

MINUTES OF THE ADVISORY COMMITTEE FOR
GENERAL INDUSTRY SAFETY ORDERS
SECTIONS 3401-3407 AND 3410-3411
PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT FOR FIRE FIGHTERS
Revisions in NFPA 1851, 2020 Edition

November 13, 2023
In-Person at Cal FIRE Headquarters
715 P Street, 2nd Floor Conference Room
Sacramento, CA 95814

1. Call to Order.

The video conference meeting was called to order by the Committee Chair (**Chair**), Maryrose Chan, Senior Safety Engineer, Occupational Safety and Health Standards Board (OSHSB), at 10:00 am on Monday, November 13, 2023, in Sacramento, CA. The Committee Chair was assisted by Bernie Osburn, Associate Governmental Program Analyst.

2. Opening remarks.

The **Chair** welcomed the attendees. Members of the advisory committee meeting introduced themselves. The Committee Chair reminded everyone that the purpose of this advisory committee is to advise the Occupational Safety and Health Standards Board (OSHSB) on how to write the rules to protect the health and safety of fire fighters.

The **Chair** pointed out that the Administrative Procedure Act has guidelines that are required to meet, include the following:

- Authority and reference
- Necessity for the rulemaking
- Clarity
- Consistency
- Non-duplication
- Preference for performance based standards
- Explore Alternatives

In addition, federal OSHA requires regulations to be at least as effective as the federal standards and the language must be enforceable.

3. The Chair mentioned that a researcher, who wrote a paper on wildland fire fighting personal protective clothing and cleaning practices will be presenting information specific to California. Review of Action Items from the April 4, 2023, Meeting and Discussion Draft

The **Chair** proceeded to review the proposed changes to the discussion draft in chronological order. The proposed amendments to the discussion draft by staff are in blue text. The proposed changes by advisory committee members are in red text.

Proposal:

§3401. Application and General Requirements.

(a) These Orders establish minimum requirements for personal protective clothing and equipment for fire fighters when exposed to the hazards of fire fighting activity, and take precedence over any other Safety Order with which they are inconsistent. Personal protective clothing, equipment or devices include protective ensembles or ensemble elements as defined by the NFPA standards, which are incorporated by reference in Article 10.1.

Outcome:

The proposed changes were accepted.

Discussion:

The **Chair** proposed to change the title of the section to reflect the contents of the section. Subsection (a) is about the application of the section and subsection (b) contains general requirements. The underlined text was added for clarity.

There were no comments from the advisory committee members.

Proposal:

§3402. Definitions.

Personal Protective Equipment. Clothing, equipment or devices necessary to comply with Article 10.1. Personal Protecting Clothing and Equipment for Fire Fighters.

(A) Ensemble Elements. The compliant products that provide protection to the upper and lower torso, arms, legs, head, hand, and feet.

(B) Proximity Fire Fighting Protective Ensemble. Multiple elements of compliant protective clothing and equipment that when worn together provide protection from some risks, but not all risks, of emergency incident operations.

(C) Structural Fire Fighting Protective Ensemble. Multiple elements of compliant protective clothing and equipment that when worn together provide protection from risks, but not all risks, of emergency incident operations.

(D) Wildland Fire Fighting and Urban Interface Protective Clothing and Equipment. Items of compliant protective clothing and equipment products that provide protection from some risks, but not all risks, of emergency incident operations.

Outcome:

The proposed changes were accepted.

Discussion:

The **Chair** proposed to add the above definitions from the NFPA standards.

There were no comments from the advisory committee members.

Proposal:

Section 3402.1 Purchase Quality Standards for Personal Protective Clothing and Equipment for Structural and Proximity Fire Fighting

(a) Personal protective clothing (ensemble elements) purchased on or after [OAL to insert - 6 months after the effective date], for use in structural or proximity fire fighting shall meet certification, labeling, design, performance, and testing requirements of National Fire Protection Association (NFPA) 1971, Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, 2018 Edition, which is hereby incorporated by reference. In addition to any other applicability, the aforementioned purchase quality standards apply to discretionary equipment orders or purchases.

EXCEPTION 1: Protective ensembles or ensemble elements meeting the most current NFPA 1971 edition will be deemed as meeting the standard.

EXCEPTION 2: Helmets can be purchased without ear covers, faceshield, or goggles, or both, provided that the shell, energy absorbing system, fluorescent and reflective trim meet the requirements of NFPA 1971, 2018 edition.

Modified proposal:

EXCEPTION 2: Helmets can be purchased without ear covers, faceshield, or goggles, or both, provided that the shell, energy absorbing system, fluorescent and reflective trim meet the performance requirements of NFPA 1971, 2018 edition. For any head protection that does not come with assembled ear protection or eye protection, the employer shall provide ear

protection and/or eye protection that meets the minimum NFPA requirements in conjunction with the helmet.

Outcome:

The **Chair** will edit the above proposal. Manufacturers will consult their legal team.

Discussion:

- The **Chair** stated the section informs the reader on what the employer must purchase. Subsections (a) through (f) were consolidated to one subsection (a). During the April 2023 meeting, the committee discussed that helmets cannot be purchased by themselves. Helmets must be purchased with ear covers, faceshield or goggles or both.

In response, there was a proposal to add an exception to allow the purchasing of helmets without earcovers, faceshield or goggles. The proposed exception was recommended by CalFire and the LA County Fire Department. The text for the exception was developed during the subcommittee meetings. The proposed exception is not consistent with existing NFPA standard, which requires that the helmet be purchased as a set to include earcover, faceshield or goggles, or both.

- **Alameda County Fire Department** asked if a manufacturer would sell an NFPA helmet with the NFPA label when it does not have the other items required by the NFPA standard. Without the other items, the helmet will not have a sticker stating that it is NFPA compliant. In addition, a question was asked regarding the culpability of manufacturers if non-NFPA goggles and ear covers were used with the helmet.
- The **Chair** clarified that individual element items when purchased separately are still required to be NFPA compliant. The proposal allows the purchase of the items separately and not as a set. Goggles, faceshield, ear covers are still required to be NFPA compliant. The proposed exception does not permit the purchasing of a substandard helmet. The helmet-shell, energy absorbing system, fluorescent and reflective trim must meet the NFPA requirements. The helmet must meet the same impact testing, temperature resistance as NFPA the standard.

The **Chair** asked what kind of documentation would the manufacturers be able to provide so that the employer can verify the helmet meets the NFPA performance standards.

- **Phenix Technologies** stated they cannot sell helmets as NFPA certified if it does not include all the other required elements. Phenix Technologies sells helmets without goggles or earflaps that meet the testing requirements of NFPA, but they are sold as OSHA compliant

helmets. There is a standard for OSHA compliant helmets. It is too much of a liability to sell a helmet as NFPA certified without the other items.

