



## National Fire Protection Association

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### MEMORANDUM

TO: NFPA Technical Committee on Structural and Proximity Fire Fighting  
Protective Clothing and Equipment

FROM: Stacey Van Zandt

DATE: August 15, 2011

SUBJECT: NFPA 1851 ROP TC Letter Ballot (F2012)

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The ROP letter ballot for NFPA 1851 is attached. The ballot is for formally voting on whether or not you concur with the committee's actions on the proposals. Reasons must accompany all negative and abstention ballots.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for action.

Please complete and return your ballot as soon as possible but no later than **Monday, August 29, 2011**. As noted on the ballot form, please return the ballot to Stacey Van Zandt either via e-mail to [svanzandt@nfpa.org](mailto:svanzandt@nfpa.org) or via fax to 617-984-7056. You may also mail your ballot to the attention of Stacey Van Zandt at NFPA, 1 Batterymarch Park, Quincy, MA 02169.

The return of ballots is required by the Regulations Governing Committee Projects.

Attachments: Proposals  
Letter Ballot

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1851-1 Log #CP1 FAE-SPF  
(Entire Document)

**Final Action: Accept**

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**Submitter:** Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment.

**Recommendation:** Review entire document to: 1) Update any extracted material by preparing separate proposals to do so, and 2) review and update references to other organizations documents, by preparing proposal(s) as required.

**Substantiation:** To conform to the NFPA Regulations Governing Committee Projects.

**Committee Meeting Action:** Accept

**Committee Statement:** The technical committee reviewed the entire document and updated any extracted material by preparing separate proposals to do so, reviewed and update references to other organizations documents, by preparing proposal(s) as may have been required.

1851-2 Log #CP9 FAE-SPF  
(Chapter 3, 4, 6, 7, 8, 11, Annex A)

Final Action: Accept

Submitter: Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment,

Recommendation: Revise text to read as follows:

~~3.3.13.2 Contract Cleaning. Cleaning conducted by a facility outside the organization that specializes in cleaning protective clothing.~~

3.3.49 Independent Service Provider (ISP). An independent third party utilized by an organization to perform any one or any combination of advanced inspection, advanced cleaning, or advanced repair services.

~~3.3.49.1 Manufacturer trained ISP. An independent third party trained by any element manufacturer of the same element type to conduct cleaning, inspection and basic repair.~~

~~3.3.49.2 Verified ISP. An independent third party verified by a third party certification organization to conduct cleaning, inspection and repair.~~

~~3.3.59.1 Manufacturer trained organization. An organization trained by any element manufacturer of the same element type to conduct inspection, cleaning and basic repair.~~

~~3.3.59.2 Verified organization. An organization third party verified by a third party certification organization to conduct cleaning, inspection and repair.~~

~~4.1.4 Manufacturers shall be allowed to exclude proprietary components or specific models from this care and maintenance program.~~

~~4.2.4 Where the organization performs its own repairs or uses an independent service provider (ISP) to perform garment elements repair services, the organization or ISP shall meet the requirements of Chapter 11, Verification, and shall be verified by a third-party certification organization. The repairs identified in Section 8.3 shall be excluded from this requirement.~~

~~4.2.4 The organization shall use one of the following to perform advanced cleaning, advanced inspection and advanced repair of ensembles and ensemble elements:~~

~~(a)\* Manufacturer trained organization.~~

~~(b)\* Manufacturer trained ISP.~~

~~(c)\* Verified organization.~~

~~(d)\* Verified ISP~~

~~4.2.4.1 Verified organizations or verified ISPs shall meet the requirements of Chapter 11, Verification and shall be verified by a third-party certification organization.~~

~~4.2.4.2 Where the organization is a verified organization or uses a verified ISP for advanced cleaning, advanced inspection or advanced repairs, approval from the element manufacturer shall not be required.~~

~~4.2.4.13 Verified The organizations or verified ISP's shall receive written verification from the third-party certification organization to perform garment element advanced cleaning, advanced inspection and advanced repair services.~~

~~4.2.4.24\* The certification organization's written verification shall specify the categories of garment element repair the verified organization or the verified ISP is verified approved to perform and the processes used to perform these services.~~

~~4.2.4.35 The written verification shall indicate that the verified organization or the verified ISP has demonstrated a working knowledge of Chapter 8, Repair, of this standard as well as the design and performance requirements of NFPA 1971, Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting.~~

~~4.2.4.6 All garment advanced repairs shall be conducted by a verified organization or verified ISP.~~

~~4.2.4.7 Manufacturer trained organizations or manufacturer trained ISPs performing advanced cleaning and advanced inspection shall be trained by an element manufacturer of the same element type or by a verified ISP. The element manufacturer or verified ISP shall provide documentation that the organization or ISP has received the necessary training.~~

~~4.2.5 Where the organization performs its own advanced inspection or advanced cleaning, the organization shall be trained by the ensemble or ensemble element manufacturer or an verified ISP. Where the organization uses an ISP to perform advanced inspection or advanced cleaning, the ISP shall be trained by the ensemble or ensemble element manufacturer.~~

~~4.2.5.1\* The element manufacturer or ISP training provider shall have instructional delivery requisite knowledge and skills for an instructor. Documentation shall be provided upon request to the organization and, where applicable, to the certification organization.~~

~~4.4.2\* Where the manufacturer's instructions regarding the care or maintenance of the protective ensembles or elements differ from a specific requirement(s) in this standard, the manufacturer's instructions shall be followed for that~~

requirement.

6.3.1 Advanced inspection and any necessary testing shall be performed by a manufacturer trained organization, a manufacturer trained ISP, a verified organization or a verified ISP or the organization's trained personnel.

6.4.1 Complete liner inspection of all garment elements shall be performed by a manufacturer trained organization, a manufacturer trained ISP, a verified organization or a verified ISP or the organization's trained personnel.

7.1.9\* When a manufacturer trained ISP or verified ISP is used for contract cleaning or decontamination is used, the ISP shall demonstrate, to the organization's satisfaction, that the procedures for cleaning and decontamination do not compromise the performance of ensembles and ensemble elements.

7.3.1 Advanced cleaning shall be performed by a manufacturer trained organization, a manufacturer trained ISP, a verified organization or a verified ISP or the organization's trained personnel.

7.3.1.1 The advanced cleaning shall be managed by a member of the organization or conducted by members of the organization who have received training in the advanced cleaning of protective ensembles and ensemble elements. The ensemble or ensemble element manufacturer or verified ISP and the organization shall determine the level of training required to perform advanced cleaning. The ensemble or ensemble element manufacturer or verified ISP shall provide written verification of training.

8.1.1 All repairs shall be performed by the original manufacturer, ~~an~~ verified ISP, or a member of the verified organization who has received training by the manufacturer or by ~~an~~ verified ISP in the repair of ensembles or ensemble elements.

8.1.5 Due to the different methods of construction, the ensemble or ensemble element manufacturer shall be contacted if the verified organization or verified ISP is unsure of whether a repair can be accomplished without adversely affecting the integrity of the ensemble or ensemble element.

8.3 Additional Requirements for Basic Garment Element Repair.

The repairs specified in this section shall be performed by the element manufacturer, ~~by both verified and nonverified organizations, or by both verified and nonverified ISPs~~ manufacturer trained organizations, manufacturer trained ISP's, verified organizations or verified ISP's. Basic repairs shall be limited to the following:

- (1) Patching of minor tears, char marks, and ember burns to a separable outer shell
- (2) Repairing of skipped, broken, and missing stitches to a separable outer shell
- (3) Replacement of missing hardware, excluding positive closure systems to a separable outer shell
- (4) Reclosing of the liner of a garment after inspection

8.4.2 Major repairs to the garment outer shell shall be performed ~~only by the garment element manufacturer or by a verified ISP~~ consistent with the garment element manufacturer's methods. The garment element manufacturer shall be contacted if the organization is unsure of whether a repair is major or minor.

8.4.3\* All repairs to the garment moisture barrier shall be performed ~~only by the garment element manufacturer or by a verified ISP~~ consistent with the moisture barrier manufacturer's methods. The organization shall contact the original garment element manufacturer if the organization is unsure as to whether an area to be repaired contains a moisture barrier.

8.4.6 Restitching of more than 25 continuous mm (1 continuous in.) of a Major A seam shall require consulting the garment element manufacturer ~~or shall be performed by the garment element manufacturer or by a verified ISP~~ and shall be conducted in a manner consistent with the garment element manufacturer's methods.

8.4.7 Repairs to Major B seams in the moisture barrier shall require consulting the garment element manufacturer and shall be conducted in a manner consistent with the barrier manufacturer's recommendations. ~~be repaired or altered only by the garment element manufacturer or by a verified ISP and shall not be repaired by the organization unless the organization is also a verified ISP.~~

8.4.7.1 Repairs to Major B seams in the thermal liner that do not affect any moisture barrier material shall be permitted. Restitching of more than 25 continuous mm (1 continuous in.) of any Major B seams shall require consulting the garment element manufacturer ~~or shall be performed by the garment element manufacturer or by a verified ISP~~ and shall be conducted in a manner consistent with the garment element manufacturer's methods.

8.4.9 If replacing trim necessitates sewing into a Major A seam, trim replacement shall be conducted in a manner consistent with the garment element manufacturer's methods. ~~done only by the garment element manufacturer or by a verified ISP unless the organization is also a verified ISP.~~

8.4.10\* Replacement zippers shall be installed in a manner consistent with the garment element manufacturer's method of construction. If the complexity of the repair is uncertain, the garment element manufacturer shall be consulted. ~~Zipper that are part of a positive closure system shall not be replaced by the organization unless the organization is also a verified ISP.~~

8.5.2\* Where there is indication of a crack, dent, abrasion, bubbling, soft spot, discoloration, or warping in the helmet shell, the helmet element manufacturer or manufacturer trained ISP or verified its designated ISP shall be contacted to determine serviceability.

8.7.2 Other than the replacement of bootlaces and zipper assemblies, all repairs to boots shall be performed by the footwear element manufacturer or manufacturer trained ISP or verified its designated ISP.

11.1.1.1 Verification of the organization or ISP shall ~~be limited to~~ include advanced inspection, advanced cleaning and advanced repairs of garment elements only. Verification of the organization or ISP shall not apply to helmet elements, glove elements, footwear elements, hood element, or optional CBRN ensembles.

11.1.1.2 The verification listing shall contain the repair categories that the organization or the ISP is verified to conduct. Repair categories shall be garment outer shell repairs, garment moisture barrier repairs, and garment thermal barrier repairs.

11.1.4 All verified organizations or ISPs shall be listed by the certification organization. ~~The listing shall contain the repair categories that the organization or the ISP is verified to conduct. Repair categories shall be garment outer shell repairs, garment moisture barrier repairs, and garment thermal barrier repairs.~~

11.1.5 The certification organization shall not issue any new verifications to the 2008 edition of NFPA 1851, Standard on Selection, Care and Maintenance of Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, on or after the NFPA effective date for the 2013 edition which is [NEW EFFECTIVE DATE TO BE INSERTED]

11.1.6 Organizations or ISP's verified to the 2008 edition of NFPA 1851, Standard on Selection, Care and Maintenance of Protective Ensembles shall undergo verification to the 2013 edition of NFPA 1851 within 6 months of the NFPA effective date for the 2013 edition which is [NEW EFFECTIVE DATE TO BE INSERTED].

11.3.7 For verification of an organization's or an ISP's advanced cleaning services, the certification organization shall evaluate the organization's or ISP's procedures in accordance with Section 7.3 of this standard.

11.3.8 For verification of an organization's or an ISP's advanced inspection services, the certification organization shall evaluate the organization's or ISP's procedures in accordance with Sections 6.3 and 6.4 of this standard.

11.3.9 ~~11.3.7~~ For verification of an organization's or an ISP's repair services, the following series of tests shall be required for each repair category for which the organization or the ISP is verified. Testing shall be conducted using new materials as outlined in Table 11.3.9 11.3.7(a) through Table 11.3.9 11.3.7(c).

Renumber Table 11.3.7 (a) through (c) as Table 11.2.9 (a) through (c).

11.3.9.1 ~~11.3.7.1~~ For repairs to tears in the outer shell, moisture barrier, and thermal barrier, the certification organization shall create the tear in the material(s) to be repaired in accordance with Figure 11.3.9.1 11.3.7.1.

