: The Chair will draft a broad general definition of RACS.

3) **Are gas-based systems included in the proposed rules and regulations?**
   a. Proposed Text
      Gas-based RACS may be added to the proposed regulations. Please refer to the proposed amendments and comments.

   b. Proposed Amendments
      Jason Denning, Cal/OSHA: Add a gas-based RACS section in this rulemaking proposal.

   c. Comments
      Jason Denning, Cal/OSHA: Differentiate between gas-based and solid-state explosives based on NFPA definition of explosives.

      Braden Schmidt, CIL Explosives: Gas based, and solid-state explosive RACS initiate snow avalanches using pressure waves.

Kenneth Bokelund, Avalanche Risk Solutions: Workers are not involved in gas-based systems.

Yancy Yap, Cal/OSHA: Existing regulations include gas-based systems. Maintenance workers are included in gas-based systems.

Outcome: §5349 will be amended.

Action Item: The Chair will add a section for gas-based RACS.

§5350. Training.

4) Review the relocation changes within §5350(C) through (2) for consensus (refer to strikethrough, substantial changes were not made).

a. Proposed Text

§5350(b).

*****

(C)Procedures for clearing and guarding the ski lifts, blasting areas, slopes, and runout zones pursuant to requirements in Section 5356(c)(5), Section 5357(a)(~~2)~~(3), Section 5357(b)(6) and Section 5357(e)(3) where applicable.

*****

(e) Essential personnel, as defined in the Note in Section 5355.1(a), other than avalanche blasting crewmembers, shall be adequately trained and competent in their blasting related duties and in the following:

*****

(2) Clearing adjacent areas pursuant to requirements in Sections 5355.1(a)(1) and (3), Section 5356(c)(5), 5357(a)(~~2)~~(3), Section 5357(b)(6) and Section 5357(e)(3) where applicable;

b. Proposed Amendments

None

c. Comments

None

Outcome: Affirmed

Action Item: None

§5357. Snow Avalanche Control Blasting.

5) Review §5357(a)(1) through (2) for consensus.

a. Proposed Text

§5357.

(a)General Requirements.

<u>(1) The employer shall develop and implement effective, written procedures for avalanche control blasting to ensure the safety of avalanche blasting crewmembers during all phases of avalanche control blasting.</u>

(A) The procedures shall be reviewed and updated as often as necessary to ensure that the procedures reflect current, safe operating procedures.
(B) The procedures shall include at a minimum:
1. Recognition of avalanche and blasting hazards;
2. Access to deployment zones;
3. Communication among avalanche blasting crewmembers;
4. Pre-selection of position(s) of safety and terrain barrier(s);
5. Handling, arming, and deploying of explosives; and
6. Emergency response and rescue.
(C) The employer shall provide for the effective participation of avalanche control blasting crewmembers in the development of safe avalanche control blasting procedures.
(D) The employer shall ensure that all avalanche control blasting crewmembers are competent in the avalanche control blasting procedures.
(E) The employer shall provide effective training on the avalanche control blasting procedures to avalanche blasting crew members at least annually.
1. The training shall be conducted prior to the first blasting operation of each avalanche control season.
2. The employer shall provide an opportunity for interactive questions and answers on avalanche blasting procedures with a licensed avalanche blaster knowledgeable and experienced with the procedures.
EXCEPTION to subsection (a)(1)(E): If no blasting occurs during the entire avalanche control season, then training on the procedures is not required for that season.

b. Proposed Amendments
Kenneth Bokelund, Avalanche Risk Solutions: Majority of §5357 relates to training. Relocate the language to §5350.

c. Comments
Amalia Neidhart, OSHSB: The Board considers written procedures separate from training. (Consensus from Cal/OSHA)

Outcome: Affirmed

Action Item: None

6) Should an exception be included in §5357(a)(6)?

a. Proposed Text
§5357(a) General Requirements.
*****
~~(5)~~(6) Avalanche blasting shall be conducted during daylight hours, except during emergency operations.

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

b. Proposed Amendments
Braden Schmidt, CIL Explosives: Add an exception for subsection (6) regarding daylight hours.

Jason Denning, Cal/OSHA: Add "for blasting operations other than RACS above subsections 6 & 7" or add an exception to (5) and (6) that states "except as provided in subsection (f)."

c. Comments
Jason Denning, Cal/OSHA: Add subsections instead of having multiple exceptions to avoid conflicting language.

Jeff Goldstone, NSAA: Subsection (6) was drafted in 2008 with the intent to create a safe space for workers to do hand-charging at night.

Simon Trautman, USFS: Refer to existing regulations for artillery.

