

**INITIAL STATEMENT OF REASONS
FOR
PROPOSED BUILDING STANDARDS
OF THE
OFFICE OF THE STATE FIRE MARSHAL
REGARDING THE 2013 CALIFORNIA BUILDING CODE,
CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 2
2013 INTERIM RULEMAKING CYCLE**

The Administrative Procedure Act requires that an Initial Statement of Reasons be available to the public upon request when rulemaking action is being undertaken. The following are the reasons for proposing this particular rulemaking action:

STATEMENT OF SPECIFIC PURPOSE AND RATIONALE

(Government Code Section 11346.2)

The specific purpose of this rulemaking effort by the Office of the State Fire Marshal (SFM) is to act in accordance with Health and Safety Code section 18928, which requires all proposed regulations to specifically comply with this section in regards to the adoption by reference with amendments to a model code within one year after its publication.

The actions described above are reasonably necessary to carry out the purpose for which it is proposed. The rationale for these actions is to establish minimum requirements for the prevention of fire and for the protection of life and property against fire and panic in occupancies addressed in the 2012 International Building Code and published as the 2013 California Building Code.

The general purpose of this proposed action is principally intended to update the 2013 California Building Code (California Code of Regulations, Title 24, Part 2) based upon updated information or recent actions of the SFM. This proposed action:

- Repeal certain amendments to the 2012 International Building Code and/or California Building Standards not addressed by the model code that are no longer necessary nor justified pursuant with Health and Safety Code 18930(a)(7).
 - Adopt and implement additional necessary amendments to the 2013 California Building Code that address inadequacies of the 2012 International Building Code as they pertain to California laws.
 - Codify non-substantive editorial and formatting amendments to the 2013 California Building Code.
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The specific purpose and rationale of each adoption, amendment, or repeal is as follows:

[Item 1. Incorporation and correlation of NFPA 2 Hydrogen Technologies Code into the California Codes.]

SECTION 202

DEFINITIONS

HYDROGEN FUEL GAS ROOM.

SECTION 421

HYDROGEN FUEL GAS ROOMS

421.1

421.2 Definitions.

HYDROGEN FUEL GAS ROOM.

421.3

421.4

421.4.1

421.5

421.6

421.6.1

421.6.2

421.6.3

421.6.4

421.7

TABLE 509.1

Rationale: The OSFM is proposing the above modifications based on proposals (F254-13, F255-13, F256-13, F303-13, F323-13, F324-13 and G14-13) approved for the 2015 IFC and IBC that correlates and incorporates NFPA 2 "Hydrogen Technologies Code", with existing portions of the IFC and IBC. The following is the rationale by the original proponent that proposed the modifications. This code proposal has been heard and accepted by the ICC Fire Code Committee at the ICC Code Hearings held April-May, 2013 in Dallas, TX. Final Action of these modifications were approved in October 2013, in Atlantic City, NJ. The SFM is bringing these proposals forward in part to implement the Governor's Zero-Emission Vehicles (ZEV) Action Plan [http://opr.ca.gov/docs/Governors_Office_ZEV_Action_Plan_\(02-13\).pdf](http://opr.ca.gov/docs/Governors_Office_ZEV_Action_Plan_(02-13).pdf) and provide necessary tools for enforcement officials, building owners, manufacturers and the construction industry.

The following is the rationale for support of the proposed modifications:

Original proponent's reason: The purpose of this submittal is cleanup of language, correlation with NFPA 2 "Hydrogen Technologies Code", and correlation with other portions of the IBC. NFPA 2 has been formed to provide a source document for the storage, use and handling of hydrogen and much work has gone into refining terms and requirements. For consistency the concepts and terms within the IFC, the IBC and NFPA should correlate for effective and efficient application of hydrogen technologies.