\*\*\*\*EXISTING FIGURE 11.3.7.1 TEAR REPAIRS HERE AND RENUMBER AS 11.3.9.1\*\*\*\*

11.3.9.2 ~~11.3.7.2~~ For moisture barrier hole repairs, the certification organization shall create the hole in the material(s) to be repaired in accordance with Figure 11.3.9.2 11.3.7.2.

\*\*\*\*EXISTING FIGURE 11.3.7.2 HOLE REPAIRS HERE AND RENUMBER 11.3.9.2\*\*\*\*

11.3.9.3 ~~11.3.8~~ The certification organization shall not allow test specimens that have been conditioned and tested for one method to be reconditioned and tested for another test method unless specifically permitted in the test method.

11.3.10 ~~11.3.9~~ The organization or the ISP shall maintain all inspection and test data from the certification organization used in the verification of the organization's or the ISP's services. The organization or ISP shall provide such data, upon request, to the purchaser or authority having jurisdiction.

11.3.11 ~~11.3.10~~ All repair categories that are verified in accordance with this standard shall undergo verification on an annual basis.

A.4.2.4(a) A manufacturer trained organization receives training from an element manufacturer or a verified ISP in cleaning, inspection and repair services. For garment elements, this entity has not received any formal verification from a third party certification organization.

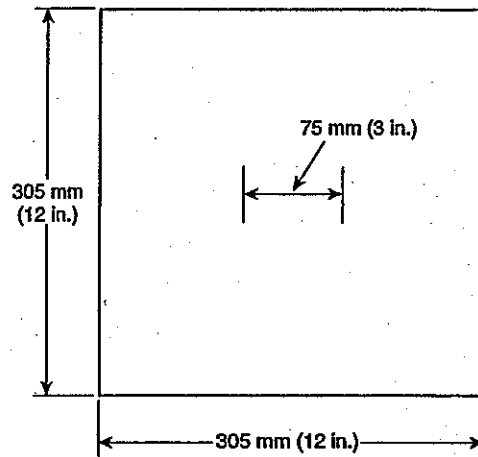
A.4.2.4(b) A manufacturer trained ISP receives training from an element manufacturer or a verified ISP in cleaning, inspection and repair services. For garment elements, this entity has not received any formal verification from a third party certification organization.

A.4.2.4(c) A verified organization has demonstrated the ability to conduct cleaning, inspection and repairs to a third party certification organization in accordance with this standard and is not required to have the approval of the element manufacturer to perform these services.

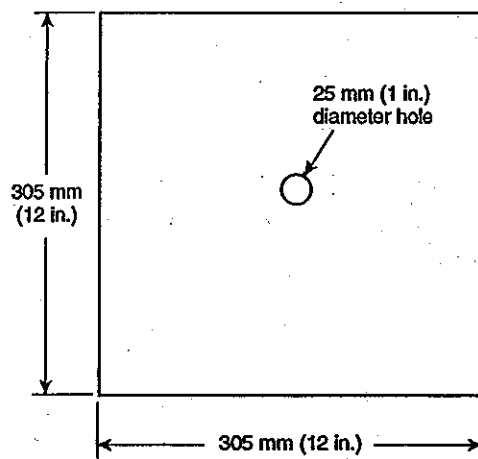
A.4.2.4(d) A verified ISP has demonstrated the ability to conduct cleaning, inspection and repairs to a third party certification organization in accordance with this standard and is not required to have the approval of the element manufacturer to perform these services.

A.4.2.4.24 The end user should always request a product verification the list of repair categories for which the verified ISP is approved to perform from the ISP.

A.4.2.5.1 Requirements for instructional delivery requisite knowledge and skills can be found in NFPA 1041, Standard



**FIGURE 11.3.7.1 Tear Repairs.**



**FIGURE 11.3.7.2 Hole Repairs.**

for Fire Service Instructor Professional Qualifications. An Instructor II level or equivalent is recommended:

A.4.4.2 It should be noted that the intent of this requirement is not to allow manufacturers to dictate which ISP an organization must use. The organization is allowed a choice in service providers for cleaning, inspection and repairs.

A.6.3.2.1 For any inspection program to be effective, ensembles and ensemble elements should be evaluated by trained individuals. The individuals evaluating the ensembles and ensemble elements should understand the limitations of each element and recognize the signs of failure. Utilizing trained individuals provides consistency on whether an item should be repaired or retired. The manufacturer or verified ISP and the organization should determine the level of training required to perform advanced inspections. Resources for training that should be considered, as a minimum, are the manufacturer(s) of the elements in use; the Fire and Emergency Manufacturers and Services Association (FEMSA) user guides; NFPA 1500, Standard on Fire Department Occupational Safety and Health Program; and professional cleaning and repair facilities.

A.8.2.4 Although some hardware can be replaced in the field, it should be noted that field application might not be as permanent or as strong as when the hardware is replaced at the factory, by a verified organization, or by a verified ISP.

A.11.2.5 The contractual provisions covering verification programs should contain clauses advising the verified organization or verified ISP that, if requirements change, the process should be brought into compliance with the new requirements by a stated effective date through a compliance review program involving all currently verified repairs. Without such clauses, certification organizations would not be able to move quickly to protect their names, marks, or reputations. A verification program would be deficient without these contractual provisions and the administrative means to back them up.

A.11.2.12 Such inspections should include witnessing of advanced cleaning, advanced inspections and advanced repairs and review of the quality management system.

**Substantiation:** The technical committee is providing the following modifications in order to further clarify and expand the requirements for verification, ISP's and organizations. This language is intended to clarify what entities can perform various functions and the level of training needed and who can provide this training.

**Committee Meeting Action:** Accept

1851-3 Log #42 FAE-SPF  
(3.3.x Patch and A.3.3.x (New) )

**Final Action:** Reject

**Submitter:** Jason L. Allen, Intertek Testing Services

**Recommendation:** New text to read as follows:

**3.3.X Patch.** An additional layer of outer shell, moisture barrier, thermal barrier, and visibility marking material that is placed on top of a damaged area of a garment for the purposes of making a repair.

**A.3.3.X Patch.** Patches do not include moisture barrier seam sealing tape in the case of repairs made on moisture barrier material using moisture barrier seam sealing tape.

**Substantiation:** A definition of patch is needed. It could be misconstrued that a patch includes moisture barrier seam sealing tape. The definition is needed for clarification for the acceptability of repairs.

**Committee Meeting Action:** Reject

**Committee Statement:** The definition for patch is not required, see 1851-32 (Log #43).

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1851-4 Log #1 FAE-SPF  
(3.3.36 Flame Resistance and A.3.3.36 (New) )

Final Action: Accept in Principle

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**Submitter:** Glossary of Terms Technical Advisory Committee,

**Recommendation:** Revise text to read as follows:

3.3.36\*Flame resistance (protective apparel). The property of a material whereby combustion is prevented, terminated, or inhibited following application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source. ~~Flame resistance can be an inherent property of a material, or it can be imparted by specific treatment.~~ (See also 3.3.50, Inherent Flame Resistance.)

A.3.3.36 Flame resistance can be an inherent property of the textile material, or it can be imparted by specific treatment.

**Substantiation:** It is important to have consistent definitions of terms within NFPA. The term flame resistance is widely used in the documents associated with protective apparel. NFPA definitions should be in a single sentence. Most NFPA definitions of "flame resistance" and uses of the term are in the documents associated with firefighters/first responders. In general, for other uses the term has been replaced and previous references to flame resistance are now being replaced by references to materials that meet the requirements of NFPA 701. It is likely that the documents associated with first responders would like to retain this concept and therefore the definition is being modified with a qualifier and with an annex note for the second sentence. Also, a recommendation is being made that NFPA 1500 be the primary document responsible. The definition is included in NFPA 1851, 1951, 1971, 1975, 1977, 2112 and 2113.

**Committee Meeting Action:** Accept in Principle

Revise text to read as follows:

3.3.36\*Flame resistance (protective clothing and equipment). The property of a material whereby combustion is prevented, terminated, or inhibited following application of a flaming or non-flaming source of ignition, with or without subsequent removal of the ignition source. ~~Flame resistance can be an inherent property of a material, or it can be imparted by specific treatment.~~ (See also 3.3.50, Inherent Flame Resistance.)

A.3.3.36 Flame resistance can be an inherent property of the textile material, or it can be imparted by specific treatment.

**Committee Statement:** The technical committee accepted the proposal in principle, and provided the revised text of Section 3.3.36 (see meeting action). The term "protective clothing and equipment" is more applicable to NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, than protective apparel. The submitter also proposes removing the sentence that states that flame resistance can be inherent or can be imparted to the Annex, which is appropriate as well. This change is in agreement with similar proposals reviewed by the NFPA 1951 Special Operations Technical Committee.

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1851-5 Log #20 FAE-SPF  
(4.2.5)

Final Action: Accept in Principle

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**Submitter:** Vicki Smith, LION Apparel

**Recommendation:** Revise text to read as follows:

Where the organization performs its own advanced inspection, advanced cleaning or basic repair, the organization shall be trained by the ensemble or ensemble element manufacturer, a Verified ISP or an ISP. Where the organization uses an ISP to perform advanced inspection, or advanced cleaning or basic repair, the ISP shall be trained by the ensemble or ensemble element manufacturer.

**Substantiation:** The standard creates two categories of Independent Service Provider (ISP) — Verified ISP and ISP. A Verified ISP has annual testing of repairs, facility inspection and their Quality Manual audited to verify continued compliance of all services provided. An ISP has not been evaluated for compliance to the standard; therefore should be trained by the manufacturer to perform these services and to train organizations to perform them. Manufacturer training should not be required by Verified ISPs.

**Committee Meeting Action:** Accept in Principle

**Committee Statement:** The technical committee accepted the proposal in principle. See 1851-2 (Log #CP9).

1851-6 Log #32 FAE-SPF  
(5.1.2 and A.5.1.2(6))

Final Action: Accept in Principle

**Submitter:** Jeffrey O. Stull, International Personnel Protection, Inc.

**Recommendation:** Change 5.1.2(6) to read "\*\* Specific physical area of operation" Renumber current (6) as (7).

Add new paragraph to A.5.1.2.(6): One of the hazards faced by firefighters is being struck by vehicular traffic. The high visibility materials required on firefighter PPE effectively enhance visual conspicuity during the variety of fireground operations. The continuous use of high visibility garments is one component of a strategy to mitigate risks from struck-by hazards, which are known to cause serious firefighter injuries and fatalities on an annual basis. Additional high visibility requirements for firefighters on or near roadways are regulated by the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD, 2009 version). It is the responsibility of the authority having jurisdiction (AHJ) to specify appropriate high visibility apparel from the available garment options, if any, and based on a risk assessment, to establish policies for use in accordance with prevailing regulations (the MUTCD) and in compliance with applicable standards (e.g., NFPA 1971, ANSI/SEA 107, ANSI/SEA 207, et.).

Ordinary firefighter protective ensembles many not permit firefighter to float and are likely to impact the safety of firefighters if they fall into water. The use of personal flotation devices may need to be considered for operations near water ways. Personal flotation devices must comply with applicable U.S. Coast Guard Regulations.

Firefighters operating at elevation may need some form of fall protection, which may or may not be incorporated into their protective clothing. Consideration must be given to devices that comply with NFPA 1983.

**Substantiation:** The need for additional safety equipment may vary with the physical location of the firefighter. In particular, specific person-position hazards such as operating near vehicle traffic, waterways, or at elevation warrant consideration of additional PPE such as supplemental high visibility apparel, personal flotation devices, or fall protection. This is not original material; its reference/source is as follows:

1971-190 Log #60.

**Committee Meeting Action:** Accept in Principle

Change 5.1.2 (6)\* to read "Specific physical area of operation."

Renumber current (6) as (7).

Add new paragraph to A.5.1.2.(6):

A.5.1.2 (6) Examples of physical areas of operations include but are not limited to:

a) One of the hazards faced by firefighters is being struck by vehicular traffic. The high visibility materials required on firefighter PPE effectively enhance visual conspicuity during the variety of fireground operations. The continuous use of high visibility garments is one component of a strategy to mitigate risks from struck-by hazards, which are known to cause serious firefighter injuries and fatalities on an annual basis. Additional high visibility requirements for firefighters on or near roadways are regulated by the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD, 2009 version). It is the responsibility of the authority having jurisdiction (AHJ) to specify appropriate high visibility apparel from the available garment options, if any, and based on a risk assessment, to establish policies for use in accordance with prevailing regulations (the MUTCD) and in compliance with applicable standards (e.g., NFPA 1971, ANSI/SEA 107, ANSI/SEA 207, et.).

b) The use of personal flotation devices may need to be considered for operations near water ways.

c) Firefighters operating at elevation may need some form of fall protection, which may or may not be incorporated into their protective clothing.