- **CalFire** stated the proposal does not require helmets come with the NFPA sticker. LA County and CalFire are trying to do something different from the NFPA standard. Phenix helmets currently provide helmets for CalFire and the Cal/OSHA sticker is acceptable to CalFire and LA County.
- The **Chair** understands the helmet will not have the NFPA certification sticker. The **Chair** asked if there is some way to verify that it is the same helmet, but it is without the eyes, ear, and neck protection. The other items, the eye, ear and neck protection can be purchased separately and must meet the NFPA standards. The proposal is to decouple them so that they do not have to be purchased as a set every time you purchase a helmet.
- **Alameda County Fire Department** asked if the testing methods required for an OSHA compliant helmet include the impact resistance, impact penetration, and the chin strap - the same as the NFPA standards.
- **Bullard Safety** stated that OSHA test methods are different from NFPA test methods. NFPA has an elevated overall standard of protection. The helmets manufacturers provide are NFPA compliant, so they are tied to the NFPA standards. Bullard Safety helmets are tested by a third-party testing group-SCI. Bullard Safety can get documentation showing that the helmet meets the heat testing and impact testing, but the helmet now belongs to a separate category because it does not meet all the requirements of the NFPA standard without the eyes, ear, and neck protection. Bullard Safety has to check with their legal team because it brings litigation possibilities.
- The **Chair** stated that the standard for OSHA approved helmets is based on a US Department of Commerce August 1977 (recording said 1973) standard. That is not the kind of helmet we want the fire fighters to be using. We want the shell and all the other components of the helmet to have the same performance as the NFPA helmet. We want the same NFPA helmet but allow CalFire to pair them with the NFPA approved eye, ear, and neck protection that meets their needs for their operations.
- **CalFire** agreed with the statement the **Chair** made. CalFire clarified that their proposal is not to change the design, performance, lower the level of safety, or change the testing of the helmet. They are asking for the other items to be an optional purchase item. The NFPA standard requires the other elements and this requirement has not kept up with the times. Cal Fire wants to reduce the exposure to carcinogens. They should not promote the use of

goggles or earflaps, which are the required items of the helmet, to be worn outside of the firefighting environment. Eye protection must also be worn in a vehicle type of accident. There are other ways to get the necessary eye protection that they need.

One reason ear flaps should be optional is that structural hoods provide the same level of protection as the earflaps. In addition, the helmet has the ear flap that may be contributing to heat illness. There is the laundering issue, are they being washed and decontaminated in the appropriate time frames.

- **Bullard Safety** appreciated CalFire's comment regarding the reduction of exposure to carcinogens. Fire fighters wear soft goods outside of the fire. Because fire fighters put on those helmets when they are out of the fire, their company created care kits, which allows all soft goods to be bundled washed in the extractor. Washing cleans and removes majority of carcinogens. The eye protection can be removed. The bourke systems (flip down eye protection attached to the helmet) can't be removed but they can be cleaned using a cleaning solution.
- The **Chair** stated that the fire departments are required to do their risk assessment and pair their helmets with the appropriate eye and neck protection. The exception gives them the flexibility to mix and match them depending on their operations.
- **LA County Fire Department** stated the NFPA requirement for the helmets to be purchased with eye, ear and neck protection is a problem. The earflaps, people take them off or they just leave them on, and they just don't get cleaned. The helmet suspension needs to be removable and thrown away after one extreme exposure. Since 1988, helmets were allowed to be purchased separately and now that we are trying to adopt the NFPA standards, we are running into problems with purchasing of the helmets by itself.
- The **Chair** solicited comments from those who want the NFPA approved helmets that include the entire kit.
- **Phenix Technologies** stated that the language as proposed is something they cannot support because it is creating something that does not exist.
- **Cal/OSHA** stated that they learned they needed to decouple from the NFPA standard when they were working through respiratory protection. Cal/OSHA suggested "helmets can be purchased without earflaps, goggle or face shield or both provided that the employer demonstrates or documents that the shell, energy absorbing and so forth meets the requirement of NFPA 1971."

- The **Chair** asked if that is something the manufacturer can provide.
- **Cal/OSHA** responded that they would want to see the documentation the employer would provide.
- The **Chair** asked how can the fire department demonstrate that it meets NFPA 1971. The fire department would have to request that information from the manufacturer.
- **Cal/OSHA** agreed that the employer would have to request that from the manufacturer.
- **Phenix Technologies** suggested leaving it up to the employer to find the right equipment. It is more challenging to come up with the documentation, leave it up to the fire department to find the equipment that meets their standards operating procedures and other requirements of the department, in line with their safety standards.
- **Alameda County Fire Department** stated they can buy an OSHA standard helmet and there is no problem. Alameda County Fire Department asked if testing requirement of the OSHA standard the same as the NFPA standard?
- The **Chair** replied no it is not.
- **Phenix Technologies** stated that the NFPA tests are more stringent than the OSHA test. Phenix Technologies sells helmets that have the OSHA certification and they have been tested to the NFPA standards. Goggles and earflaps must be provided in order to label the helmet as meeting the NFPA standards. Also, NFPA 1971 might not exist anymore by the time the rulemaking is finished, because NFPA 1971 is being combined with another standard.
- The **Chair** is aware that there is a consolidation process.
- **3M, Scott & Fire Safety** stated that the -Notice of Intent to Make a Motion (NITMAN) deadline is December 4.
- **LA County Fire Department** stated that NFPA targeted certain standards to be combined or grouped, but that does not mean that the individual standard has changed. The committee members have not changed. However, there may be 4 or 5 standards that are now in NFPA 1970, but the standards have not changed.

- The **Chair** asked if the fire departments can submit their concerns to the NFPA and await their decision because that may solve our problem.
- **CalFire** said that it may be a good idea, but they don't want the outcome of the rulemaking to be dependent on NFPA's decision as to whether they decide to decouple the other items from the helmet. Cal Fire suggested language, "For any head protection that does not come assembled with ear or eye protection, the employer shall provide ear protection, eye protection that meet the minimum protection in conjunction with the helmet."
- The **Chair** stated that section 3402.1 is for the procurement department to inform the employer what they must purchase. There are other sections for in-service PPE. The employer's duty to provide is listed in another section and in-service requirements. For example, section 3403(b) Head protection shall be provided to each fire fighter, and shall be maintained in a location of readiness for immediate response to fires and like emergencies. Head protection shall be worn by fire fighters whenever they are exposed to a head injury hazard. Subsection 3403(c) eye protection and/or face protection shall be provided to and used by each fire fighter..., subsection 3403(d) Ear and Neck Protection and Protective Hood Interface. Protection against burns or injury to the ears and neck shall be provided by one or both of the following:

The proposed text that CalFire is referring to cannot be placed in section 3402.1, because section 3402.1 is essentially for procurement. It informs them of what must be purchased and the section requires the latest NFPA standard because of the 10 year life span. Subsection (a) requires the employer to purchase ensemble elements that meet NFPA 1971, 2018 edition. Goggles and earflaps are ensemble elements.

- **CalFire** proposed to amend the exception to state the helmet meets the performance requirement of NFPA 1971. This gets us away from requiring an NFPA sticker.
- **Bullard Safety** asked what kind of test do the fire departments want to see. After the goggles shroud and earflaps are removed is the fire department expecting the same results from NFPA.
- **LA County Fire Department** responded partially yes to meet or exceed it. There may be some challenges with the removal of the earflap if not in the correct structural garment to pass that specific test. "There might be a shower test...I am not 100% on that. However, for heat, thermal shrinkage, top impact, side impact, those types of tests." LA County Fire would like to see verification that those tests are being done.