Michael Reitzell, Ski California: General requirements should not be too broad to avoid nonapplicable scenarios.

Outcome: The proposed language will be amended

Action Item: The Chair will consider the proposed amendments when drafting the language.

7) Review §5357(b)(4)(B)(1) through (5) for consensus.

a. Proposed Text
§5357(a) General Requirements.
*****
(4) Before attaching the igniter, the blaster shall:
*****
~~(B)~~(C) Check the runout zone for personnel;
~~(C)~~(D) Check the blast area for personnel; and
(E) Orally alert all affected crewmembers each time a charge will be deployed.
*****
(5) When the blast area and runout zone are clear of personnel, the blaster igniter shall be attached to the safety fuse, and immediately activated the igniter to ignite the charge and the charge deployed the charge within 20 seconds of attaching the igniter onto the safety fuse.

b. Proposed Amendments

Yancy Yap, Cal/OSHA: Amend subsection to (C) to state, "Ensure there are no personnel in the runout zone." Amend subsection (D) to state, "Ensure there are no personnel in the blast area."

c. Comments
Jeff Goldstone, NSAA: The language used in (5) should refer to the igniter being attached to the safety fuse.

Chuck Megivern, Mammoth Mountain: Subsection (5) does not reflect the 2018 proposed language.

Yancy Yap, Cal/OSHA: Weather conditions may cause subsection (E) to be unenforceable.

Braden Schmidt, CIL Explosives All staff on a blasting mission have radio devices that allow for oral communication despite the weather. Replacing "runout zone" with "danger zone" provides an accurate description of the area, which includes the buildings, roadways, etc. The danger zone includes the runout zone.

Jeff Goldstone, NSAA: Runout zones and blast zones are the standard terms used in the industry.

Outcome: The proposed language will be amended.

Action Item: OSHSB will clarify runout zone and review the historical reference regarding runout zone and blast zone.

8) Review §5357(b)(7) through (9) for consensus.

a. Proposed Text
§5357(b) Hand Deployed Charges (handcharges).
*****
(7) Prior to any handcharge being ignited, avalanche blasting crewmembers not involved in igniting or deploying the handcharge shall be behind the pre-selected terrain barrier or remain in a position of safety as described in subsection (b)(4)(B). Each crewmember shall orally report to the blaster-in-charge the crewmember's position of safety, and the blaster-in-charge shall orally acknowledge the report or, when necessary, re-direct the crewmember to another position of safety.
(8) Immediately following the deployment of a charge, the avalanche blasting crewmember responsible for deploying the charge shall move or be behind the pre-selected terrain barrier or to the other position of safety described in subsection (b)(4)(B).
~~(7)~~(9) At the completion of individual avalanche control routes, unused charges shall be deployed or disarmed pursuant to Section 5358(h)(1) and all components transported and returned to approved storage magazines pursuant to requirements in Article 121.

Exception to subsection (b)(9): Unused charges that are immediately required for deployment at another location.

b. Proposed Amendments
None

c. Comments
None

Outcome: Affirmed

Action Item: None

9) Does §5357(f)(3) reflect gas-based systems?

a. Proposed Text
§5357(f) Remote avalanche control system (RACS) requirements.
*****
(3) RACS with no possibility of exposing employees to explosive hazards from the handling, storage, or deployment of explosive materials shall be installed, maintained, serviced, and repaired according to manufacturer's instructions and shall be excluded from the requirements of subsection (f)(4).

b. Proposed Amendments
Jason Denning, Cal/OSHA: Add “but not limited to gas-based systems” in subsection (3).

c. Comments
Jason Denning, Cal/OSHA: How are gas-based systems charged?

Kenneth Bokelund, Avalanche Risk Solutions: Separate compressed propane tanks and oxygen cylinders are remotely mixed.

Jason Denning, Cal/OSHA: Is a propane tank an explosive?

Jeff Goldstone, NSAA: According to Cal/OSHA training, propane tanks are not categorized as explosives, according to our Cal/OSHA training.

Jason Denning, Cal/OSHA: Subsection (3) captures gas-based systems.

Yancy Yap, Cal/OSHA: Subsection (3) reads that everything is applicable if an accident occurs. Rewrite subsection (3).

Outcome: The proposed language will be amended.
Action Item: The Chair will amend §5357(f)(3).

10) Should firing and loading procedures be separated into subsections?

a. Proposed Text
§5357(f)(4) RACS with any possibility of exposing employees to explosive hazards shall comply with the following requirements:
(A) During loading and firing of explosive rounds, the firing crew shall consist of the blaster in charge, one trained operator, and/or one blaster in training. All other personnel shall be removed to a minimum of 100 feet from the RACS before firing can commence.

b. Proposed Amendments
None

c. Comments
Jeff Goldstone, NSAA: Loading and firing are separate operations. Loading is typically completed pre-season by multiple people.