**Committee Statement:** The technical committee accepted the proposal in principle, and provided amended text to the submitted Annex item.

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1851-7 Log #17 FAE-SPF  
(5.1.6.1 (New))

Final Action: Accept in Principle

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**Submitter:** Karen E. Lehtonen, LION

**Recommendation:** New text to read as follows:

5.1.6.1\* As a minimum the organization shall ensure the proper overlap between ensemble elements being used, including but not limited to coat to hood and helmet, coat to pant, coat to glove, and pants to footwear. Any other specialty equipment being used shall also be considered to ensure the equipment does not interfere with the proper function and interface of the protective ensemble or ensemble elements.

**Substantiation:** Additional attention should be given to the interface areas between elements during the selection process. Specific reference to the interface areas should be called out in this standard to ensure the proper attention is given.

**Committee Meeting Action:** Accept in Principle

Delete asterisk to 5.1.6

Delete A.5.1.6.

Delete existing text in 5.1.6, and replace with the following:

5.1.6 The organization shall ensure the proper interface between ensemble elements, including but not limited to coat to hood and helmet, coat to pant, coat to glove, and pants to footwear. Any other specialty equipment being used shall also be considered to ensure the equipment does not interfere with the proper function and interface of the protective ensemble or ensemble elements.

**Committee Statement:** The technical committee accepted the proposal in principle, and provides revised clarifying text as shown in the meeting action.

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1851-8 Log #2 FAE-SPF  
(6.2.2.5(3)(c))

Final Action: Accept

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**Submitter:** James M. Baker, TotalCare

**Recommendation:** Revise text to read as follows:

Exposed or deformed ~~steel~~-toe, ~~steel~~-midsole, or shank.

New / Exposed or deformed protective toe, protective midsole, or shank.

**Substantiation:** The document assumes that boots will always use steel to protect the toe and midsole. The standard should allow for other technologies that may replace steel.

**Committee Meeting Action:** Accept

Revise text to read as follows:

6.2.2.5(3)(c) Exposed or deformed ~~steel~~ protective toe, ~~steel~~ protective midsole, or shank.

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1851-9 Log #3 FAE-SPF  
(6.2.3.1)

Final Action: Accept in Principle

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**Submitter:** James M. Baker, TotalCare

**Recommendation:** Add - Separation or peeling of aluminized fabric.

**Substantiation:** Peeling and separation of the fabric has been observed during inspection of aluminized fabric. Issue appears in both new and used fabric.

**Committee Meeting Action:** Accept in Principle

Add a new 6.2.3.1(3) Delamination as evidenced by separation or peeling of the outer shell.

**Committee Statement:** The technical committee added the term delamination, and revised the text to add clarity to the intent of the paragraph.

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1851-10 Log #4 FAE-SPF  
(6.2.3.3)

**Final Action: Accept in Principle**

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**Submitter:** James M. Baker, TotalCare

**Recommendation:** Add - Separation or peeling of aluminized fabric.

**Substantiation:** Peeling and separation of the fabric has been observed during inspection of aluminized fabric. Issue appears in both new and used fabric.

**Committee Meeting Action:** **Accept in Principle**

Add a new 6.2.3.3 (3) Delamination as evidenced by separation or peeling of the outer shell.

Renumber subsequent.

Add a new 6.2.3.2 (3) Delamination as evidenced by separation or peeling of the outer shell.

Renumber subsequent.

**Committee Statement:** The technical committee added the term delamination, and revised the text to add clarity to the intent of the paragraph. The the TC also added the same text to 6.2.3.2 (3).

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1851-11 Log #21 FAE-SPF  
(6.3.1)

**Final Action: Accept in Principle**

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**Submitter:** Vicki Smith, LION Apparel

**Recommendation:** Revise text to read as follows:

Advanced inspection and any necessary testing shall be performed by a verified ISP, ISP, or the organization's trained personnel.

**Substantiation:** The standard must clearly delineate the differences between ISP and verified ISP, and the fact that the ISPs which are under no scrutiny must have manufacturers' training to perform advanced inspection and to train organizations on advanced inspection. Verified ISPs on the other hand have chosen to invest in developing NFPA 1851 compliant processes and have chosen to have these processes scrutinized and deemed acceptable by a third party certification organization.

**Committee Meeting Action:** **Accept in Principle**

**Committee Statement:** The technical committee accepted the proposal in principle. See 1851-2 (Log #CP9).

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1851-12 Log #16 FAE-SPF  
(6.3.3)

Final Action: Accept in Principle

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**Submitter:** Karen E. Lehtonen, LION

**Recommendation:** Revised text to read as follows:

Advanced inspections of all protective ensemble elements, even if not issued and used, shall be conducted at a minimum of every 12 months, or whenever routine inspections indicate that a problem could exist.

**Substantiation:** There is confusion in the field regarding this paragraph and if advanced inspections are required annually even if the ensemble or ensemble element is not issued or used. The added language is intended to clarify the committee intent assuming the advanced inspection is required annually regardless of the element being issued or used. See also 7.3.3 for reference:

**Committee Meeting Action:** Accept in Principle

Revise text to read as follows:

6.3.3\* Advanced inspections of all protective ensemble elements that are issued shall be conducted at a minimum of every 12 months, or whenever routine inspections indicate that a problem could exist.

A.6.3.3 If ensemble elements have been issued, they are not reserve, and are intended to be subjected to the advanced inspection.

6.3.3.1 Ensemble elements that have been properly stored in accordance with Chapter 9 and are not being used, are not required to be subjected to advanced inspection.

6.2.1 Individual members shall conduct a routine inspection of their protective ensembles and ensemble elements upon issue and after each use.

**Committee Statement:** The technical committee accepted the proposal in principle, and provided the text as shown in the meeting action to address the issue. Clarification provided by the TC resulted in language to specify when advanced inspections are necessary for issued ensemble elements.

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1851-13 Log #5 FAE-SPF  
(6.3.4)

Final Action: Accept in Principle

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**Submitter:** James M. Baker, TotalCare

**Recommendation:** The findings of the advanced inspection shall be documented on an inspection form.

Add: This form may be paper, electronic or any type of permanent record.

**Substantiation:** The statement causes the user to assume they must use a paper form.

**Committee Meeting Action:** Accept in Principle

Revise 6.3.4 as follows:

6.3.4 The findings of the advanced inspection shall be documented. ~~on an inspection form:~~

**Committee Statement:** The technical committee accepted the proposal in principle and revised the text of 6.3.4. The TC agrees that the paragraph causes the user to assume they must use a paper form.

1851-14 Log #33 FAE-SPF  
(6.3.5, A.12.2.1, and A.12.2.3.1)

Final Action: Reject

Submitter: Stacy Trenkamp, University of Kentucky Textile Testing Laboratory

Recommendation: Add new text to read as follows:

6.3.5\* The advanced inspection shall include, as a minimum, the inspections specified in 6.3.5.1 through 6.3.5.7 and for garment elements only the testing specified in Section 12.1 and Section 12.2:

~~Section 12.2~~

~~A.12.2.1 It is important to realize that this field evaluation procedure can produce results that are inconsistent with more comprehensive or sophisticated testing and might detect only the worse-case failure areas. To perform more sophisticated testing of the moisture barrier, the garment manufacturer should be contacted for advice.~~

~~A.12.2.3.1 If there are questions about using an alcohol-tap water mixture for evaluating the protective garment, the garment manufacturer should be contacted directly for advice~~

Add new Annex text:

A.6.3.5 Loss of integrity can be determined by a field test evaluation of the moisture barrier using the Leakage Evaluation Test. It is important to realize that this field evaluation procedure can produce results that are inconsistent with more comprehensive or sophisticated testing and might detect only the worse-case failure areas. The procedure in this section is based on Section 12.2 of NFPA 1851 2008 Edition. It is recommended that this section be moved to the annex because the Leakage Evaluation Test is an easy and inexpensive indicator of leakage for field evaluations; however, the study from the Firefighter Durability Study Phase I shows that the Water Penetration Barrier Evaluation shows more accurate results.

For this testing, at a minimum, the front and back body panels of each protective garment should be evaluated using three different moisture barrier material areas. Liner evaluation areas should be from high-abrasion areas of the garment, including, but not limited to:

- (1) Broadest Part of the shoulders
- (2) Back waist area of the coat
- (3) Knees
- (4) Crotch Area
- (5) Seat Area

In addition to the areas listed where potential damage to the garment outer shell or thermal barrier has been detected, the evaluation should be conducted on the corresponding area of the moisture barrier. Where potential damage to the garment moisture barrier has been detected, the evaluation should also be conducted on that area.

The liner composite should be positioned in the evaluation apparatus so that the moisture barrier is oriented upward and is contacted with the liquid exposure in the evaluation apparatus. An alcohol-tap water solution should be made by combining 1 part rubbing alcohol, 70 percent isopropanol alcohol with 6 parts tap water. If there are questions about using an alcohol-tap water mixture for evaluating the protective garment, the garment manufacturer should be contacted directly for advice. A 5 gal bucket or similar container should be used to support the liner during evaluation. The evaluation should be performed at room temperature. The evaluation should be conducted using the following procedure:

- (1) If possible, separate the liner from the outer shell.
- (2) Orient the liner such that the moisture barrier is on the outside.
- (3) Position the dry liner over the bucket with the thermal barrier facing down and the moisture barrier side facing up.
- (4) Cup the liner area that is being evaluated, so that it is lower than the surrounding liner.
- (5) Pour 1 cup of the alcohol-tap water mixture onto the moisture barrier in the cupped area of the liner.

The liner should be visually inspected for leakage on the thermal barrier side after 3 minutes. If any liquid passes through the moisture barrier and wets the thermal barrier, the liner should be removed from service and repaired or replaced. After the evaluation procedure has been performed, the liner shall be cleaned and allowed to completely dry to remove all traces of the alcohol-tap water mixture.

**Substantiation:** It is proposed and recommended to remove the Leakage Evaluation Test from the body of the Standard and revise/enter the test into the annex. The Durability Study (Phase I) conducted at the University of Kentucky did not show a strong correlation between the Water Penetration Barrier Evaluation and the Leakage Evaluation tests, indicating that the accuracy of the Leakage Evaluation Test is not reliable enough for placement in the body of the text. The study documented that 32% of the moisture barriers tested failed the Leakage Evaluation Test, where as 66% of the same moisture barriers tested failed the Water Penetration Barrier Evaluation. A high concentration of failures in the Water Penetration Barrier Evaluation occurred at moisture barrier seams; therefore, it is being

recommended that the Leakage Evaluation Test be moved to the annex of NFPA 1851. This would provide a simple and inexpensive test to be conducted on moisture barrier fabrics as a field evaluation/inspection.

This is not original material; its reference/source is as follows:

Firefighter Durability Study Phase I, Deena Cotterill's Thesis, is available upon request.

**Committee Meeting Action:** Reject

**Committee Statement:** This is an appropriate field test and does not exclude the use of a more stringent hydrostatic test.

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1851-15 Log #6 FAE-SPF  
(6.3.5.2)

**Final Action: Accept in Principle**

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**Submitter:** James M. Baker, TotalCare

**Recommendation:** ADD - Label integrity and legibility

**Substantiation:** Label integrity and legibility is required for record keeping.

**Committee Meeting Action:** Accept in Principle

Add a new 6.3.5.2 (8)\* Label integrity and legibility

Asterisk 6.3.5.2 (8) and add an Annex item

A.6.3.5.2 (8) If a label problem is identified, the organization should contact the manufacturer of the ensemble or ensemble element.

**Committee Statement:** The technical committee accepted the proposal in principle, and added a new list item and Annex item.

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1851-16 Log #7 FAE-SPF  
(6.3.5.3)

**Final Action: Accept in Principle**

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**Submitter:** James M. Baker, TotalCare

**Recommendation:** ADD - Label integrity and legibility

**Substantiation:** Label integrity and legibility is required for record keeping.

**Committee Meeting Action:** Accept in Principle

Add a new 6.3.5.3 (13)\* Label integrity and legibility

Asterisk 6.3.5.3 (13) and add an Annex item

A.6.3.5.3(13) If a label problem is identified, the organization should contact the manufacturer of the ensemble or ensemble element.

**Committee Statement:** The technical committee accepted the proposal in principle, and added an explanatory Annex item.