- **Cal/OSHA** asked CalFire to repeat the additional language they proposed for the exception (see red text).
- The **Chair** stated that Cal/Fire and LA County want to buy the ear and eye protection separately apart from the helmet. They want to be able to mix and match depending on their operations and their own hazard assessment.
- The **Chair** stated that each element is required to meet NFPA standards. When you buy an NFPA 1971 helmet, it comes as a unit. If the eye protection breaks, a replacement is needed. The employer can purchase an NFPA approved goggle separately. Subsection (a) requires every ensemble element to be approved. This includes the eyes protection, ear protection, and shroud. The language CalFire is proposing is already included. Generally, duplication is avoided, but the Chair offered to restate that requirement for clarity.

Action Item: Check with NFPA regarding purchasing helmets separately.

- **Bullard Safety** was asking if the fire departments are going to conduct a risk assessment and specify if they are going with NFPA approved helmets or specify other types of tests, such as impact or heat resistance. Then the manufacturer will have to provide documentation of testing, but stated that they will not be providing the ear and neck protection.
- **Los Angeles County Fire Department** replied that their risk assessment will be modified to require the tests.
- **Bullard Safety** asked Cal/OSHA what they will be requiring. Currently, the inspector can just look at the individual's helmet and see if it has an NFPA sticker on it.
- **Cal/OSHA** replied they will be enforcing the letter of the law.
- **Alameda County** asked how it is verified, currently the helmet either has an NFPA or OSHA sticker. How do you get a sticker to show that the helmet is compliant?
- **Cal/OSHA** replied there probably wouldn't be a sticker. Cal/OSHA will ask for documentation.
- **Bullard Safety** said potentially a 2-cent sticker can be placed for it being Cal/OSHA compliant if there was a statement for that as well. Manufacturers want to meet to make it as easy for the fire department.

- The **Chair** stated that the Cal/OSHA does not require stickers on products. When a helmet is OSHA compliant, that is Fed/OSHA. The Fed OSHA standard references a US Department of Commerce 1977 standard (recording states 1973).

The documentation to prove that the helmet by itself meets the performance requirements of NFPA standard is more involved than the sticker.

- **Bullard Safety** stated that manufacturers currently place stickers on helmets. Bullard Safety is proposing adding a sticker that says that the helmet is compliant with Cal/OSHA standards.
- **Cal/OSHA** stated that the helmet does not need a sticker. Cal/OSHA will ask for documentation from the employer to demonstrate that the product met the performance requirements of NFPA. If it makes sense for the manufacturer to develop their own product label stating that it meets Cal/OSHA standards then that would be great, but it doesn't make that much of a difference from the enforcement point of view.
- **Bullard Safety** was concerned for fire fighters themselves because fire fighters look at the helmet to make sure that it is certified. When a firefighter puts on an SCBA, they want to make sure that the standards are on that SCBA.
- **Cal/OSHA** asked if there is a label that says: "meets California GISO", etc., would that address your concern.
- **Bullard Safety** replied yes, manufacturers places prop 65 labels on their products. Bullard Safety is suggesting language to require labeling.
- **Cal/OSHA** asked if that addresses the liability question for the manufacturer.
- **Bullard Safety** replied that the question requires checking with their legal department.
- **Los Angeles County Fire Department** stated that in chapters 4 and 19 of their risk assessment, they address helmet, goggle, hoods, earflaps, gloves. Regarding helmets, it specifies that the helmet must meet the requirements of US Forest Service Administration (USFA), ANSI, Cal/OSHA T8 3403. It would have to be amended in section 3402. Their risk assessment states that they have the right to ask the manufacturers for the current testing of particular lot number. LA County is not sure if they have exercised that right. In this case, LA County would have to start doing that. They would request who tested it, what it was tested for, what are their testing methods, and if they conform with NFPA testing methods.

- **Cal/OSHA** said that the compliance would be looking for the documentation LA County described.
- **CalFire** said the obligation the employer has is still the same. LA County and CalFire changes out components of their helmet and that sticker has remained. There is no item tracking of the individual components, the chin strap, suspension, goggles, and the shell that ties components to a helmet like a VIN number for a vehicle. For example, the suspension strap could have been changed 15 times during the life of that helmet. It is the employer's responsibility to provide the suspension system designed for the helmet. That is not the manufacturer's responsibility.
- **Bullard Safety** stated that NFPA specifies that a third-party is involved in ensuring that the product meets the NFPA standards. The laboratory must be ISO certified. A new company might interpret that standard as permitting internal testing is sufficient.
- **Western Fire Supply** agrees with Bullard Safety that there should be language requiring third party certification. Helmets must be tested as one piece, as an ensemble. One piece work with another, to take the individual parts and to say that it stands alone by itself does not always work.
- The **Chair** stated that the manufacturers are welcome to suggest language upon speaking with their legal team.

§3402.2. Purchase Quality Standards for Personal Protective Clothing and Equipment for Wildland Fire Fighting.

Outcome:

Chair to update the proposal to permit the purchasing of US Department of Agriculture, Forest Service chainsaw chaps.

Discussion:

The **Chair** asked the committee members if there is a need to specify the latest edition of the NFPA 1977 given that the wildland firefighting gear is not proposed to have an end of service life similar to structural firefighting PPE.

Bullard Safety verified if the edition changes when a new NFPA is released.

The **Chair** replied yes. The intent of the section is to require the purchasing of new PPE to meet the latest edition to maximize the service life of the PPE. NFPA standards are currently being consolidated. It depends on the timing if NFPA finishes their consolidation before the rulemaking is noticed.

The **Chair** asked if fire fighters use other equipment that are not NFPA approved, for example fire shelters.

CalFire responded chainsaw chaps. Chainsaw chaps that meet the US Department of Agriculture, Forest Service are currently allowed, but it is not listed in section 3402.2.

The **Chair** replied that the proposal will be updated to reflect the latest USDA, Forest Service standard.

Proposal:

~~§3402.3 Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting~~ [Application of Section 3402.4 and 3402.5](#)

[Section 3402.4 Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting \(NFPA 1851, 2014 Edition\) is operative until \[one year from OAL effective date\].](#)

[The operative date of Section 3402.5 Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting \(NFPA 1851, 2020 Edition\) is \[one year plus one day from OAL effective date\].](#)

~~(a) Structural and proximity fire fighting protective ensembles shall be selected, inspected, and maintained in accordance with the National Fire Protection Association (NFPA) 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, 2014 Edition, which is hereby incorporated by reference.~~

~~Exception: In addition to the recordkeeping requirements of subchapter 4.3 of Chapter 4, Program of the NFPA 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, 2014 Edition, which is hereby incorporated by reference, the employer shall maintain records on its structural and proximity fire fighting protective ensemble and ensemble elements for three years from the date of retirement.~~

~~*****[Existing Text Will Be Deleted]~~

Outcome:

The committee accepted the proposed change to ensure there is a section that is operative as the NFPA standard is updated and departments transition into the new requirements.

Discussion:

The **Chair** proposed to change the title of the section and replace it with “Application of Section 3402.4 and Section 3402.5”. The proposed change is to allow for a one-year grace period before the newer edition of the NFPA standard becomes operative. There will be two sections with different operative dates. Section 3402.4 will remain operative until the new Section 3402.5 becomes operative. Section 3402.4 will contain the existing standard and Section 3402.5 will be the new standard that is being discussed by the committee. For the next cycle, the contents of the section will be shifted.