Jason Denning, Cal/OSHA: The regulation does not require three people "and /or is stated."

Jamie Yount, Wyssen USA: Wyssen USA standards are based on proper training and not a specific mandated number of personnel for loading.

Chuck Megivern, Mammoth Mountain: Loading and firing should have separate sections. The industry must rely on the manufacturer's requirements and not mandate a specific number of personnel for operations.

Kenneth Bokelund, Avalanche Risk Solutions: A trained person can perform loading and firing procedures. The industry would be limited if only a licensed blaster could perform operations.

Simone Sumeshwar, OSHSB: The 1970 ANZI standard for commercial blasting states, "the handling of explosives and blasting agents shall be performed by a qualified blaster or by other employees under the direct supervision of a qualified blaster provided that such employees are at least 21 years of age."

Jason Denning, Cal/OSHA: The written regulation does not require a licensed blaster to perform the blasting procedures.

Kenneth Bokelund, Avalanche Risk Solutions: Do any manufacturers conduct certified specific training for operators?

Jamie Yount, Wyssen USA: Wyssen USA staff are trained by the manufacturer. There is no certification. Loading and blasting training is offered virtually and in person. Everyone is trained at the same level. The training record is in the user's interface and accessible by the user.

Brenden Cronin, Avalanche Infrastructure Management: The activation process for these systems is multi-step. Manufacturers must train personnel. The blasting procedures are then initiated through the training platform. One person can perform the blasting procedure, and detonating the blasting process is a two-step procedure.

Outcome: The proposed language will be amended.

Action Item: The Chair will separate loading and firing into separate sections.

11) Is §5357(f)(4)(A) redundant?

a. Proposed Text
§5357(f)(4) RACS with any possibility of exposing employees to explosive hazards shall comply with the following requirements:

b. Proposed Amendments
None

c. Comments
Kenneth Bokelund, Avalanche Risk Solutions: The proposed text is redundant to the runout zone.

Outcome: The proposed language will be amended.

Action Item: The Chair will revise the last sentence from §5357(f)(4)(A).

12) Should the manufacturer's instructions or the manufacturer's recommendations be used in §5357(f)(4)(B) & (C)?

a. Proposed Text
§5357(f)(4) RACS with any possibility of exposing employees to explosive hazards shall comply with the following requirements:
*****
(B) All equipment shall be in good working condition, and shall be assembled, maintained, and operated in accordance with the manufacturer's instructions.
(C)The components of RACS shall be replaced, assembled and used in accordance with the manufacturer's instructions.

b. Proposed Amendments
Mark O'Green, Union Pacific Railroad: Combine clauses (B) and (C) by stating "all equipment and components."

c. Comments
Kenneth Bokelund, Avalanche Risk Solutions: The industry's standard language is the manufacturer's recommendations.

Jason Denning, Cal/OSHA: Use the manufacturer's instructions and recommendations. The terms have two separate meanings.

Amalia Neidhart, OSHSB: Manufacturer's instructions are commonly used within existing regulations. (Consensus from Wyssen USA)

Outcome: The proposed language will be amended.

Action Item: OSHSB will consult with legal to determine if and /or can be used within the proposed rules and regulations. The Chair will consider all recommendations when determining whether the manufacturer's recommendations or instructions will be used.

13) Does §5357(f)(4)(D) accurately reflect transporting procedures?

a. Proposed Text
§5357(f)(4) RACS with any possibility of exposing employees to explosive hazards shall comply with the following requirements:
*****
(D) The explosives and related components shall be inspected before transport loading to the RACS site to ensure proper working condition, and shall be free from damage, obstructions, dirt and debris.

b. Proposed Amendments
Chuck Megivern, Mammoth Mountain Ski Resort: Replace "transport" with "loading" in subsection (D).

Kenneth Bokelund, Avalanche Risk Solutions: Amend subsection (D) to "Shall be inspected before transport and prior to loading."

Jason Denning, Cal/OSHA: Add "immediately" in front of "prior to loading".

c. Comments
None

Outcome: The proposed language will be amended.

Action Item: The Chair will consider the proposed amendments.

14) What is the intent of §5357(f)(4)(E)?

a. Proposed Text

§5357(f)(4) RACS with any possibility of exposing employees to explosive hazards shall comply with the following requirements:
*****
(E) Defective RACS components shall not be used and shall be properly disposed of or returned to the manufacturer.

b. Proposed Amendments
Kenneth Bokelund, Avalanche Risk Solutions: Add repair language in subsection (E).