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1851-17 Log #8 FAE-SPF  
(6.3.5.4)

Final Action: Accept in Principle

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Submitter: James M. Baker, TotalCare

Recommendation: ADD - Label integrity and legibility

Substantiation: Label integrity and legibility is required for record keeping.

Committee Meeting Action: **Accept in Principle**

Add a new 6.3.5.4 (8)\* Label integrity and legibility

Asterisk 6.3.5.4 (8) and add an Annex item as follows:

A.6.3.5.4(8) If a label problem is identified, the organization should contact the manufacturer of the ensemble or ensemble element.

Committee Statement: The technical committee accepted the proposal in principle, and added an explanatory Annex item.

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1851-18 Log #9 FAE-SPF  
(6.3.5.5)

Final Action: Accept in Principle

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Submitter: James M. Baker, TotalCare

Recommendation: ADD - Label integrity and legibility

Substantiation: Label integrity and legibility is required for record keeping

Committee Meeting Action: **Accept in Principle**

Add a new 6.3.5.5 (10)\* Label integrity and legibility

Asterisk 6.3.5.5 (10) and add an Annex item

A.6.3.5.5(10)\* If a label problem is identified, the organization should contact the manufacturer of the ensemble or ensemble element.

Committee Statement: The technical committee accepted the proposal in principle, and added a new list item and explanatory Annex item.

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1851-19 Log #10 FAE-SPF  
(6.3.5.7)

Final Action: Accept in Principle

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Submitter: James M. Baker, TotalCare

Recommendation: ADD - Label integrity and legibility

Substantiation: Label integrity and legibility is required for record keeping

Committee Meeting Action: **Accept in Principle**

New 6.3.5.7(5) Label integrity and legibility

Asterisk 6.3.5.7(5) and add an Annex item

A.6.3.5.7(5) If a label problem is identified, the organization should contact the manufacturer of the ensemble or ensemble element.

Committee Statement: The technical committee accepted the proposal in principle, and added a new list item and explanatory Annex item.

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1851-20 Log #11 FAE-SPF  
(6.3.6.1)

Final Action: Accept

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Submitter: James M. Baker, TotalCare

Recommendation: Add - Separation or peeling of aluminized fabric.

Substantiation: Peeling and separation of the fabric has been observed during inspection of aluminized fabric. Issue appears in both new and used fabric.

Committee Meeting Action: Accept

Add a new 6.3.6.1(3) Delamination as evidenced by separation or peeling of the outer shell.

Committee Statement: The technical committee added the term delamination, and revised the text to add clarity to the intent of the paragraph.

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1851-21 Log #12 FAE-SPF  
(6.3.6.2)

Final Action: Accept

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Submitter: James M. Baker, TotalCare

Recommendation: Add - Separation or peeling of aluminized fabric.

Substantiation: Peeling and separation of the fabric has been observed during inspection of aluminized fabric. Issue appears in both new and used fabric.

Committee Meeting Action: Accept

Add a new 6.3.6.2(5) Delamination as evidenced by separation or peeling of the outer shell.

Committee Statement: The technical committee added the term delamination, and revised the text to add clarity to the intent of the paragraph.

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1851-22 Log #13 FAE-SPF  
(6.3.6.3)

Final Action: Accept

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Submitter: James M. Baker, TotalCare

Recommendation: Add - Separation or peeling of aluminized fabric.

Substantiation: Peeling and separation of the fabric has been observed during inspection of aluminized fabric. Issue appears in both new and used fabric.

Committee Meeting Action: Accept

Add a new 6.3.6.3(5) Delamination as evidenced by separation or peeling of the outer shell.

Committee Statement: The technical committee added the term delamination, and revised the text to add clarity to the intent of the paragraph.

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1851-23 Log #14 FAE-SPF  
(6.3.6.5)

Final Action: Accept

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Submitter: James M. Baker, TotalCare

Recommendation: Add - Separation or peeling of aluminized fabric.

Substantiation: Peeling and separation of the fabric has been observed during inspection of aluminized fabric. Issue appears in both new and used fabric.

Committee Meeting Action: Accept

Add a new 6.3.6.5(3) Delamination as evidenced by separation or peeling of the outer shell.

Committee Statement: The technical committee added the term delamination, and revised the text to add clarity to the intent of the paragraph.

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1851-24 Log #34 FAE-SPF  
(6.4.3 and A.6.4.3)

Final Action: Reject

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**Submitter:** Stacy Trenkamp, University of Kentucky Textile Testing Laboratory

**Recommendation:** Revise text to read as follows:

6.4.3 A complete liner inspection of all garment elements shall be conducted at a minimum after ~~3~~2 years in service and annually thereafter or whenever advanced inspections indicate that a problem might exist. The liner system shall be opened to expose all layers for inspection and testing.

A.6.4.3 It should be noted that this standard's requirement that a complete liner inspection be performed after the first ~~3~~2 years of service and every year thereafter should not negate the necessity of conducting a complete liner inspection sooner than the required time frame if circumstances or appearances dictate. For example, inside layers that show marked discoloration or physical deterioration should trigger a complete liner inspection.

**Substantiation:** We recommended changing the liner inspection from after three years of service to two years of service based on findings of the Water Penetration Barrier Evaluation conducted in the Firefighter Durability Study Phase I. In this study, it was found that 53% of garments in the 2-3 year age category leaked during the Water Penetration Barrier Evaluation. Since over half of the moisture barriers had water penetration after the evaluation, it is recommended that a liner inspection be completed after two years in service for the safety of the firefighter and for preventative measures against burn injury.

This is not original material; its reference/source is as follows:

Deena Cotterills Thesis, The Firefighter Durability Phase I is available upon request.

**Committee Meeting Action:** Reject

**Committee Statement:** The technical committee rejected the proposal because it believes that the 3 year requirement is sufficient.

1851-25 Log #30 FAE-SPF  
(6.4.5.2)

Final Action: Reject

**Submitter:** Jeffrey O. Stull, International Personnel Protection, Inc.

**Recommendation:** Revise text to read as follows:

*Changes to inspection procedures:*

6.4.5.2 The moisture barrier liner shall be tested using the hydrostatic test to evaluate the water penetration barrier evaluated for liquid leakage, as specified in ~~Section 12.3~~ Section 12.2 and shall show no leakage.

6.4.5.2.1 If leakage of the liner is found, then those portions of the liner showing leakage shall be further evaluated using the hydrostatic test of the moisture barrier as specified in Section 12.3 to determine the specific areas of leakage.

6.4.5.2.2 The results of the hydrostatic testing shall be used to make a determination if the liner can be repaired or must be replaced.

*Changes to water penetration barrier evaluation.*

12.3.1 **Application.** This evaluation method shall apply to moisture barrier materials and moisture barrier seams in structural or proximity fire fighting protective garment elements that are in service and are found to be leaking as a result of the leakage evaluation applied during the advanced inspection.

*Replace current paragraph 12.3.2.1, 12.3.2.1.1, and 12.3.2.1.2 with:*

12.3.2.1 The same areas of the garment liner that have been found to leak when tested during advanced inspection using the leakage evaluation in 12.2 shall be evaluated.

12.3.2.1.1 The tested areas shall coincide with the center of the test areas evaluated in accordance with 12.2.

**Substantiation:** A preliminary study has shown that the hydrostatic test identifies leaks in the moisture barrier that are unlikely to result in liquid exposure of the wearer. End users are finding higher than expected failure rates in hydrostatic testing of moisture barriers. These failures apply to material as well as seams and are leading to higher maintenance costs and lower perceptions of barrier quality. A significant number of the failures cannot be identified visually. Moreover, there is often no apparent damage or exposure/use history that can be cited to explain the specific location of the identified failures. Garments that show hydrostatic failures often seem to be still completely serviceable by the respective end users, with no associated complaints of liquid leakage into the garments. In limited testing, garments that show hydrostatic failures have not been shown to have corresponding failures within the Whole Garment Integrity Test (Shower Test) or in other tests that attempt to simulate fireground liquid exposures.

The proposed changes rely on the leakage evaluation (puddle test) to identify potential failure areas of the liner and moisture barrier. Where leakage is found, it is recommended that the water penetration barrier evaluation be applied to determine the specific areas of leakage in the moisture barrier.

**Committee Meeting Action:** Reject

**Committee Statement:** The technical committee rejected the proposal because it believes this is not just a test for water leakage. The hydrostatic test is a more reproducible test than the puddle test.

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1851-26 Log #31 FAE-SPF  
(6.4.5.2, 12.3.4, and 12.3.5)

Final Action: Reject

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Submitter: Jeffrey O. Stull, International Personnel Protection, Inc.

Recommendation: Revise text to read as follows:

6.4.5.2 The moisture barrier shall be tested using the hydrostatic test to evaluate ~~the~~ its resistance to water penetration barrier, as specified in Section 12.3 and shall show no Type 2 leakage.

12.3.4.1 (3) Visually inspect the visible side of the moisture barrier after 15 seconds to determine if water penetration has occurred and rate any water penetration according to the instructions provided in 12.3.4.2.

12.3.4.2 Rate the observed water penetration for leak location, time of leak, and type of leak according to Table 12.3.4.2.

\*\*\*\*\*Insert Table 12.3.4.2 Here\*\*\*\*\*

12.3.4.3 Any test location that shows a Type 2 rating for any of the rating categories (leak location, time of leak, and type of leak) shall be classified as Type 2 leakage.

12.3.5.1 ~~If any water passes through any Type 2 leakage is found~~ for the moisture barrier or moisture barrier seam, the liner shall be removed from service and repaired or replaced.

**Substantiation:** The system for applying a pass/fail determination for hydrostatic testing of garment moisture barrier and moisture barrier seams during the complete liner inspection does not account for the potential contribution of the leak to the overall integrity of the garment and its ability to prevent liquid contact with the wearer. Small, non-visible pinhole leaks randomly located on the liner do not result in exposure of the wearer when evaluated under simulated liquid exposure conditions. In contrast, leaks which are visible, which readily occur, and which occur allowing relatively large volumes of liquid do result in potential exposure of the wearer to liquids. The proposed system of rating the damage at the leak location, the onset of leakage, and the type of leak provides discrimination for the significant and potential safety associated with leaks identified by a rigorous hydrostatic test method.

**Committee Meeting Action:** Reject

**Committee Statement:** The technical committee rejected the proposal, and believes that it represents a major change in the standard without any supporting data.

**Table 12.3.4.2 – System of Rating Moisture Barrier Leaks During Hydrostatic Testing**

	<b>Leak Location</b>	<b>Time of leak</b>	<b>Type of leak</b>
Type 1	No apparent visible damage	During full applied pressure	1 to 3 water droplets form; thin water stream from pinhole
Type 2	Visible damage at location of leak	Before full applied pressure	More than 4 water droplets form; test basin fills with water

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1851-27 Log #38 FAE-SPF  
(6.5.4.2, 12.3.5.1, 12.3.5.2)

Final Action: Reject

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**Submitter:** Daniel J. Gohlke, W.L. Gore & Assoc., Inc.

**Recommendation:** Revise text to read as follows:

6.4.5.2 delete "and shall show no leakage."

Delete old 12.3.5.1.

New 12.3.5.1 Moisture barriers shall be repaired or replaced if leaks appear in every test site or 4 or more leaks appear in any one test site.

Delete old 12.3.5.2.

New 12.3.5.2 After testing, and before repairing if needed, the liner shall be allowed to dry completely before being returned to service.

**Substantiation:** The existing criteria for determining whether a moisture barrier needs to be repaired or replaced has led to unnecessary repairs and replacements of moisture barriers. This proposition is supported by observations in the industry of garments performing very satisfactorily or effectively in use, but still incurring repair costs when maintained according to NFPA 1851. Some departments have chosen not to implement NFPA 1851, or not to implement it fully, because of this discrepancy. There also seems to be no evidence or correlation between the level of scrutiny required by NFPA 1851 and actual exposure of the fire fighter on the fire ground to liquids, whether by rain, chemical or blood. In fact, NFPA 1851 actually creates a higher level of scrutiny than does NFPA 1971 for the new garment. Is it unreasonable to have a zero defect exception, when even the FDA does not require zero defects in barriers used in operating room gowns? Even vapor tight suits (NFPA 1991) are allowed to leak, i.e. they are allowed a pressure decay rate in the inflation test. NFPA 1994 garments specify different levels of protection, none of them absolute. Therefore, it seems reasonable to conclude that for structural fire fighting garments not every and all water leaks found according to Clause 12.3 lead to exposure on the fire ground. There are multiple possible modifications to the inspection regime that would alter the current level of required scrutiny. This proposal suggests that the criterion for implementing repairs be graded, so that serious flaws and failures get required as they should be but that inconsequential ones (e.g. single pinholes?) do not mandate repair or replacement.