From the 2011 edition of NFPA 2:

Origin and Development of NFPA 2

"With the increased interest in hydrogen being used as a fuel source, the National Fire Protection Association was petitioned to develop an all-encompassing document that establishes the necessary requirements for hydrogen technologies. In 2006, the Technical Committee on Hydrogen Technology was formed and tasked to develop a document that addresses all aspects of hydrogen storage, use, and handling, that draws from existing NFPA codes and standards, and that identifies and fills technical gaps for a complete functional set of requirements for code users and enforcers. This document is also structured so that it works seamlessly with building and fire codes."

The term "Hydrogen Cutoff Room" is proposed to be changed to "Hydrogen Gas Room" which is the phrase used by NFPA 2 for consistency. The change would be reflected in the definition, titles and technical language found within the code.

Section 421.4 is modified to improved correlation of this section with Section 509 Incidental Uses. Hydrogen cutoff rooms not classified as a Group H are in Table 509 as an Incidental use. The specifications for separation are covered by 509.4.1. The "hydrogen cutoff room" was not intended to be an H Group, so the language referring to Group separated or non-separated uses is not necessary. That language will apply if a Group H classification is determined to apply. The change provides a cleaner, easier to understand application of these requirements Section 421.4.1 is modified to be consistent with the newer requirements found within NFPA 2 for hydrogen gas rooms.

Section 421.5 is modified to clarify that it is an "exhaust" ventilation system that is required and a pointer to the specific section in the IMC has been added instead of the generic Chapter 5 reference for clarity.

A new Section 421.6.2 has been added to provide standards for the required gas detection system. This language and the referenced standards already exist in the IFC, IBC and IMC for when gas detection systems are required to be installed. Section 421.6.2, Item 2 and Section 421.6.3 are proposed to be modified by adding the word "exhaust" to add clarity that it is a "mechanical exhaust system" that is be required.

Section 421.7 has been modified to point to the explosion control requirements located within Chapter 4 of the IBC, they are a match for the requirements of the IFC.

[Item 2. Emergency voice/alarm communication system correction.]

907.2.3.3

Rationale: The OSFM is repealing the exception originally proposed to utilize other two way communication methods intended for existing facilities. The omission of this exception will require existing facilities undergoing renovation or additions to address emergency voice/alarm communication systems on a case-by-case basis. The OSFM is reevaluating how to address this issue relating to existing facilities for future rulemaking.

The actions described above are reasonably necessary to carry out the purpose for which it is proposed. The rationale for these actions is to establish minimum requirements for the prevention of fire and for the protection of life and property against fire and panic in occupancies that are addressed in the California Building Standards Codes pursuant to Health and Safety Code Section 13108, 13113, 13114, 13131.5, 13143, 17921, 18949.2 and California Education Code Section 17070.

[Item 3. Correlation of regulations regarding smoke alarms and statutory changes made by SB 1394 (2012) and SB 745 (2013)]

907.2.11.1

907.2.11.2

907.2.11.2.3

907.2.11.2.4

907.2.11.4

Rationale: The SFM proposes to correct provisions relating to smoke alarms in accordance with revisions made to Health and Safety Code 13113.7, 13113.8 and 13114 after the initial rulemaking for the 2013 California Building Standards Code (Senate Bill 1394 (2012) and Senate Bill 745 (2013)). The legislative revisions to the statute make these amendments no longer necessary, furthermore these regulations conflict with both the intent of the statute and California Code of Regulations Title 19, Division I.

[Item 4. Clarification of Group I-2.1 occupancy provisions and editorial corrections.]

302.1

308.1

308.4.1

407.2

407.4

407.4.1

407.4.2

407.4.3

407.10

TABLE 508.2.5

709.5

713.13

716.5.9.3

717.6.1

TABLE 803.9

804.4.2

806.1

903.2.6

907.2.13

907.5.2.2
909.5.2
907.5.2.5
1003.3.3.1
1003.5
1008.1.1
1008.1.1.1
1009.4
1014.2.2
TABLE 1014.3
1015.1
TABLE 1016.2
1018.1
TABLE 1018.1

Rationale: The OSFM is proposing to correct and correlate missing occupancy classifications for Group I-2.1 occupancies. Confusion as to whether or not the base Group I-2 provisions should apply to a Group I-2.1 exists in several areas. This proposal specifically adds the I-2.1 classification to only those sections that are to apply as originally intended when the International Codes were first adopted in California for the 2007 California Codes.