No comments from the advisory committee members.

Proposal:

[§3402.4. Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting \(NFPA 1851, 2014 Edition\).](#)

(a) Structural and proximity fire fighting protective ensembles shall be selected, inspected, and maintained in accordance with the National Fire Protection Association (NFPA) 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, 2014 Edition, which is hereby incorporated by reference.

(c) ~~Effective~~ Operative Dates.

(1) Subchapter 4.1 (General), subchapter 4.2 (Program Organization for Structural Fire Fighting Ensembles and Ensemble Elements and Proximity Fire Fighting Ensembles and Ensemble Elements), and subchapter 4.3 (Records) of Chapter 4 (Program), Chapter 5 (Selection), Chapter 6 (Inspection), Chapter 7 (Cleaning and Decontamination), Chapter 8 (Repair), Chapter 9 (Storage), and Chapter 12 (Test Procedures) of NFPA 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, 2014 Edition, which is hereby incorporated by reference, shall be ~~effective~~ operative January 1, 2024.

(2) Chapter 10 (Retirement, Disposition, and Special Incident Procedure) of NFPA 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and

Proximity Fire Fighting, 2014 Edition, which is hereby incorporated by reference, and subsection (b) shall be effective operative January 1, 2026.

Outcome:

The proposed relocation of the contents of section 3402.3 to section 3402.4 was accepted.

The term effective was changed to operative to avoid confusion with OAL effective date.

Discussion:

The **Chair** stated that the existing requirements under section 3402.3 were moved to section 3402.4.

No comments from advisory committee members.

Proposal:

[§3402.5. Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting \(NFPA 1851, 2020 Edition\).](#)

(a) The employer shall establish and implement the procedures and requirements National Fire Protection Association (NFPA) 1851, Standard on Selection, Care, and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, 2020 edition, which is hereby incorporated by reference without the Annex, except for A 5.1.5.

(d) Recordkeeping

[\(2\) Training records demonstrating the implementation of subsection \(c\)\(2\) shall be made available to the Division seven days upon request. Records shall include employee name or other identifier, training dates, name and employer of the instructor, and description of the training.](#)

Outcome:

The committee accepted the relocation of section 3204.4 to section 3204.5.

The **Chair** is to develop alternate language to subsection (d)(2) that cross references the recordkeeping requirement to subsection 3203(b).

Discussion:

- The **Chair** stated the proposal incorporating NFPA 1851, 2020 edition was moved to section 3402.5. The bold text subsection (a) was accepted by the committee in a prior meeting. The **Chair** solicited comments regarding proposed subsection (d)(2).
- There was a comment to amend the proposal to “within 7 days of the request”
- **CalFire** stated they will not be able to provide some of the training records being requested by the subsection.
- The **Chair** asked CalFire to state the records they cannot provide.
- **CalFire** replied certificates that were provided by an outside contractor, who the instructor is, training description. The certificate may just state NFPA 1851 class. It may not have multiple sentences.
- The **Chair** replied that in prior meeting, it was discussed that employees were going to be trained depending on their duties. For example, if the employee was tasked with just cleaning, such as running the washing machine, then the training record would state that the employee is trained on how to run the washing machine. If the employee was tasked with performing advanced inspection, then the employee would be trained on advanced inspection. The comment from the prior meeting was employees do not have to be trained on the entire NFPA 1851 program if their duties do not require them to do everything. The proposal gives the employer the flexibility on how they want to describe the training because it is a performance based standard.
- **CalFire** stated that the certificate that they received from an ISP in California does not contain every item that is listed in that description.
- The **Chair** asked CalFire how they want the text to be amended.
- **CalFire** responded the description of the training may or may not be there, the name of the instructor will be there, but maybe the name of who they are working for may not be in the certificate. The certificate that they received from a verified ISP only had a signature line on it without the name of the instructor. It does not contain who the employer is. Cal Fire can verify the employer information for the training, but if that information is not included in the certificate, then they can be issued a citation.

- The **Chair** asked an ISP if there is a problem with the information being requested.
- **Solution Safety** replied training dates is easy, the instructor's name can be identified, but the description of the training is problematic. The training certificate should state trained for advanced cleaning and inspection as per NFPA 1851. It automatically implies that the employee was trained per NFPA 1851 including all the chapters.
- The **Chair** stated that NFPA 1851 does not have a training section.
- **Solution Safety** replied see section 4.2.4.5.2 requires that training includes all the items listed, which basically includes all the chapters.
- **CalFire** commented that they want their employees trained in what has changed from one edition to another.
- **Cal/OSHA** replied that records should include the name, date of training, confirmation meets the requirements of NFPA 1851, Chapter 4.
- **Solution Safety** asked whose training is required to be documented.
- The **Chair** replied that the training record is for all employees.
- **Solution Safety** replied that not all employees will be trained in all the requirements listed in Chapter 4.
- The **Chair** replied that California has an overarching training record requirement under IIPP, which requires that the employer to document employee name or other identifier, training dates, type(s) of training, and training providers.
- **San Diego Fire Department** stated that there is a difference between 1851 level trained vs. user training. He thought that the 1851 level trained can do a train the trainer training.
- **CalFire** suggested that we just reference the existing requirements in section 3203(b).

§3403. Head, Eye and Face Protection. Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting.

Outcome:

The proposal needs to be adjusted pending discussions on the use of non-NFPA approved helmets.

Discussion:

- The **Chair** stated that section 3403 contains requirements for in-service PPE, what the fire fighter is required to wear. The NFPA 1971 edition listed must account for the 10-year life of the PPE.
- **Bullard Safety** stated that the manufacturer's preference is to implement a 10-year life for all helmets whether it is NFPA or non-NFPA. All the helmets have a date of manufacture.
- The **Chair** replied that the proposal does not change. However, additional language is needed if non-NFPA is allowed.
- **Bullard Safety** stated that language regarding eye and face protection should also be added.
- The **Chair** replied that the section is divided into different subsections. Subsection (b) requires that the fire fighter be provided with and use eye and face protection. Other PPE provisions, such as ear and neck protection, body protection, foot protection, were consolidated into this one section as opposed to assigning a section number for each. The provisions that were relocated to this section speak of the duty of the employer to provide PPE.

Proposal:

~~§3410. Selection, Inspection, and Maintenance of Protective Ensembles for Wildland Fire Fighting~~ [Application of Section 3410.1 and Section 3410.2.](#)

[Section 3410.1 Selection, Care, and Maintenance of Protective Ensembles for Wildland Fire Fighting \(NFPA 1877, 2011 Edition\) is operative until \[one year from OAL effective date\].](#)

[The operative date of Section 3410.2 Selection, Care, and Maintenance of Protective Ensembles for Wildland Fire Fighting \(NFPA 1877, 2022 edition\) is \[one year plus one day from OAL effective date\].](#)

~~(a) The employer shall perform a risk assessment prior to the selection of PPE. The risk assessment shall be in writing and shall include, but not be limited to, the hazards that can be encountered by wildland fire fighters based on the following:~~

~~*****~~

Outcome:

The committee accepted the above proposed text.