**Committee Meeting Action:** Reject

**Committee Statement:** The technical committee rejected the proposal, and believes that it represents a major change in the standard without any supporting data.

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1851-28 Log #22 FAE-SPF  
(7.3.1)

Final Action: Accept in Principle

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**Submitter:** Vicki Smith, LION Apparel

**Recommendation:** Revise text to read as follows:

Advanced cleaning and any necessary testing shall be performed by a verified ISP, ISP, or the organization's trained personnel.

**Substantiation:** The standard must clearly delineate the differences between ISP and verified ISP, and the fact that the ISPs which are under no scrutiny must have manufacturers' training to perform advanced cleaning and to train organizations on advanced cleaning. Verified ISPs on the other hand have chosen to invest in developing NFPA 1851 compliant processes and have chosen to have these processes scrutinized and deemed acceptable by a third party certification organization.

**Committee Meeting Action:** Accept in Principle

**Committee Statement:** The technical committee accepted the proposal in principle. See 1851-2 (Log #CP9).

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1851-29 Log #15 FAE-SPF  
(7.3.7(10))

Final Action: Reject

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Submitter: James M. Baker, TotalCare

Recommendation: New text to read as follows:  
7.3.7(10)

ADD – Cleaning and soaking agents shall not leave any residue or cause any degrading of the ensemble of ensemble elements

**Substantiation:** Preliminary testing of some products show a residue after cleaning. This issue is of particular concern with the moisture barrier. It appears that this residue can cause premature seam tape failures.

**Committee Meeting Action:** Reject

**Committee Statement:** The technical committee rejected the proposal. The TC believes that there is no way to check for residue, and that most laundry cleaning agents will leave a residue and add to degradation.

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1851-30 Log #23 FAE-SPF  
(8.1.1)

Final Action: Accept in Principle

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Submitter: Vicki Smith, LION Apparel

Recommendation: Revise text to read as follows:

All repairs shall be performed by the original manufacturer, a Verified ISP, and ISP, or a member of the organization who has received training by a manufacturer, a Verified ISP, or by an ISP in the repair of ensemble or ensemble elements.

**Substantiation:** The standard must clearly delineate the differences between ISP and verified ISP, and the fact that ISPs which are under no scrutiny must have manufacturers' training to perform basic repairs and to train organizations on basic repairs. Verified ISPs on the other hand have chosen to invest in developing NFPA 1851 compliant processes and have chosen to have these processes scrutinized and deemed acceptable by a third party certification organization.

**Committee Meeting Action:** Accept in Principle

**Committee Statement:** The technical committee accepted the proposal in principle. See 1851-2 (Log #CP9).

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1851-31 Log #CP3 FAE-SPF  
(8.2.3)

Final Action: Accept

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Submitter: Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment,

Recommendation: Revise 8.2.3 as follows:

8.2.3 Add to end of this paragraph: For any tears, char marks, ember burns and abraded areas that require a patch larger than 160 cm<sup>2</sup> (25 in<sup>2</sup>), the manufacturer or the verified ISP, in conjunction with the organization, shall be consulted.

8.2.3 Delete "32 cm<sup>2</sup> (5 in<sup>2</sup>)" and replace with "160 cm<sup>2</sup> (25 in<sup>2</sup>)"

**Substantiation:** The proposed change clarifies the procedures for repairs larger than 160 cm<sup>2</sup> (25 in<sup>2</sup>). In 8.2.3 the intent was to allow a 5 square inch patch but in the standard it is currently written as 5 in<sup>2</sup>, not 25 in<sup>2</sup>.

**Committee Meeting Action:** Accept

1851-32 Log #43 FAE-SPF  
(8.2.3.4)

Final Action: Accept in Principle

Submitter: Jason L. Allen, Intertek Testing Services

Recommendation: New text to read as follows:

8.2.3.4 Where moisture barrier tears, holes, or abrasions are being repaired, the applied seam tape shall extend at least 18 mm (3/4 in.) in all directions beyond the edge of the patch or the repaired damage.

Substantiation: The current language in 8.2.3.1 implies that the moisture barrier seam sealing tape must extend 1 inch beyond the edge of the patch or the repaired area of damage; however, the majority of moisture barrier sealing tapes are not sufficiently wide enough to provide this amount of overlap. Furthermore, the required test for efficacy of repairs addressed in Table 11.3.7(c) provides a relatively rigorous demonstration of continued moisture barrier performance.

Committee Meeting Action: Accept in Principle

Add new text to read as follows:

8.2.3.4 Where moisture barrier tears, holes, or abrasions are being repaired, a single width of seam tape shall be used and shall be required to extend at least 12.5 mm (1/2 inch) in all directions beyond the edge of the repaired damage. Where the moisture barrier has a hole or abrasion measuring more than 12.5 mm (1/2 inch) in diameter in any direction or a tear greater than 3 inches in length, a patch consisting of the same moisture barrier fabric shall be used for repair.

Committee Statement: The technical committee accepted the proposal in principle, and added a second clarifying sentence to the new paragraph 8.2.3.4.

1851-33 Log #39 FAE-SPF  
(10.1)

Final Action: Reject

Submitter: Daniel E. Nichols, Roosevelt Fire District

Recommendation: Revise text to read as follows:

10.1.2 Structural fire fighting ~~ensembles and ensemble elements~~ protective garments, structural firefighting protective gloves, and structural fire fighting protective hoods shall be retired in accordance with 10.2.1, no more than 10 years from the date the ~~ensembles or ensemble elements~~ were manufactured.

10.1.3 Proximity fire fighting ~~ensembles and ensemble elements~~ protective garments, proximity fire fighting protective gloves, and proximity fire fighting protective hoods shall be retired in accordance with 10.2.1, no more than 10 years from the date the ~~ensembles or ensemble elements~~ were manufactured.

10.1.4 Structural fire fighting protective helmets and proximity fire fighting protective helmets shall be retired at a time frame determined by the organization, taking into consideration to condition and maintenance record of such elements.

10.1.4.1 Ear covers of fire fighting protective helmets and proximity fire fighting protective helmets shall be retired in accordance with 10.2.1, no more than 10 years from the date the ensemble elements were manufactured, and shall be replaced in accordance with Chapter 8.

[Renumber subsequent sections]

Substantiation: The 2007 edition placed a finite retirement date on firefighting gear, 10 years from manufacturer. Reviewing the committee documents from last cycle and the information found in the 1851 annex, the information seems to stem from the maintenance and care of textile-based gear components; namely coats and pants. I did not see any compelling information to the need to retire helmets after 10 years of manufacturer. Helmets are not susceptible to sunlight and UV rays as garments, do not flex like garments, and are not degraded by the cleaning process as garments (1851 has specific cleaning processes for helmets). Helmet inspections are much easier to complete than garments, as the failure points found in 1851 include many things that you can see with the naked eye (cracks, bulges, broken hardware, chipped paint, missing components, separating shells and outer layers).

Furthermore, helmets are crafted using various materials; leather, Kevlar, and fiberglass-composites. I did not find any information that these materials degraded similar to the outer shell or liners of protective garments.

This issue is important to us for two reasons. First, we buy helmets at a bulk rate to get a lower price since we do not need to buy a sized helmet for most of our incoming volunteer members. We have helmets that may be in their original factory boxes for 2-3 years prior to distribution. Being subjected to absolutely no hazards, we have needlessly lost out on using these helmets for their intended lifespan. Secondly, we have bought helmets that we have seen last longer than other, particularly leather helmets. We made a significant investment in some of our helmets being leather due to the increased durability we have seen with these helmets.

To specifically address the ear covers, which are made and have the similar properties of garments, we have proposed the 10 year retirement and mandatory replacement of these in this proposal.

It is our opinion that a blanket 10 years for all helmets is not warranted due to the vast different between garments and helmets as well as the current blanket requirement not taking into account the different materials a helmet can be constructed from. The proposed language allows the organization to determine the life cycle of helmets, based on maintenance, use, materials, and idle (storage) time.

Thank you for your consideration.

Committee Meeting Action: Reject

Committee Statement: The technical committee rejected the proposal, and directs the reader to 1851-36 (Log #18).

1851-34 Log #CP10 FAE-SPF  
(10.1.2, 10.1.3)

Final Action: Accept

Submitter: Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment,

Recommendation: 10.1.2 and 10.1.3:

Change "10.2.1" in each of these paragraphs to read "10.2.1 or 10.2.2."

Substantiation: The technical committee is proposing these changes to indicate that in certain situations structural fire fighting ensembles and ensemble elements may be used in non-live fire training.

Committee Meeting Action: Accept

1851-35 Log #36 FAE-SPF  
(10.1.2 and 10.1.2.1 (New) )

Final Action: Reject

Submitter: Stacy Trenkamp, University of Kentucky Textile Testing Laboratory

Recommendation: Revise text to read as follows:

10.1.2\* Structural fire fighting ensembles and ensemble elements shall be retired in accordance with 10.2.1, no more than 10 years from the date the ensembles or ensemble elements were manufactured.

10.1.2.1 Structural fire fighting garments shall also be retired prior to the 10 years from date of manufacture in the event the garment has sustained damage such that it is beyond repair. Additional factors to consider shall include but not be limited to physical damage, thermal damage, or excessive soil build up to any or all of the layers.

Substantiation: According to the Fire Fighter Durability Study Phase I completed at the University of Kentucky, 23 of the 40 retired garments collected were retired prior to the 10 years from the date of manufacture. The reason for retirement varied and 57% of these retired garments did not meet one or more of the NFPA 1851 Advanced Inspection Requirements.

Soiled ensembles and ensemble elements typically reflect less radiant heat. After materials are saturated with hydrocarbons, they tend to absorb rather than reflect the radiant heat from the surrounding fire. Ensemble and ensemble elements contaminated with hazardous bodily fluids could spread contaminants in the fire station and or living areas if a firefighter wears it again. Ensembles and ensemble elements impregnated with oil, grease, and hydrocarbon deposits from soot and smoke can ignite and cause severe burns and injuries, even if the materials are normally flame resistant.

This is not original material; its reference/source is as follows:

Deena Cötterills Thesis, The Firefighter Durability Phase I is available upon request.

Committee Meeting Action: Reject

Committee Statement: The technical committee rejected the proposal because it believes this is covered elsewhere in the standard (see paragraph 10.1.4).

1851-36 Log #18 FAE-SPF  
(10.1.2 and 10.1.3)

Final Action: Reject

Submitter: Karen E. Lehtonen, LION

Recommendation: Revised text to read as follows:

10.1.2\* Structural fire fighting ensembles and ensemble elements shall be retired in accordance with 10.2.1, ~~no more than 10 years from the date the ensembles or ensemble elements were manufactured.~~ Structural fire fighting ensembles and ensemble elements that have followed the cleaning, inspection and repair requirements of this standard at least annually shall be retired 10 years from the date the ensemble or ensemble element was issued to be worn. Structural fire fighting ensembles and ensemble elements that have not followed the cleaning, inspection and repair requirements of this standard at least annually shall be retired no more than 10 years from the date the ensembles or ensemble elements date of manufacture.

10.1.3\* Proximity fire fighting ensembles and ensemble elements shall be retired in accordance with 10.2.1, ~~no more than 10 years from the date the ensembles or ensemble elements were manufactured.~~ Proximity fire fighting ensembles and ensemble elements that have followed the cleaning, inspection and repair requirements of this standard at least annually shall be retired 10 years from the date the ensemble or ensemble element was issued to be worn. Proximity fire fighting ensembles and ensemble elements that have not followed the cleaning, inspection and repair requirements of this standard at least annually shall be retired no more than 10 years from the date the ensembles or ensemble elements date of manufacture.

Substantiation: Ensembles and Ensemble elements that at least annually have been properly cared for, inspected and maintained in accordance with the requirements of this standard should be allowed to be retired more than 10 years after placement in service. By following a program for inspection, care and maintenance as outlined in this standard there is a protocol that has been established for proper review of the ensemble or ensemble element to ensure its continued fitness for use. In the absence of a care and maintenance program then the element should be required to be retired 10 years from the date of manufacture.