Additional corrections are being proposed for footnote b of Table 803.9 which is no longer part of the model code, and Table 508.2.5 to remove "storage rooms over 100 sf" which is a model code provision that was removed from the 2012 IBC and should not have been maintained in the California Codes.

[Item 5. Adoption of NFPA 502.]

429
429.1
Chapter 35 Referenced Standards – NFPA 502

Rationale: SFM is proposing adoption of NFPA 502, Standard for Road Tunnels, Bridges, and Other Limited Access Highways, 2014 Edition for consistency in the overall fire protection engineering practices in these types of structures. The 2014 Edition of NFPA 502 is the most current edition at this time.

Current regulations and state law allow that where regulations do not specifically cover any matter, then recognized fire prevention engineering practices shall be employed, which includes the most current standards of NFPA National Fire Codes. Due to the lengthy time line during the design phase of these projects, the use of the most current NFPA Standard during the design phase may result in financial burden and delays in the project. Specifically adopting the 2014 Edition of NFPA 502 will ensure consistency of the fire protection systems in these structures throughout the 2013 Code Cycle. This adoption will also ensure architects and engineers understand which edition standard that they are required to design to.

[Item 6. Reinstate model code provisions missing.]

907.2.29.1

Rationale: The SFM proposes to bring forward model code provisions that were not specifically intended to be eliminated from certain new public schools regarding emergency voice/alarm communication system requirements that were introduced into the 2012 International Building and Fire Code. In an effort to address the ever changing environment of enhanced safety measures associated with "lockdown" programs at public schools where students are being trained to ignore the fire alarm, there needs to be afforded a reliable mechanism with which verbal directions may be communicated to staff and/or students during other than a fire emergency. In addition, inclusion of these provisions will afford consistency with the emergency preparedness provisions in chapter 4 of the 2012 International Fire Code.

As the SFM is not aware of any rationale to treat certain state funded public school projects any differently than non-state funded schools, these standards which were developed on a nationally based model code and this proposal bring clarity and consistency for all schools in California.

[Item 7. Clarification and editorial modifications for photovoltaic solar systems.]**3111.1 through 3111.3.**

Rationale: The OSFM is proposing the above modifications based on proposals (F62-13) approved for the 2015 IFC Section 605.11 that is also in Section R331 of the California Residential. These modifications are primarily editorial and provide additional clarification. These modifications are primarily editorial and provide additional clarification. The following is the rationale by the original proponent that proposed the modifications. This code proposal has been heard and accepted by the ICC Fire Code Committee at the ICC Code Hearings held April-May, 2013 in Dallas, TX. Final Action of these modifications was approved in October 2013, in Atlantic City, NJ. The SFM is bringing these proposals forward in part to further implement the State's Renewable Portfolio Standard (RPS) and provide necessary tools for enforcement officials, building owners, manufacturers and the construction industry.

The following is the rationale for support of the proposed modifications:

Original proponent's reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

This proposal is primarily an editorial clarification to Section 605.11.3. There is only one section which contains new text, it is Section 605.11.3.2.1. The sections and their revisions are noted below:

605.11 Exc: This exception eliminates all requirements for solar PV systems located on Group U structures. This exception inadvertently eliminates the requirements for listing of components, marking and location of disconnects. This exception is relocated to Section 605.11.3 so that it only eliminates the requirements for access and pathways which will then retain the listing and marking requirements.

605.11.3 Exc 1: This exception is actually a requirement; it is not an exception. Therefore, the exception is deleted and the text has been relocated to Section 605.11.3.2.1.

605.11.3 Exc 2: This is an exception based on the need for the ability to vertically ventilate smoke through the roof. Section 605.11.3.2.5 (renumbered from 605.11.3.2.4) deals with smoke ventilation. The exception is intended to apply to a specific set of requirements regarding smoke ventilation. If the exception is left in this section, it exempts these systems from all of the requirements in this entire section. Therefore this exception has been relocated to Section 605.11.3.2.5.