Discussion:

The **Chair** said that this was a similar concept to the selection, care, and maintenance of wildland firefighting.

Proposal:

§3410.1. Personal Protective Equipment for Wildland Firefighting Selection, Care, and Maintenance of Protective Ensembles for Wildland Fire Fighting [Text was relocated from section 3410]

(a) The employer shall perform a risk assessment prior to the selection of personal protective equipment (PPE). The risk assessment shall be in writing and shall include, but not be limited to, the hazards that can be encountered by wildland fire fighters based on the following:

(1) Type of duties performed while wearing wildland fire fighting PPE;

(2) Identification and characterization of hazards of the duties while wearing wildland fire fighting PPE;

(3) Geographic location, elevation, and climate;

(4) Seasonal effect;

(5) Garment configurations of the wildland fire fighting PPE (single-layer or multi-layer garment);

(6) Organizational experience and lessons learned with current wildland fire fighting PPE; and

(7) Proximity and location of private residences and other habitable structures in relation to wildland vegetation and areas of refuge.

Outcome:

The contents of section 3410 will be relocated to section 3410.1

Discussion:

There was no comment to the proposed relocation of the contents of section 3410 to section 3410.1

Proposal:

[§3410.2. Selection, Care, and Maintenance of Protective Ensembles for Wildland Fire Fighting \(NFPA 1877, 2022 Edition\).](#)

[\(a\) The employer shall establish and implement the procedures and requirements of NFPA 1877, Standard on Selection, Care, and Maintenance of Protective Ensembles of Wildland Fighting Clothing and Equipment, 2022 edition, which is hereby incorporated by reference excluding the Annex, sections 4.3. and 10.2.22 \(2\).](#)

[\(b\) Program for the Selection, Care, and Maintenance of protective ensembles \(Chapter 4 of NFPA 1877\).](#)

[\(3\) Employees shall be trained on the importance of decontamination to reduce dermal exposure to chemicals.](#)

[\(4\) Reporting PPE Health and Safety Concerns.](#)

[\(A\) To implement chapter 4 Program, subchapter 4.6.1 of the NFPA 1877, Standard on Selection, Care, and Maintenance of Protective Ensembles of Wildland Fighting Clothing and Equipment, 2022 edition, the organization shall notify the manufacturer and the certification organization in writing within 20 business days upon discovery of the PPE health and safety concern caused by a known or suspected element failure. \[Number of days require further consideration\]](#)

[\(5\) Records.](#)

[\(A\) Records of inspections as required by chapter 6 Inspection, subchapter 6.2.1 of the NFPA 1877, Standard on Selection, Care, and Maintenance of Protective Ensembles of Wildland Fighting Clothing and Equipment, 2022 edition shall be maintained for one year.](#)

[\(B\) Training records demonstrating the implementation of subsection \(b\)\(2\) shall be made available to the Division seven days upon request. Records shall include employee name or other identifier, training dates, name and employer of the instructor, and description of the training. \[Number of days require further reconsideration\]](#)

[\(c\) Selection.](#)

(1) Employers or fire departments that choose to adopt the findings of the risk assessment performed by California Department of Forestry and Fire Prevention (CAL FIRE) from January STANDARDS PRESENTATION Page 32 of 37 TO CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH STANDARDS BOARD TITLE 8, DIVISION 1, CHAPTER 4 OSHSB-98(2/98) 2010 shall be deemed as meeting chapter 5 Selection subchapter 5.1.1 of the NFPA 1877, Standard on Selection, Care, and Maintenance of Protective Ensembles of Wildland Fighting Clothing and Equipment, 2022 edition. CAL FIRE predicted a Reasonable Maximum Exposure (RME) of 7.1 kilowatts per square meter(kW/m²), which necessitated a minimum Radiant Protection Performance value (RPP) value of 10 and Total Heat Loss (THL) of 500 watts per square meter (W/m²). [Check for an updated risk assessment prior to drafting rulemaking documents]

(d) Cleaning and Decontamination.

(1) In lieu of chapter 7 Cleaning and Decontamination, subchapter 7.3.2 of the NFPA 1877, Standard on Selection, Care, and Maintenance of Protective Ensembles of Wildland Fighting Clothing and Equipment, 2022 edition, the employer may use a machine designed for washing helmets.

Outcome:

The proposal was acceptable to the committee except for subsection (b)(5)(A).

Discussion:

Subsection(a)

- The **Chair** said that the subcommittee recommended the deletion of section 4.3 because of the amount of recordkeeping that would be required. The recommendation was to maintain inspection records as opposed to recordkeeping per section 4.3. The justification was that the inspection records would provide records as to what the fire fighter is currently using.

4.3 Records. 4.3.1 The organization shall compile and maintain records on their wildland firefighting PPE. 4.3.2 At least the following records shall be kept for each PPE:

- Manufacturer and model name or design
 - Manufacturer's identification number, lot number, or serial number
 - Month and year of manufacture
- **LA County Fire Department** said that it was difficult to track how many wildland PPE each fire fighter has in addition to the one the department issued. The only way that they can feasibly track them is to inspect the fire fighter's current inventory of the their gear, "I want to see your gear right now today". During the annual inspection of the PPE,

fire fighters will bring out their PPE and inspect them. If PPE is ripped, torn, burned, it would be marked in the inspection report. If the equipment is being inspected once a year, then there would be no need to track the identification number, lot number or serial number. They view wildland PPE as almost disposable. They don't know if they will last one use or 10 years. Even though it's permitted to be used for 10 years, LA County will retire PPE after 10 years.

- The **Chair** wanted to address a comment from the last meeting, a question was asked if load carrying equipment from this section (web gear) should be exempt from the section.
- Multiple committee members did not recommend excluding load carrying equipment.
- **CalFire** stated that the load carrying equipment is not PPE. It carries PPE such as fire shelter and other items.
- The **Chair** replied that load carrying equipment is covered under NFPA 1977 and NFPA 1877 addresses the selection, care, and maintenance of PPE that is listed in NFPA 1977.
- **LA County Fire** agreed with **CalFire** that it should be cleaned on an as needed basis. Including web gear in cleaning requirements of the section is time consuming.
- The **Chair** stated that during the wildland respirator field trials PAPR were mounted or attached to the load carrying equipment. At some point the load carrying equipment may eventually be part of the PPE.
- **Cal/OSHA** said that this is a new development. In some of them the filter and the pump device were integrated into the web gear. If you took off the web gear, you took off the respirator. Having web gear that is grossly contaminated would probably be a problem. Cal/OSHA needs to look further into the matter.
- **Western Fire** stated that web gear is personalized, and it must be separated from NFPA 1877 and cleaned on as needed basis.
- The **Chair** asked the committee to clarify their recommendation by asking if they want the web gear cleaned, but outside the scope of NFPA 1877.