Kenneth Bokelund, Avalanche Risk Solutions: Delete subsection (E).

Jason Denning, Cal/OSHA: Keep subsection (E) and specify explosives.

c. Comments
Jason Denning, Cal/OSHA: Defective means nonoperational. A missing component may not mean defective. Do manufacturers allow the customer to repair components?

Jamie Yount, Wyssen USA: Yes, repair by the customer is allowed. What is the intent of subsection (E)? If it is the broad RACS, subsection (E), as written, is fine.

Kenneth Bokelund, Avalanche Risk Solutions: Subsection (E) may be redundant to subsections (B) & (C).

Outcome: The proposed language will be amended.

Action Item: The Chair will consider the proposed amendments.

15) Is §5357(f)(4)(F) redundant?

a. Proposed Text
§5357(f)(4) RACS with any possibility of exposing employees to explosive hazards shall comply with the following requirements:
*****
(F) The RACS safety devices or components shall not be removed, unless recommended by the manufacturer and is approved by Cal/OSHA.

b. Proposed Amendments
None

c. Comments

Chuck Megivern, Mammoth Mountain Ski Resort: Subsection (F) may be redundant to subsection (C).

Yancy Yap, Cal/OSHA: Subsection (F) may not be necessary. Cal/OSHA does not have the expertise to enforce (F).

Outcome: The proposed language will be amended.

Action Item: The Chair will strike subsection §5357(f)(4)(F).

16) Should "not in use" be defined in §5357(f)(4)(J)?

a. Proposed Text
§5357(f)(4) RACS with any possibility of exposing employees to explosive hazards shall comply with the following requirements:
*****
(J) The RACS shall be stored in a nonfunctional condition when not in use or shall be locked securely to prevent unauthorized use.

b. Proposed Amendments
Kenneth Bokelund, Avalanche Risk Solutions: Add "when not in use, RACS should be stored and inaccessible."

c. Comments
Jeff Goldstone, NSAA: The term not "in use" is unclear. A definition may be needed.

Kevin Goddard, OSHSB Chair: If the device is in a static position, is it in use?

Jeff Goldstone, NSAA: If the device is loaded and in position, it is in use.

Mike Ferrari, Mt. Rose: The "in use" term should be defined by ATF guidelines.

Outcome: The proposed language will be amended.

Action Item: The Chair will consider the proposed amendments.

NOTE: Due to the committee's concerns about 5357(f)(4)(M) and the limited time remaining for the meeting, the Chair made the decision to expedite the review and asked the committee to consider 5357(f)(4)(K), 5357(f)(4)(L) and 5357(f)(4)(M) at the same time. The committee spent the last portion of the meeting focused on 5357(f)(4)(M). Based on feedback, the Chair believes that the committee did not have sufficient time to discuss 5357(f)(4)(K), 5357(f)(4)(L) and 5357(f)(4)(M) or to identify any potential impacts that the proposed changes could have on the industry. Therefore, the Chair will request to convene an additional advisory committee meeting to be held in-person.

17) What is the intent of §5357(f)(4)(M)?

a. Proposed Text

§5357(f)(4) RACS with any possibility of exposing employees to explosive hazards shall comply with the following requirements:

*****

(M) RACS utilizing explosives mated to their initiation system and handled by an employee must use safety fuses that have an "ignition spit" that is visible from 25 feet away at initiation conditions. After ignition, the fuse must look dissimilar than before ignition of the safety fuse.

b. Proposed Amendments

Greg Cunningham, Kirkwood Mountain Ski Resort: Delete subsection (M).

Mark O'Green, Union Pacific Railroad: Amend subsection (M) to state, "RACS utilizing safety fuse should be loaded in good visibility."

c. Comments

Chuck Megivern, Mammoth Mountain Ski Resort: Subsection (M) limits electronic blasting systems and other initiation systems.

Jason Denning, Cal/OSHA: Subsection (M) implements safety procedures for when employees handle fuses.

Braden Schmidt, CIL Explosives: When was the most recent accident/statistics?

Yancy Yap, Cal/OSHA: The most recent accident was in 2019.

Outcome: The proposed language will be amended.

Action Item: The Chair will consider all proposed amendments when redrafting §5357(f)(4)(M).

Closing Remarks

Kevin Goddard, OSHSB Chair: Thank you for your participation. Please submit any questions, comments, or concerns to me via email by Friday, December 6, 2024.

Amalia Neidhart, OSHSB: Thank you for your participation. The Standards Board will contact the committee members for further recommendations. Please include any cost concerns with your written comments.