605.11.3.2: The title of this section is revised to correlate with the text of the section. The text only applies to one- and two-family dwellings so the term "residential" is removed from the title.

Also, the section is revised by deleting the reference to 'access' since the subsections deal with more than access, and additional access requirements are found in 605.11.3.1.

605.11.3.2.1: This section originates from 605.11.3 Exception 1. It is relocated to the section which applies to dwellings and is inserted as a requirement.

Additionally, the 2nd sentence is added as a new requirement. The current requirements limit the size of each PV array but provide no guidance as to the required separation between multiple PV arrays. This requirement fills that void by requiring a 3 foot separation between PV arrays. The 3 foot distance is the same spacing requirement found around PV arrays to the edge of roof or to the ridge of the roof, and provides for access around the arrays.

605.11.3.2.2: Renumbered from 605.11.3.2.1. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.

605.11.3.2.3: Renumbered from 605.11.3.2.2. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.

605.11.3.2.4: Renumbered from 605.11.3.2.3. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.

605.11.3.2.5: Renumbered from 605.11.3.2.4. The text is revised to correlate with the previous sections regarding one- and two-family dwellings.

Additionally, the exception is added which was previously located in Section 605.11.3. This exception is based on the need for the ability to vertically ventilate smoke through the roof, and Section 605.11.3.2.5 deals with smoke ventilation.

605.11.3.3: The text is revised to correlate with the previous revisions regarding one- and two-family dwellings.

605.11.3.3.1: This exception is reworded into an actual exception which states that the required clearance is allowed to be reduced to 4', rather than requiring a clearance of 4'.

605.11.1 The language in these sections relate to the installation of the electrical system for photovoltaic systems. They do not belong in the fire code. The language in this section is similar to that of the NEC. They are already included in the National Electrical Code (NEC), NFPA 70 Article 690.31. The NEC is already referenced in Chapter 27 of the IBC. It states "Electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of NFPA 70". Section 102.4 of the IFC states that the design and construction of buildings shall comply with the IBC. Therefore, the requirements are duplicative and are not needed in the IFC. By having similar requirements in two different codes, there is a great potential for conflicts.

Final Action Hearing modifications

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: <http://www.iccsafe.org/cs/CAC/Pages/default.aspx>.

Proposals F62-13, F64-13, F69-13, F72-13, F73-13, F74-13 and RM96-13 all made revisions to Section 605.11 requirements for solar photovoltaic power systems. Most of the revisions accepted by the committee worked well together, with a few exceptions that need coordination/clarification.

This public comment to F62-13 shows what Section 605.11 will look like if all of the approved proposals are adopted. The changes included in this proposal accomplish the following:

1. Editorially show the new numbering system that results from F94-13 deleting Sections 905.11.1 through 905.11.2. (Note - ICC staff ultimately decide the numbering system to be used)
2. In new Section 605.11.1, proposal F62-13 removed what is shown as exception 2, but this section was modified by F69-13. This exception was retained.
3. In new Section 605.11.1.2 the exception was added by proposal RM96-13.
4. In new Section 605.11.1.3 both F62-13 and F72-13 (as modified) added wording which resulted in the title of the section reading "Other than one- and two-family dwellings Group R-3 buildings". This title was revised to only include "Group R-3 buildings". In addition the text in this section was editorially revised to clarify that it applies to buildings, other than those containing Group R-3 occupancies. In addition references to "one- and two-family dwellings" was changed to "Group R-3 buildings" in Sections 605.11.1.2.2 , 605.11.1.2.3, 605.11.1.2.4 and 605.11.1.2.5 for consistency.
5. New Section 605.11.2 deleted referenced to previous Section 605.11.2 since this section was deleted by proposal F64-13.

[Item 8. Clarification and coordination of residential fire sprinkler systems, antifreeze and NFPA 13D and modifications to the referenced standards.]