Committee Meeting Action: Reject

Committee Statement: The technical committee spent considerable time discussing the issue of mandatory retirement. The technical committee is rejecting this proposal and is making no changes to the retirement criteria based on the following factors:

- (1) Since the NFPA standards are revised every five years, the ten years represents two revision cycles which incorporate significant enough performance enhancements in ensembles and ensemble elements to warrant retirement of PPE 10 years from the date of manufacture.
- (2) In the absence of a scientifically-validated test method that would support modifying or eliminating the current mandatory retirement of 10 years, the Technical Committee confirmed the existing 10 year requirement for all PPE.
- (3) In the absence of a non-destructive test or evaluation method that can conclusively and reliably determine PPE remains compliant with the performance requirements in place at the time of manufacture, the committee continues to support the existing retirement criteria.

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1851-37 Log #24 FAE-SPF  
(11.1.1.1)

Final Action: Accept in Principle

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**Submitter:** Vicki Smith, LION Apparel

**Recommendation:** Revise text to read as follows:

Verification of the organization or ISP shall be limited to advanced inspection, advanced cleaning and repairs of garment elements only. Verification of the organization or ISP shall not apply to helmet elements, glove elements, footwear elements, hood element, or optional CBRN ensemble.

**Substantiation:** The standard contains redundant training requirements for Verified ISPs. Presently Verified ISPs have non-brand specific repair testing to ensure they meeting performance criteria established by the standard, but must seek training from each brand manufacture to clean and inspect the garments that they have demonstrated competence to repair. Although verification testing is specific to garment repairs, the scope of verification covers all operational processes and the quality system since they are required to be documented in a Quality Manual. Once annually, the third party certification organization performs a random inspection of the facility and audits the Quality Manual to verify continued compliance for all services provided. This means that advanced inspection and advanced cleaning, in addition to repairs, are scrutinized for NFPA 1851 compliance and deemed acceptable by a third party certification organization. Advanced inspection and advanced cleaning training by each individual brand manufacturer should not be required for Verified ISPs.

**Committee Meeting Action:** Accept in Principle

**Committee Statement:** The technical committee accepted the proposal in principle. See 1851-2 (Log #CP9).

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1851-38 Log #48 FAE-SPF  
(11.2.12)

Final Action: Accept in Principle

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**Submitter:** Jason L. Allen, Intertek Testing Services

**Recommendation:** Revise text to read as follows:

11.2.12\* The certification organization shall have a follow-up inspection program of the organization's or the ISP's facilities of the compliant services with at least one random and unannounced visit per 12 month period annually to verify continued compliance.

**Substantiation:** The proposed change will permit more flexibility in the scheduling of audits.

**Committee Meeting Action:** Accept in Principle

Revise text to read as follows:

11.2.12\* The certification organization shall have a follow-up inspection program of the Verified organization's or the Verified ISP's facilities of the compliant services with at least one random and unannounced visit ~~per 12 month period~~ annually to verify continued compliance.

**Committee Statement:** The technical committee accepted the proposal in principle and agrees with the intent of the proposal. However, the TC offered alternative language to clarify the issue.

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1851-39 Log #44 FAE-SPF  
(11.3.7.x (New) )

Final Action: Reject

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**Submitter:** Jason L. Allen, Intertek Testing Services

**Recommendation:** New text to read as follows:

11.3.7.X Outer shell, thermal barrier, and moisture barrier material shall be selected for verification testing such that the materials have breaking strengths that are in excess of the respective seam requirements for seams constructed of these materials.

A.11.3.7.X For example, if an outer shell is evaluated for seam strength and is required to have a seam strength that is greater than 667 N (150 lb), then the outer shell material must have a breaking strength that is at least 667 N (150 lb).

**Substantiation:** In the evaluation of repaired seams, it is important that the quality of the seam be evaluated through its ability to meet the respective strength requirements in paragraph 7.1.1.3, as specified in NFPA 1971, if seams are constructed of a fabric that has a breaking strength that is less than the required seam strength, the breaking of the fabric along the seam does not permit an adequate evaluation of the organization of ISP's ability to properly repair the seam.

**Committee Meeting Action:** Reject

**Committee Statement:** The technical committee rejected the proposal because NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*, has a provision for the seam to be stronger than the material, which is why it is allowed here. This could require a repaired seam to be stronger than a new seam.

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1851-40 Log #45 FAE-SPF  
(11.3.7.1 (New) )

Final Action: Accept in Principle

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**Submitter:** Jason L. Allen, Intertek Testing Services

**Recommendation:** New text to read as follows:

11.3.7.X Sample seams shall be prepared by the organization or the ISP that have been certified as compliant with the applicable requirements of NFPA 1971.

11.3.7.X.1 It shall be permitted that sample seams be provided to the certification organization from a manufacturer of NFPA 1971 compliant garments.

11.3.7.X.2 If an ISP provides repairs for several different manufacturers, then only one set of seam samples shall be required for testing.

**Substantiation:** No instructions are currently provided in NFPA 1851 for how and who creates the seam samples for verifying the repair capabilities of the organization of ISP. The above instructions are intended to clarify the responsibilities for the source of seam samples and issues related to testing ISPs that service multiple manufacturer garments.

**Committee Meeting Action:** Accept in Principle

Add new text to read as follows:

11.3.7.3 Sample seams shall be prepared and submitted to the certification organization by a NFPA 1971 certified manufacturer, verified organization, or verified ISP submitting the seams for verification testing.

11.3.7.3.1 Where a verified organization or verified ISP performs repairs for more than one manufacturer, then only one set of seam samples shall be required for verification testing.

**Committee Statement:** The technical committee accepted the proposal in principle, and added the clarifying text as shown in the meeting action.

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1851-41 Log #49 FAE-SPF  
(11.3.7.3)

Final Action: Accept in Principle

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**Submitter:** Jason L. Allen, Intertek Testing Services

**Recommendation:** New text to read as follows:

11.3.7.3 For repairs to outer shell and thermal barrier seams, the certification organization shall create defects in sample seams by removing multiple stitches such that the seam would no longer be compliant in terms of its seam strength.

**Substantiation:** No instructions are currently provided in NFPA 1851 for how and who creates the seam samples for verifying the repair capabilities of the organization or ISP. The above instructions are proposed so that the certification organizations can consistently provide samples for verification of seam repair

**Committee Meeting Action:** Accept in Principle

Add new text to read as follows:

11.3.7.3.3 For outer shell and thermal barrier seam repairs, the certification organization shall damage the sample seams by cutting multiple stitches to a distance of 75 mm (3 in.) + 12.5 mm /-0.00 mm (+1/2 in/-0 in).

**Committee Statement:** The technical committee accepted the proposal in principle, and added new clarifying text to this section.

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1851-42 Log #46 FAE-SPF  
(11.3.7.4)

Final Action: Accept in Principle

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**Submitter:** Jason L. Allen, Intertek Testing Services

**Recommendation:** New text to read as follows:

11.3.7.4 For repairs to moisture barrier seams, the certification organization shall create defects in sample seams by cutting multiple stitches through the seam tape such that the seam would no longer be compliant in terms of its seam strength.

**Substantiation:** No instructions are currently provided in NFPA 1851 for how and who creates the seam samples for verifying the repair capabilities of the organization or ISP. The above instructions are proposed so that the certification organizations can consistently provide samples for verification of seam repair.

**Committee Meeting Action:** Accept in Principle

Add new text to read as follows:

11.3.7.3.2 For moisture barrier seam repairs, the certification organization shall damage the sample seams by cutting multiple stitches and the seam tape to a distance of 75 mm (3 in.) + 12.5 mm /-0.00 mm (+1/2 in/-0 in).

**Committee Statement:** The technical committee accepted the proposal in principle, and provides the new text in this section to address the issue.

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1851-43 Log #41 FAE-SPF  
(Table 11.3.7(a))

Final Action: Reject

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**Submitter:** Jason L. Allen, Intertek Testing Services

**Recommendation:** Revise text to read as follows:

In Table 11.37(a), insert "(Major A)" after "5 ft felled seam" and "(Minor)" after "5 ft overedge seam."

**Substantiation:** Clarification of the appropriate seam requirements is required in the table on Outer Shell Repairs. An overedge seam is a hem type seam, sometimes used in pockets, and does not result in immediate danger to the wearer when it ruptures.

**Committee Meeting Action:** Reject

**Committee Statement:** It was the intent of the technical committee to evaluate overedge seams to the Major B performance requirements.

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1851-44 Log #40 FAE-SPF  
(Table 11.3.7(b))

Final Action: Reject

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**Submitter:** Jason L. Allen, Intertek Testing Services

**Recommendation:** Revise text to read as follows:

In Table 11.3.7(b), insert "(Major B)" after "5 ft felled seam" and "(Minor)" after "5 ft overedge seam."

**Substantiation:** Clarification of the appropriate seam requirements is required in the table on Thermal Liner Repairs. An overedge seam is a hem type seam and does not result in immediate danger to the wearer when it ruptures.

**Committee Meeting Action:** Reject

**Committee Statement:** It was the intent of the technical committee to evaluate overedge seams to the Major B performance requirements.

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1851-45 Log #19 FAE-SPF  
(11.3.10)

Final Action: Reject

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**Submitter:** Rick Mansfield, Apex Fire Services

**Recommendation:** Revise text to read as follows:

All repair categories that are verified in accordance with this standard shall undergo verification on an annual basis; whenever a revised NFPA 1851 standard is issued, the physical facility of the verified ISP is moved to a new location, and/or the named ISP changes its business name.

**Substantiation:** Current annual certification is an economic burden on ISPs and end users. Requiring ISPs to re-certify driven upon logical events would make providing services to end users more affordable as well as make it more cost effective for larger end users to become an ISP.

**Committee Meeting Action:** Reject

**Committee Statement:** The technical committee rejected the proposal because it believes that annual retesting is necessary in order to verify ongoing compliance.

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1851-46 Log #47 FAE-SPF  
(11.4.3.1)

Final Action: Accept in Principle

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Submitter: Jason L. Allen, Intertek Testing Services

Recommendation: New text to read as follows:

11.4.3.1 If the ISP changes the designated person, the ISP shall notify the certification organization of the change and provide information to demonstrate that the person's understanding of the ISP's quality system.

Substantiation: The current language appears to imply that the verification is contingent on a single individual as responsible for the quality system and does not account for changes made by the ISP for this responsibility.

Committee Meeting Action: Accept in Principle

Add new text as follows:

11.4.3.1 If the Verified ISP or Verified organization changes the designated person, the Verified ISP or Verified organization shall notify the certification organization.

Committee Statement: The technical committee accepted the proposal in principle and agrees with the intent of the proposal. However, the TC offered alternative language to clarify the issue.

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1851-47 Log #CP5 FAE-SPF  
(12.1.5.3)

Final Action: Accept

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Submitter: Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment,

Recommendation: Revise 12.1.5.3. Delete "advanced" and add "complete liner."

Substantiation: This change is being proposed to correct an error. Correct reference should be to a complete liner inspection.

Committee Meeting Action: Accept

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1851-48 Log #28 FAE-SPF  
(12.2.4.2)

Final Action: Reject

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Submitter: Jeffrey O. Stull, International Personnel Protection, Inc.

Recommendation: Add new item (x) after (3) in 12.2.4.2:

(x) Use light clamps or other means to help stabilize and position the tested area on the bucket.

Substantiation: This item is suggested as a means for improving the practicality and precision of the test.

Committee Meeting Action: Reject

Committee Statement: The technical committee rejected the proposal. This is intended to be a simple and quick field test not requiring the use of clamps.

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1851-49 Log #27 FAE-SPF  
(12.2.5.1)

Final Action: Reject

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**Submitter:** Jeffrey O. Stull, International Personnel Protection, Inc.

**Recommendation:** Revise text to read as follows:

12.2.5.1 The liner shall be visually inspected for leakage on the thermal barrier side after § 1 minutes.

**Substantiation:** Some experimentation has shown that a one minute dwell time can show leaks that would result in exposure of the wearer under actual use conditions. A one minute test time makes it easier to provide a more efficient evaluation of the garment. In addition, a similar proposal has been put forward in the inspection of liners for technical rescue garments.

**Committee Meeting Action:** Reject

**Committee Statement:** The technical committee rejected the proposal because no technical data was submitted in support of the change in test time.

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1851-50 Log #29 FAE-SPF  
(12.2.5.3)

Final Action: Reject

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**Submitter:** Jeffrey O. Stull, International Personnel Protection, Inc.

**Recommendation:** Add new 12.2.5.3, renumber and re-title current 12.2.5.3 as "12.2.6 Returning Garment to Service."

12.2.5.3 It shall be permitted to use blotting to aid in the detection of wetting on the face cloth side of the thermal barrier. If blotting is used, a soft tissue shall be used and lightly presses against the thermal barrier for 5 seconds. If wetness appears on the tissue, the thermal barrier shall be considered to have been wetted and the liner shall be removed from service and repaired or replaced.