- **Alameda Fire Department** stated that if the web gear is to be cleaned then a process needs to be identified.
- An advisory committee member stated that web gear does not touch the skin. It should be cleaned in the same manner as the SCBA.
- The **Chair** read the scope of NFPA 1877 and it includes load carrying equipment.
- **Alameda County Fire Department** asked the Chair to read the requirements of NFPA 1877 regarding load carrying equipment.
- **CalFire** stated that the reason there was a proposal to exclude web gear is to ensure that it does not follow the 10-year life and that it wouldn't be tracked like other PPE.
- The committee read subchapter 7.8 Wildland Fire fighter Load-Carrying Equipment and there was a consensus not to exclude load-carrying equipment from the section.
- There was a question regarding the 10-year life expectancy.
- The **Chair** replied that NFPA 1877 does not have 10 year on PPE. If the future edition includes it, then it will be discussed during the next set of advisory committee meetings.

Subsection(b)(3)

There were no comments to the proposal to add subsection(b)(3).

Subsection(b)(4)

The **Chair** stated that there was a concern regarding the number of days required for reporting to the manufacturer element failure. The **Chair** asked if the number of days can be decreased.

CalFire asked if AC members utilized the rule and there was no response.

CalFire stated, if there is a failure, it is usually probably because it is at its service life or there is an issue with the wearer. It did not fit right to begin with.

A commenter stated that they have had a critical failure with gloves, and they reached out to the manufacturer.

The **Chair** asked if 20 business days is too long.

The commenter responded, no because it was not going to change anything. Fire departments still need to do an investigation to determine if it is truly a problem with the manufacturer or the end user. The investigation takes time.

There was a question as to how 20 days was decided. Is the 20 days to give them time to return from assignment.

The **Chair** replied yes and there were comments regarding shift schedules.

Subsection(b)(5)

The Chair said the records will be changed to be consistent with section 3402.5, which references the IIPP.

Subsection(c)(1)

- The proposed (c)(1) permits other fire departments to use Cal/Fire's risk assessment for selecting their gear.
- NFPA 1877 requires a risk assessment prior to selecting their gear. Cal/Fire received a grant to conduct a risk assessment to estimate their exposure. Small fire departments may not have the resources to do that. The proposal allows them to use Cal/Fire's findings.
- CalFire said that they are in the midst of conducting one right now and agreed to provide the results of the risk assessment once completed.

Subsection (d)(1)

- The **Chair** said that there was a comment from Sac Metro asking to clarify that machine washing of helmets is allowed.

Subsection(e)(2)

- The **Chair** asked for comments regarding proposed subsection(e)(2).

- **Solution Safety** stated that the reason to use paper to preserve evidence. Storing body fluids and gear in a plastic container will cause mold to grow and would hurt the evidence.
- The **Chair** replied that the way the NFPA is written it cannot be stored in a plastic container momentarily. The subcommittee developed language that is performance based with a note stating that plastic or airtight containers may further degrade clothing or equipment due to moisture.
- **CalFire** stated that they train their employees on how items should be collected, but they cannot guarantee that they will not be collected and transported in a plastic bag. It may be initially collected in and placed in a plastic bag. They send items to Missoula and if it has fuel in it, it may have to be transported in a plastic bag.
- The **Chair** clarified that the rest of Chapter 10 still applies, and that the proposal is to replace subchapter 10.2.2.2(2).

§3410.3 Personal Protective Equipment for Wildland Firefighting

The **Chair** stated there is no need to update the edition for in-service equipment because NFPA 1877 did not have service life limit to the PPE like NFPA 1851. Absent a safety issue with the equipment similar to the safety alert NFPA issued on the PASS and face pieces of SCBAs, there is no reason to update the editions. There is a danger that the edition will become old overtime, but that can be handled at a later time.

Alameda County Fire Department was disappointed that there is no service life to the equipment.

The **Chair** stated that after the new rule is adopted, that is when the 10-year rule will be changed.

Alameda County Fire Department recommended that there should be a service life to the PPE.

LA County Fire stated that the inspection of the gear would determine the retirement of the gear rather than just looking at date of manufacture.

CalFire supports removing the 10-year life expiration.

The **Chair** stated that the risk assessment governs the selection of PPE. If the risk assessments shows that the higher level of PPE is needed, then older PPE should be retired.

Proposal:

§3411. Private Fire Brigades.

(d) Personal Protective Clothing and Equipment shall be provided by the employer at no cost to the employee in accordance with this article commensurate with the fire fighting activity involved. With respect to structural fire fighting by private fire brigades, those personal protective clothing and equipment requirements shall be in accordance with sections 3402.1, 3402.3, 3402.4, 3402.5, 3403, 3404, 3405, 3406, 3407, 3408, and 3409.

Outcome:

Section 3402.4 and section 3402.5 will be added.

The **Chair** will amend the proposal to add a cross-reference to wildland firefighting sections

Discussion:

- There was no comment to the addition of sections 3402.4 and 3402.5. The **Chair** asked if a cross-reference to the wildland sections can be added section 3411.

4. Review of Documents Relied Upon

Presentation on Wildland Firefighting and Protective Clothing and Cleaning Practices in California by Meredith McQuerry, PhD and Elizabeth Easter, PhD

The **Chair** introduced the speakers by stating their current occupation and accomplishments. During the April 2023 meeting, the committee discussed a research paper regarding wildland protective clothing and cleaning practices. The data analyzed was from a nationwide survey. The **Chair** reached out to the researchers to isolate the data from California and analyze the information. They graciously agreed and presented their findings.

Dr McQuerry and Dr. Easter presented information from a subset of data collected in the year 2020. They were contacted by the NFPA task group on NFPA 1877 standard. At the time, NFPA 1877 was in the development stage, not yet released. The task group was looking for feedback on current wildland cleaning practices, use practices centered around PPE, how it was being selected, stored, and cared for, and how the current practices would relate to the NFPA 1877 standard.

There was a total of 648 responses to the US survey. The California portion made up about 50% at 301 responses. The survey was distributed online using Qualtrics. Other organizations assisted in distributing the survey- US Forest Service, CalFire, Fire Industry Education Resource Organization (FIERO), International Association of Fire Fighters (IAFF)

helped. There were 40 information gathering questions. The researchers isolated the data from California for the quantitative portion, but not the qualitative portion, which were open-ended questions portion.

ANSWERS TO RESEARCH QUESTIONS FILTERED FOR CALIFORNIA

Demographics

- 94% were male, 6% female
- 61% were between 30-49 years old
- 20% of the fire fighters were strictly wildland and 80% were both structural and wildland
- 60% permanent full time
- 80% were career fire fighters
- 50% had 11+ years of experience

Crew Type (decreasing order of number)

- Majority engine crew
- Hand crew
- Miscellaneous: Hellitack, Tractor Crew, Dozer, Heavy Equipment

Work shift Length-defined as the length of time they were deployed on the fire line before returning either to station or base camp. This was to determine the length of time they were deployed until they had access to laundry facilities.

- Most common was 24 hours, which makes sense because 80% of the respondents were structural and wildland fire fighters
- 35-40% were 2+ days (48 hours to 21 days)

Wildland Fire Locations

- 64% wildfires in California were in WUI setting, which was insightful. This is different from the national data. This has an impact on the type of gear, the type of protection their PPE affords or does not afford them. Fire fighters in WUI settings are getting exposed to the hazards of structural fires.