Chapter 35 Matrix Table modifications:

Delete the "NFPA 92a" should only be NFPA 92 in the Matrix Table

Add NFPA 502 in the Matrix Table

CHAPTER 35 REFERENCED STANDARDS

NFPA 13

NFPA 13D

NFPA13R

Rationale: The SFM proposed to correct the Matrix Table by removing the reference to NFPA 92a-12 which is no longer adopted by the SFM or produced by NFPA and it has been incorporated into NFPA 92-12 . The adoption of NFPA 502 as proposed in section 429 (Item 5 above) is reflected in the Matrix Table and the Referenced Standards Chapter of the Code.

The SFM further proposes to align the California Building Standards Codes with the most recent NFPA 13 Standards (2013 edition) and repeal existing modifications. At the National Fire Protection Association (NFPA) Standards Council meeting August 2013, a final decision was made to issue the tentative interim agreement (TIA) 13-1, TIA Log #1067, on NFPA 13D 2013 edition, respectively to address to the use of antifreeze solutions within all NFPA 13D applications (One- and Two-Family Dwellings). This information is available for review on the NFPA website at <http://www.nfpa.org/antifreeze>. These existing SFM modifications are no longer necessary as a result in the approval and ratification of TIA 13-1 made to the 2013 edition of NFPA 13.

Additional editorial modifications are proposed the correct section references and the edition of the California NFPA 25 standard.

[Item 9. Editorial or clarifying corrections to the model code or SFM amendments.]

304.1

425.8.4.2

504.2

907.2.9.4.1

TABLE 1004.1.1

TABLE 1021.2(1)

Rationale: The OSFM is proposing the above modification regarding occupancy classifications and tutoring centers based on proposals (G30-12) approved for the 2015 IBC/IFC. These modifications are primarily editorial and provide additional clarification. The following is the rationale by the original proponent that proposed the modifications. This code proposal has been heard and accepted by the ICC General Code Committee at the ICC Code Hearings held April-May, 2012 in Dallas, TX. Final Action of these modifications was approved in October 2012, in Portland, OR. The SFM is bringing this proposal forward to provide necessary clarification relating to tutoring centers.

The 2012 International Building Code defines a Group E occupancy as the use of a building or structure, or a portion thereof, by six or more persons at any one time for educational purposes through the 12th grade. There are a variety of local interpretations on whether a tutoring center falls into a Group B or Group E classification. This code proposal is intended to classify tutoring centers and similar transient occupancies that cater to children as Group B occupancies per section 304.1. Enforcing Group E regulations greatly increases the cost to tutoring centers, in particular, as other similar uses clearly do not fall into the academic provisions of the Group E occupancies, i.e. martial arts, gymnastics, etc. The majority of tutoring centers are placed in multi-unit, Type V structures. Placing a Group E occupancy in a Type V building requires either a one-hour or two-hour wall between adjoining occupancies depending on fire sprinkler coverage. In addition, a manual fire alarm system is required in all Group E occupancies having an occupant load of more than 30, unless provided with fire sprinklers.

The OSFM is proposing the additional following editorial or clarifying corrections as follows:

- 304.1 editorial correction to section reference.
- 425.8.4.2 Exception 3 is in direct conflict with item 2 and is carry over language from prior codes. Furthermore, exception 1 and 2 both accommodate the reductions to 36 inches where necessary.
- 504.2 this correct the intent of both the IBC and the California amendments by reinstating the allowance to use an NFPA 13R fire sprinkler system in a Group R-3 occupancy of 4 stories.
- 907.2.9.4.1 The SFM is correcting a drafting error, the provisions contained in 907.2.9.5 are missing provisions from the conversion from the I-1 occupancy classification to R-2.1 during the adoption of the 2009 IBC/IFC for the 2013 CBC/CFC. These provisions are from IBC/IFC Section 907.2.6.1. This correction has no change in regulatory effect as these are currently mandated by Health and Safety Code 13113.7.
- Table 1004.1.1 editorial correction to reinstate missing model code provisions for locker rooms.
- Table 1021.2(1) The SFM propose to remove the Group R-4 from Table 1021.2(1) as it conflicts with Table 1021.2(2). During the drafting of the 2013 California Codes the Group R-4 was added to this table in error. This proposal has no regulatory effect and corrects the intent of the original SFM proposal to revise this table by adding Group R-3 occupancies.