**Substantiation:** In some cases, wetting of the thermal barrier can be difficult to detect. The current 12.2.5.3 is not related to the results of the testing.

**Committee Meeting Action:** Reject

**Committee Statement:** The technical committee rejected the proposal. This is intended to be a simple and quick field test for the end user. The TC also believes that the paragraph is appropriate as written.

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1851-51 Log #CP11 FAE-SPF  
(A.4.4.2)

Final Action: Accept

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**Submitter:** Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment,

**Recommendation:** Asterisk 4.4.2, and add an Annex paragraph as follows:

A.4.4.2\* It should be noted that the intent of this requirement is not to allow manufacturers to dictate which ISP an organization must use. The organization is allowed a choice in service providers for repairs, cleaning and inspection.

**Substantiation:** The technical committee is proposing this Annex paragraph to clarify its intent to allow the organization to choose its service providers for repairs, cleaning and inspection.

**Committee Meeting Action:** Accept

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1851-52 Log #26 FAE-SPF  
(A.6.3.5.1(9))

Final Action: Accept in Principle

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**Submitter:** Tim J. Gardner, 3M Occupational Health and Environmental Safety Division

**Recommendation:** Add new text at the end of the last paragraph in the section:

With proper care, visibility markings on turnout gear can provide long service, often as long as the service life of the ensemble itself. Attention during inspection should be paid to sections which show evidence of damage, abrasion, or stains/discoloration. With proper maintenance, the performance of visibility markings on the ensemble can be maintained at a high level.

**Substantiation:** This statement is consistent with findings of the recent in-use garment study performed by the University of Kentucky.

**Committee Meeting Action:** Accept in Principle

Add new text to the end of Annex item:

A.6.3.5.1(9):

Attention during inspection should be paid to sections which show evidence of damage, abrasion, excessive soiling, or stains/discoloration. With proper care, visibility markings on turnout gear can provide long service, often as long as the service life of the ensemble itself.

**Committee Statement:** The technical committee accepted the proposal in principle, and added "excessive soiling" to the list of sections.

1851-53 Log #37 FAE-SPF  
(A.6.3.5.1(9))

Final Action: Accept in Part

**Submitter:** Stacy Trenkamp, University of Kentucky Textile Testing Laboratory

**Recommendation:** A.6.3.5.1(9) Visibility markings can appear to the human eye to be undamaged when actually they have lost much of their ability to reflect. Retroflective properties can be checked with the following simple flashlight test:

- (1) Stand approximately 12 m (40 ft) from a sample of the trim being tested and a sample of new trim.
- (2) Hold a bright, focused flashlight at eye level, either next to the temple or on the bridge of the nose, and aim the light beam at the samples.
- (3) Compare the brightness of the reflected lights. If the reflected light from the trim being tested is substantially less than the light reflected from the new trim, the trim should be replaced.

This field evaluation test provides effective and timely results while allowing the evaluator to physically view the reflective trim as it is seen by the naked in eye in real, working situations.

While this simple test provides a practical evaluation of trim retroflective performance, it does not evaluate trim fluorescence or mean that the trim will provide adequate fire fighter visibility. Trim can lose fluorescence (daytime visibility) and still remain retroflective. Trim can also appear to be retroflective and not have sufficient intensity for nighttime visibility at far distances. Only testing under laboratory conditions can provide an accurate determination of trim visibility properties.

**Substantiation:** The Fire Fighter Durability Study Phase I completed at the University of Kentucky completed this field evaluation test on 67 garments used in the study. All garments passed the field evaluation test, and it was noted that some of the samples that did not perform as well had soiling or thermal damage visible to the eye. This information supports that the field evaluation on trim is effective and gives the fire fighter confidence that their gear will perform the way it's supposed to.

This is not original material; its reference/source is as follows:

Deena Cotterills Thesis, The Firefighter Durability Phase I is available upon request.

**Committee Meeting Action:** Accept in Part

Revise A.6.3.5.1(9) as follows:

**A.6.3.5.1 (9)** Visibility markings can appear to the human eye to be undamaged when actually they have lost much of their ability to reflect. Retroflective properties can be checked with the following simple flashlight test:

- (1) Stand approximately 12 m (40 ft) from a sample of the trim being tested and a sample of new trim.
- (2) Hold a bright, focused flashlight at eye level, either next to the temple or on the bridge of the nose, and aim the light beam at the samples.
- (3) Compare the brightness of the reflected lights. If the reflected light from the trim being tested is substantially less than the light reflected from the new trim, the trim should be replaced.

This field evaluation test provides effective and timely results while allowing the evaluator to physically view the reflective trim as it is seen by the naked eye.

While this simple test provides a practical evaluation of trim retroflective performance, it does not evaluate trim fluorescence or mean that the trim will provide adequate fire fighter visibility. Trim can lose fluorescence (daytime visibility) and still remain retroflective. Trim can also appear to be retroflective and not have sufficient intensity for nighttime visibility at far distances. Only testing under laboratory conditions can provide an accurate determination of trim visibility properties.

**Committee Statement:** The technical committee accepted the proposal in part, and deleted the proposed text "in real, working situations." The TC believes that this sentence better states the proposal.

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1851-54 Log #CP4 FAE-SPF  
(A.6.4.3.1)

Final Action: Accept

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**Submitter:** Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment,

**Recommendation:** Add new Annex text as follows:

A.6.4.3.1\* The two year requirement for the complete liner inspection after moisture barrier replacement is to ensure that the thermal barrier – which has not been replaced but has remained in service – continues to be inspected in a timely manner, as opposed to going another three years without being inspected.

**Substantiation:** The technical committee is proposing to add explanatory text to the Annex for 6.4.3.1.

**Committee Meeting Action:** Accept

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1851-55 Log #CP6 FAE-SPF  
(A.6.4.5.1)

Final Action: Accept

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**Submitter:** Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment,

**Recommendation:** Asterisk 6.4.5.1 and add an Annex paragraph A.6.4.5.1:

A.6.4.5.1 The ability to inspect the interior sides of the liner for the moisture barrier and thermal barrier may be accommodated by the presence of an inspection opening designed by the manufacturer that is built into the protective element. The location and method for securing this opening will vary with the manufacturer's design. However, the intent of this feature is to permit the organization conduct the inspection to invert the liner so that the interior sides of the moisture barrier and thermal barrier can be readily inspected. If the protective element is not provided with an inspection opening, the organization conducting the complete liner inspection may be required to remove a portion of the seam in the lining to permit opening the lining and allow its inversion for inspecting the interior sides of the moisture barrier and thermal barrier. The procedures used for removing the lining seam should conform to those procedures specified by the manufacturer of the protective element and should account for practices that minimize the damage and allow for ease of reconstructing the seam of the liner to limit any decrement of protective element performance or integrity.

**Substantiation:** The proposed Annex language provides additional details for how the complete liner is inspected.

**Committee Meeting Action:** Accept

1851-56 Log #35 FAE-SPF  
(A.7.1.1)

Final Action: Accept

Submitter: Stacy Trenkamp, University of Kentucky Textile Testing Laboratory

Recommendation: Revise text to read as follows:

A.7.1.1 The importance of maintaining the cleanliness of ensembles and ensemble elements should not be underestimated. Studies have shown that soiled or contaminated ensembles and ensemble elements are a hazard to fire fighters because soils and contaminants can be flammable, toxic, or carcinogenic. Additionally, soiled or contaminated ensembles and ensemble elements can have reduced protective performance. Clean ensembles and ensemble elements offer the emergency responder better protection and can add to the life of the ensemble and ensemble elements. Ensembles and ensemble elements should be cleaned whenever they have become soiled.

In everyday use, personal protective equipment becomes dirty by absorbing sweat from the wearer and soils, soot, and so forth from the outside environment. Cleaning of ensembles and ensemble elements removes those substances. Ensembles and ensemble elements can also become contaminated with other substances, principally hazardous materials, particulates, and body fluids. The removal of these substances is most often referred to as *decontamination*. In structural and proximity fire fighting, both general cleaning and decontamination of ensembles and ensemble elements might be necessary.

*Health risks of soiled or contaminated ensembles and ensemble elements.* Soiled or contaminated ensembles and ensemble elements can expose fire fighters to toxins and carcinogens that enter the body through ingestion, inhalation, or absorption. Repeated small exposures to some contaminants can add up over time and cause health problems. Although great emphasis is placed on safety to avoid injury or inhalation hazards to personnel working on the fire ground, many of the toxins that lead to health risks are being carried away from the fire scene on personal protective equipment used by the fire fighter.

Toxins that a fire fighter will come into contact with can be trapped in the fibers of soiled ensembles and ensemble elements or absorbed into the materials themselves. Contact with the soiled ensembles and ensemble elements increase the risk of the toxic contaminants being introduced into the body.

Ensembles and ensemble elements contaminated with body fluids presents a potential risk of a communicable disease being transmitted to the person coming into contact with the contaminated ensembles or ensemble elements.

*Reduced performance hazards of contaminated ensembles and ensemble elements.* When ensembles or ensemble elements become laden with particles and chemicals, other problems are faced in addition to being exposed to toxins, such as the following:

- (1) Soiled ensembles and ensemble elements typically reflects less radiant heat. After materials are saturated with hydrocarbons, they will tend to absorb rather than reflect the radiant heat from the surrounding fire.
- (2) Ensembles and ensemble elements heavily contaminated with hydrocarbons are more likely to conduct electricity, increasing the danger when entering a building or vehicle where wiring can still be live.
- (3) Ensembles and ensemble elements impregnated with oil, grease, and hydrocarbon deposits from soot and smoke can ignite and cause severe burns and injuries, even if the materials are normally flame resistant.

Even though the number of specialized hazardous materials response teams is growing, individual fire fighters can still encounter various chemicals in their normal fire-fighting activities. Exposures to oils, gasoline, and lubricants can occur around fire station vehicles. During responses, exposures to liquids ranging from pesticides to acids to chemical solvents can occur, knowingly or unknowingly. These contaminants, in addition to being hazardous, can also degrade ensembles and ensemble elements as follows:

- (1) Clothing fabrics can become weakened and tear more easily.
- (2) Thread or seam sealing tape can become loose.
- (3) Flame-retarding or water-repelling treatments can be removed.
- (4) Visibility markings can lose reflective properties or markings, becoming less visible.
- (5) Helmet shells, helmet faceshields, or goggles can pit or craze.
- (6) Ensemble and ensemble elements hardware can become corroded.

**Substantiation:** The added statement supports the information that is already present in the annex (like the list of degradation that may occur from negligence of cleaning and maintenance), yet adds emphasis on the importance of making sure that garments are properly cleaned and maintained in order to extend their life cycle. Studies completed and in progress at the University of Kentucky have shown the importance of cleaning and maintaining fire fighting garments.

The Fire Fighter Durability Study Phase I completed at the University of Kentucky found that 66% of the sixty-seven garments tested showed leakage during the Water Penetration Barrier Evaluation. Questionnaires used for purposes of

the study found that 30% of respondents replied that cleaning of their garment was voluntary.

Furthermore, the Firefighter Durability Study Phase II in progress at the University of Kentucky has so far found that 9 of 12 garments tested showed leakage during the Water Penetration barrier Evaluation. The questionnaire in accordance with Phase II showed that 55% of respondents answered that the cleaning of their garments was voluntary.

**This is not original material; its reference/source is as follows:**

Deena Cotterills Thesis, The Firefighter Durability Phase I is available upon request.

**Committee Meeting Action: Accept**

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1851-57 Log #25 FAE-SPF  
(A.7.3.6)

**Final Action: Accept**

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**Submitter:** Vicki Smith, LION Apparel

**Recommendation:** Revise text to read as follows:

Machine cleaning is the most effective method for cleaning ensemble elements such as coats, trousers, coverall, and hoods. It is the most effective means of loosening and removing dirt, soot, and other debris. Presently there are two basic types of automatic washing machines ~~are~~ commonly available for use by end-users: top-loading agitator style machines and front-loading washer/extractors. New technologies are emerging every day in the cleaning industry that will affect options available to both the enduser as well as the ISP for all ensemble elements. At this time, it is generally accepted that front-loading machines are more appropriate for protective ensemble and ensemble elements, where allowed by the element manufacturer....