Type of gear

- 95% were wearing their footwear, gloves, helmet, and tactical pants
- Only 80-95% wear yellow Nomex jacket, which is different from national data- 95% or more were wearing their FR shirt or jacket. Maybe they were referring to their station wear shirts. The questions may be up for interpretation to the participants,

probably in CA they are wearing their station uniform pants with the FR T-shirt and not that many are wearing their yellow Nomex jacket

- 77% were neck or hood shroud
- Less than 50% hearing protection
- 20% were wearing some face protection, bandana or a respirator

Base layers:

- Most were wearing T-shirt or long sleeves shirt
- Fibers were 56% non-FR (fire resistant) cotton
- FR fiber content with Nomex or other aramids that are inherently FR
- 11% synthetics, which will melt to the skin

When were they wearing wildland gear

- 55% said they were wearing it on wildland fire related activity
- 22%, non-fire related activities. This could be a concern when other types of exposures could happen. It can make the gear less flammable resistant or accelerate the degradation through UV exposure.

Number of sets

- 77% -2 sets
- 23% had less than 2 sets

Other questions

- 94% were aware of NFPA 1977 of standards
- Slightly somewhat concern with dirty PPE exposure

Newest set of gear

- On average it was 2 years old
- Outlier – 21 years old

Oldest set of gear

- On average 7 years old
- Outlier -43 years old

Frequency of changing when deployed

- The changing out of Nomex shirt and pants is most commonly done every 3-5 days. A possible reason for this is fire fighters can be deployed 14 to 21 days, but they don't know how long they will be out there. 44% of the fire fighters were taking one extra set, 40% of the fire fighters were taking 2 sets of extra gear, which is higher than US sample.

- 40% who took 2 extra sets do not change their gear while deployed and were working between 8-21 days, so they are at a higher risk of exposure. This was higher than the US sample – only 29% were working 8-21 days.
- 5% did not carry additional sets with them and 55% were working at least 2 days or more
- 10% carry 3 or more sets

Isolating gear

- 48% of the fire fighters do not isolate dirty gear
- 52% isolate their dirty gear

Means of isolating - 90% trying to isolate were using some kind of plastic container, garbage bag, grocery bag, or other bags

Cleaning Gear After Shift

- 29% do not and most were working at least 12 hour shift
- 30% were not cleaning their gear after 12 plus hour shift.
- The reason for not cleaning is unknown. It could be simply that they do not have access

Retirement or Removal From Service

- 44% every 3-5 years
- 26% every 1-2 years

Specifying a retirement age should be looked into

Reasons for Retirement (descending order)

- Material damage
- Closure damage
- Fit
- Soiling that could not be removed

Storage

- Majority storing their gear in station, in a bay
- 20% in the apparatus, cab the truck

Cleaning – Do firefighters follow manufacturer’s instructions?

- 36.5% always
- 27% frequently
- Never or rarely
 - 38.5% do not read label even if they were legible and attached

- 19% label was missing or not legible

If they don't follow manufacturer's instruction, what is their reasoning or alternative method?

- 11.5% wash with regular laundry, which indicates that is family laundry or no access to an extractor
- Washed when it smells or has sweat stains

Records

- 5.7% keep a cleaning record

Frequency of washing

- 49.3% - after each use
- 27.5% - after coming home from a tour
- 18 % - after 3 months
- 2% plus - once a year

98% responsible for cleaning gear for themselves. Are they cleaning it themselves in the department as well as at home?

Reasons for cleaning

- Odor or visible dirt
 - After exposure to a wildfire
- Only 7% per following standard operational procedures

Where do they do the wash?

- 13.5% wash their PPE at home - concerning
- Large percentage wash at the station compared to national data of 24%
- 9% wash at the public laundry compared to the national data of 13%
- 5.7% in the field
- 4.7% washed by an ISP

Field Washing

- No supplies
 - 16% for water
 - 14% for cleaning solution
- It appears as if those that do, use a cleaning solution use detergent and soap and a small percentage use a scrub brush.

Means of Washing

- 53.8% use extractor
- 27% use top load washers which is concerning, because a top load washer has a tendency to be harsher on the gear
- 12.5% front loader washer
- 6.5% use hose and brush
- 1% do not wash

Wash Setting

- 64% wash on normal, which varies depending on the machine or manufacturer
- 15.8% did not know
- 10.8% use bulky
- 8% other
- 1% use gentle or delicate

Wash Temperature Setting

- 32% use warm
- 28.7 not sure
- 21% Cold
- 17.6% Hot

Cleaning solution

- 45% use liquid detergent
- 30% use liquid detergent at home. Is that the liquid detergent that they are using at the fire station. It is inconsistent with the percentage of fire fighters who wash at home. So the question is, are they using consumer detergent in the fire station?
- Detergent pods
- Do not use detergent, just hot water
- Splash of Dawn

Drying

- 41.2% air dry outside. Nomex has a potential of degradation due to light especially sunlight
- 28.3% air dry inside
- 16.1% compared to the national 57%, dry in the home dryer. This is concerning because of the heat and abrasion.
- 14% commercial dryer

Temperature Used for Drying

- Medium - 38.6%
- Low - 24.1%
- High - 16.9%
- Not sure -20%

Durability

- Most expect their gear to last more than 50 wash cycles. The researcher's interpretation of 50 wash cycles relative to consumer laundry is roughly 2 years, but is that the interpretation of the wildland fire fighters. Researchers expect it to be washed 20-25 times in a year.
- 23% - 100 laundry cycles
- 4% -1 to 20 laundry cycles

No of Fire Seasons

- Majority expect 2-3 fire seasons
- 27% -3 to 5 seasons
- 6 to 8
- 6 to 10
- 2 to 10+

Summary: Impact From the Questionnaire

NFPA 7.1.1 Organization Providing Means for PPE cleaned and decontaminated.

- 98% said they are responsible for cleaning their own gear
- More in CA are using extractors, but we still don't understand how laundry is being done in California
- Most of them not laundering at home
If most of the laundry is being done using the extractor, but they are responsible for washing their own gear. That appears to be a disconnect.

7.1.2 Contaminated PPE shall not be brought into the home or washed in home laundries

- It is discouraging that 14% of the fire fighters brought their clothing at home or washed them public laundry using. However, it is a lower percentage compared with the 50% nationally.
- CA may be the most ready state to adopt the standard, but there are gaps that need additional support. Given the presence of CalFire, Forest Service, and the location where most firefighting occur (WUI), they have to be. The researchers cannot state this definitively because they have not done a case by case analysis of all 49 states.

7.1.3 The use of public laundries shall be permitted when a procedure to decontaminate the machines after use is established.

- Use of public laundry is permitted, but the method of decontaminating washing machines are not specified. Researchers submitted their comments were because there is no published procedure. 10-13% are utilizing public laundry machines.

7.1.4 When a commercial cleaning service is used, it shall demonstrate that procedures do not compromise the performance of the PPE.

- Less than 5% are utilizing an ISP. It is unknown why the number is low. The percentage that report that they are responsible for their own cleaning is pretty high. If the ISPs were to come in, some of the responsibility would be shifted to the ISPs, and not to the wildland fire fighter. That should be something that should be open for discussion.
- Procedures used for cleaning should not compromise PPE. The research is not there. The test that is in the standard for performance are destructive tests. It would require a post-use analysis study similar to one that was done for structural. This would determine if performance is impacted by certain cleaning processes, whether they are performed by an IPS, using extractors, front load, top load, and effect of different detergent chemistries.