[Item 10. Smoke and heat removal for Group F-1 and S-1 occupancies.]

Rationale: The OSFM is proposing the above modifications based on proposals (F195-13) approved for the 2015 IBC/IFC. The following is the Rationale by the original proponent that proposed the modifications. This code proposal has been heard and accepted by the ICC Fire Code Committee at the ICC Code Hearings held April-May, 2013 in Dallas, TX. Final Action of these modifications to ratify was approved in October 2013, held in Atlantic City, NJ. The SFM is bringing these proposals forward in part to further implement the. This proposal correlates and completes the efforts of the Task Group 400 that recommended revisions to the California Codes relating to the 400 foot exit access travel distance and smoke and heat removal, these proposals were approved and adopted into the 2010 California Codes. This proposal further enhances those, the SFM is now able to repeal specific state amendments and utilize the national model code provisions made. The SFM worked closely with the Roof Vent Study Group of the International Code Council, Code Technology Committee to propose and have ultimately adopted into the model code, these provisions proposed herein.

The following is the rationale for support of the proposed modifications:

Reason: The ICC Board established the ICC Code Technology Committee (CTC) as the venue to discuss contemporary code issues in a committee setting which provides the necessary time and flexibility to allow for full participation and input by any interested party. The code issues are assigned to the CTC by the ICC Board as "areas of study". Information on the CTC, including: meeting agendas; minutes; reports; resource documents; presentations; and all other materials developed in conjunction with the CTC effort can be downloaded from the following website: <http://www.iccsafe.org/cs/CTC/Pages/default.aspx>. Since its inception in April/2005, the CTC has held twenty-five meetings - all open to the public.

This proposed code change is a result of the CTC's investigation of smoke and heat removal through the Roof Vent Study Group (RVSG), which is part of the area of CTC study entitled "Balanced Fire Protection" the scope of which is: *"To investigate what constitutes an acceptable balance between active fire protection and passive fire protection measures with respect to meeting the fire and life safety objectives of the IBC."* As part of the CTC's review of the "balanced" fire protection issue, the CTC formed the RVSG to study the issue of smoke and heat vents with specific emphasis on: building area; sprinkler versus non sprinkler operation; impact on fire-fighting operations; relationship to the on-going updating of NFPA 204; the need for smoke and heat vent design requirements, regardless if smoke and heat vents are mandated by the code. The RVSG was formed in October 2006 and has been working on this issue since January 2007 and developed code change proposal F144-09/10 which was disapproved by the ICC membership. This subsequent code change proposal is a result of continued RVSG study on the issue.

The purpose of this code change proposal is to update the provisions which mandate roof smoke and heat removal systems in industrial and storage buildings based upon technical information on the operation of roof vents which has been developed in the United States over the last 20 years. The RVSG has developed its proposed revisions to the roof vent provisions based upon the following:

- Research on the interaction of sprinklers, roof vents and draft curtains funded by the National Fire Protection Research Foundation (NFPRF) and conducted at Underwriters Laboratories (UL) in 1997/1998. This research is summarized in a document referred to as National Institute of Science and Technology Interagency Report (NISTIR) 6196-1 dated September, 1998.
- Provisions for the use of roof vents in sprinklered buildings included in the 2010 and 2013 edition of NFPA 13, including the substantiation statement for the NFPA 13 roof vent provisions.
- The capability of standard spray sprinklers to both control and/or extinguish a fire within 30 minutes of sprinkler operation, without supplemental fire department activity has been documented.
- Recommendations contained in National Institute for Occupational Safety and Health (NIOSH) 2005-132, *Preventing Injuries and Deaths of Fire Fighters Due to Truss Systems*, and NIOSH 2010-153, *Preventing Deaths and Injuries of Fire Fighters using Risk Management Principles at Structure Fires*.
- Recommendations contained in the Initial Report of the Federal Emergency Management Agency (FEMA)/National Fallen Firefighter Foundation (NFFF) Firefighter Life Safety Summit held on April 14, 2004 in Tampa, Florida.