**Substantiation:** There are several new technologies that are close to being brought to market that may not use washing machines and could theoretically clean all ensemble elements. Although the standard does mention "emerging technologies" it implies these technologies are applicable to machine washing of fabric elements. If new cleaning technology that is proven effective and safe for all elements is introduced, the standard should contain language that would make it eligible for compliance.

**Committee Meeting Action: Accept**

1851-58 Log #CP7 FAE-SPF  
(A.7.3.7(5))

Final Action: Accept

**Submitter:** Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment,  
**Recommendation:** Asterisk 7.3.7 (5), and add an Annex paragraph A.7.3.7 (5) as follows:

A.7.3.7(5) The pH for the product can be indicated on the product (detergent) container and should be the pH for the product in an undiluted form, if it is a liquid. If the detergent is a powder, the pH will be reported at a specific concentration of the solid on a weight basis in water. If the pH is not listed on the product container, then request the Material Safety Data Sheet (MSDS) from the product supplier. Most suppliers will normally provide the MSDS for their respective products as part of the shipment and it may also be possible to obtain a copy of the MSDS on line from the supplier's website. The pH for the product is typically listed in Section 9 of the MSDS for the product physical and chemical properties.

The selection of the detergent should include a consideration of several factors in addition to the pH range. Foremost amongst these is the demonstration by the supplier that the detergent is safe to use with firefighter protective clothing. This demonstration consists of two parts – (1) the effectiveness of the detergent in removing soils and other contaminants as indicated later in this section, and (2) the impact of the detergent through multiple washings on the protective element as described in A.7.1.9. This information may be available from the supplier of the detergent, the manufacturer of the protective element, or fabric suppliers. If there is uncertainty about a particular detergent or cleaning agent, contact the manufacturer of protective element.

Organizations should be cautious about detergent or chemical suppliers that offer you several different chemicals for cleaning your protective elements. Many chemical suppliers will provide the organization with an automated dispenser that can feed liquid chemicals into the washer/extractor at no cost on the requirement that you purchase chemicals from that supplier. Certain types of chemicals, such as alkali builders and sours should be avoided. Alkali builders are used to significantly increase the pH of the wash water for enhancing the cleaning performance of certain detergents. These chemicals typically have pH values that are greater than 10.5. When alkali builders are used, the pH is usually brought to a lower level using a "sour", which is an acid based agent that is used to bring the wash water back to a neutral pH. Sour cleaning agents are added towards the end of the wash formulation and almost always have pH values that are much lower than 6.0. The combination of alkali builders and sours are most often used in institutional laundering facilities but are not appropriate for protective elements, unless the manufacturer of the respective protective element has indicated that these types of products can be safely used.

In general, mild domestic laundry detergents may used, if applied consistent with the instructions provided for the laundry in terms of the amount of detergent added for the wash water volume used in the suds (detergent addition step) for the specific washing machine or washer/extractor. A single detergent may be viable for washing both the shell and liners for structural fire fighting protective garments; however, some suppliers might offer specialty detergents that have been formulated for either heavier duty cleaning of outer shells or gentler cleaning of linings. In addition, spot treatment agents are usually required for removal of specific heavy soiling and some common fireground contaminants.

**Substantiation:** The proposed Annex language provides guidance to organizations involving in cleaning protective elements on determining if the selected detergent falls with the specified range of pH and other factors related to the selection of an appropriate detergent.

**Committee Meeting Action:** Accept

1851-59 Log #CP8 FAE-SPF  
(A.7.3.7(5))

Final Action: Accept

Submitter: Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment,

Recommendation: Add an Annex paragraph as follows:

A.7.3.7 (5) Cleaning agent or detergent effectiveness. The effectiveness of a cleaning agent or detergent may be ascertained by performing testing in which the soiling is applied to the material of interest and an assessment is made to determine if the application of the cleaning process removes the soiling. While there are no established methods for evaluating the effectiveness of laundry processes in removing soils in protective clothing, the procedures are suggested:

A suitable method for modification was identified in American Association for Textile Chemists and Colorists (AATCC) Test Method 123-2000, Carpet Soiling: Accelerated Soiling Method. This test method provides procedures for determining the propensity for soiling of carpet samples using synthetic soil and a tumbling method. This method offers a means for reproducibly soiling outer shell fabrics. The synthetic soil formulation and its method of application for contacting outer shell fabrics must be made since some aspects of the AATCC procedures do not uniformly soil fabrics as intended for carpet samples. The recommended ingredient list for the synthetic soil is provided in Table A.7.3.7(5):

\*\*\*Insert Table A.7.3.7(5) \*\*\*Synthetic Soil Formulation\*\*\*

All dry ingredients are mixed together thoroughly before adding mineral oil. The mixture is then baked at 122°F (50°C) for 8 hours before use.

Sample fabrics to be used in the evaluation are preconditioned by washing using the procedures in AATCC 135, Dimensional Changes in Automatic Home Laundering of Woven and Knit Fabrics, using Machine Cycle 1 (sturdy/cotton), Wash Temperature V (160°F), and Laundering Condition Ai (tumble drying/high heat), to remove some of the finishes that applied to the fabrics during their processing. These finishes retard the wetting of fabric and the adhesion of soils. Nevertheless, the effects of these finishes are generally reduced by both washing and wear of the garment. Some preconditioned (washed) fabric outer shell samples should be retained as a laundered "control" since washing reduces the brightness and causes some color changes in fabrics, even without soiling.

The preconditioned fabric soiling is accomplished using a Launder-Ometer (specified in AATCC 61-2003, Colorfastness to Laundering, Home and Commercial: Accelerated). A Launder-Ometer is a special washing machine that is typically used in the testing of fabrics for colorfastness. It consists of a machine that rotates closed canisters in a thermostatically controlled water bath.

For the fabric soiling, 150 mm (6-in.) square specimens of preconditioned fabric are placed inside lined canisters with 100 grams of synthetic soil and 50 stainless steel balls measuring 6 mm (¼ in) in diameter. The steel balls are used to provide physical rubbing of the soil against the fabric specimen inside the canister to help increase the level of soiling. The fabric specimens are tumbled inside the Launder-Ometer without using the water bath but at a rotational speed of 40 rpm for a period of 45 minutes. This process is repeated for each set of specimens to be evaluated.

Following the conclusion of soiling period, the soiled samples are removed from the canister and any loosely adhering soil is removed by light brushing. The samples are then subjected to the laundering process to be evaluated using the detergent according to the supplier's instruction and the overall washing process according to the selecting wash formulation for the specific washing machine or washer/extractor being used. Additional serve as samples soiled, but not laundered.

The removal of soiling can be determined in one of three different ways:

1. A visual comparison can be made between the soiled and unsoiled (control) specimens
2. A gray scale change can be assigned to each specimen (a gray scale is a way of quantifying the change in a material color relative to its original color) and is performed in accordance with AATCC 61-2003, Colorfastness to Laundering, Home and Commercial: Accelerated. Both color changes and staining ratings should be applied to the control, soiled, and laundered outer shell fabric specimens. These semi-quantitative ratings should be made using two different observers.
3. Spectrophotometric measurements can be made comparing the soiled and unsoiled (control) specimens. Spectrophotometric measurements are made on control, soiled, and test outer shell fabric specimens using principles described in AATCC Evaluation Procedure 6, Instrumental Color Measurement. The color of fabric specimens is measured using reflectance methods consistent with procedures in ASTM E 308, Standard Test Method for Comparing the Colors of Objects by Using the CIE System, and Publication CIE No. 15.2(1986), Colorimetry [2nd Edition, Commission Internationale de l'Éclairage (CIE), Vienna, Austria]. Comparisons can be made using the color intensity and the color coordinates, which include: L\* – color intensity (ratio of

<b>Ingredient</b>	<b>% by Weight</b>
Peat Moss (dark)	38
Portland Cement	17
Kaolin Clay	17
Silica (200 mesh)	17
Carbon black	1.75
Red iron oxide	0.50
Mineral oil	8.75

luminance to incident luminance); a\* – color coordinate representing red-green axis, positive changes indicate a shift to red; and b\* – color coordinate representing blueyellow axis, positive changes indicate a shift to yellow. Since specimen color is affected by the type of illumination, an illumination source of D65 should be used, which is representative of average outdoor sunlight. A viewing angle of 10 degrees should also be used for all color measurements.

**Substantiation:** The technical committee is proposing Annex language which may provide information on cleaning agent and detergent effectiveness, and is including it to solicit public input during the comments stage.

**Committee Meeting Action:** Accept

1851-60 Log #CP2 FAE-SPF  
(A.10.1.1)

Final Action: Accept

**Submitter:** Technical Committee on Structural and Proximity Fire Fighting Protective Clothing and Equipment,

**Recommendation:** Delete the text of A.10.1.1, and replace with text as follows:

A.10.1.1 Retirement criteria should be based on a number of factors, including, but not limited to, the following:

- (1) Overall condition of the item
- (2) Specific deterioration of materials or components beyond their economic repair
- (3) Ability to adequately remove hazardous materials and other contaminants
- (4) Age of structural or proximity ensemble or ensemble elements
- (5) Excessive soil buildup that could impact performance of the ensemble or ensemble element

Physical damage from use, detrimental effects from improper cleaning procedures, and fabric failure of an ensemble and ensemble elements that can make repairs impossible are other factors that can affect when an item should be retired.

Where ensembles and ensemble elements are worn, damaged, or contaminated, organizations should determine if it would be more appropriate for them to be repaired, decontaminated, or replaced. One general guideline is if the cost of the repair or decontamination is greater than 50 percent of the replacement cost of the ensemble or ensemble elements, replacement should be considered. A typical guideline that can be used involves the use of a matrix that takes into account the current age of the gear and the cost of the repair versus the replacement cost of the item. (See A.10.1.4.)

Experience suggests that ensembles and ensemble elements that are approaching 10 years since the date of their manufacture have a high likelihood of performance deficiencies in multiple areas that can often be detected only by destructive testing. Additionally, experience suggests that the reflective outer shell of proximity elements that are approaching 5 years since the date of their manufacture have a high likelihood of performance failures that can be detected only by destructive testing. Such performance failures could compromise fire fighter safety.

It is important to understand that the actual service life of ensembles and ensemble elements varies depending on the amount of their use and the care they receive. Factors such as the size of the department, area covered, types of exposures, and the aggressiveness of the individual fire fighter are all considerations in how long any ensemble element will last. It is possible that a protective element could be exposed to circumstances that totally destroy it the first time it is utilized. Since the purpose of fire fighters' protective elements is to protect the wearer, if the element has saved a life or prevented serious injury, even just once, it has done its job. In many cases, an ensemble or ensemble element will need to be retired sooner than 10 years (or 5 years for the proximity reflective outer shell component).

An additional consideration that can influence the decision to repair or replace an ensemble or ensemble element centers on the advances in technology that occur through each revision of NFPA 1971, *Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting*. These technological advances might be deemed important enough by an organization to influence its criteria for replacement of ensembles or ensemble elements.

In the 2013 revision process, the technical committee spent considerable time on the issue of mandatory retirement. The technical committee reaffirmed its position based on the following factors:

- (1) Since the NFPA standards are revised every five years, the ten years represents two revisions cycles which incorporate significant performance enhancements in ensembles and ensemble elements to warrant retirement of PPE 10 years from the date of manufacture.
- (2) In the absence of scientifically-validated test methods that would support modifying or eliminating the current mandatory retirement of 10 years, the technical committee reaffirmed the existing 10 year requirement for all PPE.
- (3) In the absence of a non-destructive test or evaluation method that can conclusively and reliably determine PPE remains compliant with the performance requirements in place at the time of manufacture, the committee continues to support the existing retirement criteria.

Organizations should use members who have received training in the inspection of ensembles and ensemble elements, who understand the limitations of each ensemble and ensemble element, and who recognize the signs of failure to help make decisions as to the integrity of an ensemble or ensemble element.

Revise A.10.1.2 as follows:

A.10.1.2 After discussion of the concept of mandatory retirement for protective elements, the consensus of the technical committee, led by the fire service segment, is that the life of a turnout suit is generally less than 10 years. Regardless of when the element was originally produced, it is imperative that the protective elements be routinely inspected to ensure that they are clean, well maintained, and still safe. Just knowing the age of the elements cannot do that. In the 2013 revision cycle the technical committee, led by the fire service, again reaffirmed this position.

**Substantiation:** The technical committee spent considerable time discussing the issue of mandatory retirement, and is providing amended text to A.10.1.1. and A.10.1.2.

**Committee Meeting Action:** Accept