7.2.1 Cleaning of soiled wildland firefighting PPE shall be done in accordance with manufacturer's recommendations and instructions.

- 20% either never, rarely, or not sure if they follow manufacturer's cleaning instructions. This was significantly lower than the US sample at almost 40%.

7.2.2.1 The public shall not be exposed at any time to contaminated garments.

- Answers indicate that fire fighters perform laundry at home, laundry in public facilities, storing at home, or in storing in vehicle. These practices are not in compliance with the standard.

7.2.2.3 If contaminated protective garments are to be laundered, organizations shall provide a washing machine(s) for the sole purpose of cleaning contaminated protective garments or shall contract with the outside service

- 64% wash their gear at the fire department. Nationwide is 24%
- 1/3 of the fire fighters are not provided with the equipment

Tying to the previous slides, this is surprising because other organizations do not practice laundering at home. For example, uniforms for medical wear cannot be laundered at home. Structural fire fighters have not been laundering their gear at home for many years. Wildland is late getting into this. One of our concerns is, if individual fire fighters are

responsible for cleaning their gear, then how can you develop instructions or provisions for wildland fire fighters to actually meet the requirements of NFPA 1977.

Cleaning procedures

- Gear should be double rinsed, only 1 fire fighter did an extra rinse
- The temperature should not exceed 40 C, about 20% said that they wash in hot water
- Mild detergent with a pH range of 6-10.5. However almost 60% indicated that they use common liquid detergent. Tide is a popular common detergent and that has a pH above the requirement. Some are using Tide.
- PPE should not be exposure to direct or indirect sunlight-41% drying outside, 28% inside

Storage

- Storing in the locker of the fire stations , exposure to the fumes from the exhaust
- Storing in vehicle personal vehicle will lead to exposure and light source
- We should move away from storing at home
The NFPA standard does not have specific on where they should be stored.
- Gear should not be stored on air tight containers unless they are new or unissued. There were some responses on storing in air tight containers

Conclusion

- 98% responsible for washing gear, how do we shift this responsibility to the fire organization?
- Public laundry – If this practice is permitted, procedures need to be developed.
- Drying method – Do not dry outside. Need to find drying method that does not expose the gear to light
- The standard is vague in many places.

Future research

- Efficacy of cleaning and assessing that for performance, post-use durability assessment
- Funding from NIOSH, FEMA, and other interested parties
- The **Chair** thanked the presenters for their presentation and for identifying the gaps in the NFPA regulations. The **Chair** is hoping that the discussions during this advisory committee can fill in some of the gaps.

Los Angeles County commented that they use 2 ISPs. They are 2 ISPs in the Los Angeles region and 2 of the them outside. They are struggling on how to implement proper cleaning of their gear when they can't get a permit to handle the wastewater. There are not enough ISPs. They are not sure how they can meet the NFPA 1851 or NFPA 1877.

Human Health Risk Assessment of Wildland Fire-Fighting Chemicals

The **Chair** performed a high level review of health risk assessment performed by the US Forest Service. They published 3 Human Health Risk Assessment of Wildland Fire-Fighting Chemicals:

- Long Term Fire Retardants
- Water Enhancers
- Class A Foams

Take aways

- Importance of showering and cleaning
- Review the assumptions that were made and assess how closely that aligns to reality

The **Chair** only reviewed Health Human Assessment for Long-Term Fire Retardants. The document is separated into three sections.

- Hazard assessment
- Risk assessment
- Risk characterization

Hazard assessment includes hazard identification and hazard recognition. The section talks about what are the chemicals, how are fire fighters being exposed, what are the potential health effects, and at what level are they dangerous.

Exposure Assessment – how are fire fighters being exposed. It is divided into 2 different sections: typical work day and maximum exposure, and accidental exposure.

Hazard Identification-researchers review toxicity information, which includes animal studies

The EPA publishes reference doses for chemicals that are not carcinogens. The reference dose formula uses LD 50- 50% of the test animal dies when exposed to a particular concentration of chemical.

$$\text{RfD} = \frac{\text{LD50} \times 0.001 \times 5}{100}$$

The formula for cancer causing chemicals, there is a different.

3.0 Exposure Assessments

The exposure assessments are differentiated by job titles. Fire-fighters include airtanker base personnel, helitack crews, smoke jumpers, hotshot crews, type 2 fire fighters, engine crews and overhead workers.

For the calculations to estimate, they have to make certain assumptions such as body weight by gender, age. They make assumptions on what a typical exposure (average dose) is and what a maximum exposure (upper limit) is.

3.4.1 Air Tanker Base Personnel

For example, airtanker base personnel were assumed to be exposed for 2 hours in a typical shift and 10 hours for a maximum shift. They are assumed to have a 12 year career, working 37 days per year in a typical case and 120 days per year in the maximum case.

3.4.3 Smoke Jumpers

- Exposures are reduced due to PPE
- 10-year career
- 2 or 7 hours chemicals until chemical is washed off thoroughly by showering or changing clothes. These assumptions figure into the calculations and are based on what was presented, the showering and changing of clothes does not happen that often.

3.6 Potential Exposure to Accidental Drench

Assumptions:

- 90% reduction due to protective clothing
- 2 hours elapse after person can shower and change clothes
- The potential frequency of this happening are:
 - 2 times per year for helitack
 - 2 times per year for smoke jumper
 - 3 times per year for hot shot crew
 - 1 time per year for Type 2 fire fighters

4.2.1 Noncarcinogenic Risk Estimation

The estimated dose is calculated based on assumption and it is compared to the reference dose

Hazard Quotient (HQ)=Estimated Dose/Reference Dose.

If the HQ is 1 – then you have a problem, because the estimated dose is equal to the reference dose.

4.3 Discussion and Uncertainties

If HQ is between .1 and 1, exposures different from the assumptions could increase the HQ. If the time of exposures is higher than what is assumed or the time to get to a shower is longer, then the risk is higher.

Appendix

Attachment C- list of chemical they studied

Phos-Chek MVP-Fx

Product Data: From the product data, you can calculate the reference dose using the formula earlier.

Estimated Risk from Formulation: Hazard Quotient

Most exposed- air tanker base personnel

In a drench accident- the public faces a greater risk than fire fighters. The reason for that is there is an assumption that reduces your exposure up to 90% and it is assumed that fire fighters can shower.

The **Chair** stated that the proposal contains a subsection to train fire fighters on the importance of showering and decontamination. It may not always be feasible, but if there is a drench accident, the person in charge should be thinking of ways to get the fire fighters to a shower or at least change their protective clothing. The risk from a drench accident is similar to the risk of the air tanker base personnel, same decimal points.

In reading the other risk assessments, the only chemical that they flagged that could be hazardous was a water enhancer called Fire Ice 561. At the maximum scenario, it has a hazard quotient of 2.85.

Fire fighters are not only exposed to the byproducts of combustion, they are also exposed to materials used to fight the fires. If the fire fighter is already exposed, let us just get it off of you by providing showers and means to decontaminate.

5. Scheduling of the Next Meeting

The next meeting will be a comprehensive review of the entire proposal.

6. Closing Remarks

The Chair thanked the attendees and the meeting concluded.