The RVSG determined that the primary purpose of smoke and heat removal from the perspective of the building code requirement is to assist fire-fighting operations after control of the fire has been achieved by the automatic sprinkler system. Automatic smoke and heat vents and automatic sprinkler systems were developed independently of one another and their interaction has been a concern for many years. Even today, there is no accepted method of analyzing their interaction and, therefore, the installation standards for each (NFPA 204 and NFPA 13, respectively) give cautions to the designers of buildings having both systems.

The RVSG also determined that a manually-activated mechanical smoke removal system could perform the same function as roof vents. This code change increases the emphasis and acceptability of mechanical smoke removal systems as an acceptable alternative to smoke and heat vents. Mechanical smoke removal systems as prescribed in this code change provide fire-rated, grade-level enclosures for the control of the mechanical smoke removal system. This provides greater control of the system for the fire incident commander and reduces the need to place fire fighters on roofs or in other hazardous situations to operate smoke and heat venting systems. This methodology is consistent with the latest recommendations from NIOSH and NFFF for fire fighter safety, risk management and recommended fire-fighting tactics.

Summary of general provisions of the proposal:

- Either automatic roof vents or a manually-activated mechanical smoke removal system are permitted to be provided in industrial and storage buildings protected by a sprinkler system (in buildings where these provisions are applicable).
- Only roof vents should be permitted to be provided in storage buildings with high-piled storage which are not protected by a sprinkler system (i.e., buildings which contain high-piled storage with an area between 2,500 and 12,000 square feet). The rationale for this provision is that a mechanical smoke removal system capable of handling temperatures between 1,000^o F and 2,000^o F cannot be practically provided at a reasonable cost.
- Provisions for the design of a manually-activated mechanical smoke removal system have been included. These provisions require that the mechanical smoke removal system be sized to provide a minimum exhaust rate of 2 air changes per hour based upon the enclosed volume of the building space to be exhausted, without any deductions for the space occupied by storage or equipment. An exhaust rate of 2 air changes per hour is based on an analysis assuming a conservative approach using a Factory Mutual Research Corporation (FMRC) Standard Plastic Commodity (polystyrene cups in compartmented cartons). This commodity is recognized to represent a severe fire hazard of high density plastics. In a calculation based on this commodity, maximum of 68,960 cfm of smoke was generated by the design fire. Based upon an empty building volume of 2.659 million cubic feet, the exhaust rate required to achieve two air changes per hour is 88,633 cfm. Because no single fan can exceed 30,000 cfm, this building required five fans, each exhausting 25,570 cfm for a total of 127,850 cfm. This exceeds the minimum two air changes per hour by more than 40 percent. Even at the minimum required rate of two air changes per hour, the calculation results show that the mechanical smoke removal system proposed will be capable of removing the smoke from the building faster than it will be generated, ultimately removing smoke from the building once the fire is extinguished. A degree of conservatism is added to this by the calculation using an empty building volume.
- Provisions for the design of roof vents in buildings protected by a sprinkler system have been modified to require that the area of roof vents provide equivalent venting to that required for the mechanical smoke removal system (2 air changes per hour) based upon an assumption that each square foot of vent area will provide 300 cubic feet per minute (cfm) of ventilation. The reason for this requirement is that the roof vents should at least provide venting equivalent to the minimum venting provided by the mechanical smoke removal system. A factor of 300 cfm of venting per square foot of vent area is presently included in the 2012 edition of the *International Building Code*, although the use of this conversion factor is questionable at best. The actual ventilation provided by each square foot of vent area will depend upon the temperature differential between ambient conditions and the smoke layer under the roof deck or the pressure achieved if positive pressure ventilation is utilized. If the prescribed value is not practical for a given building design, designers have the option of demonstrating other values which provide the same performance under the alternate method of design provisions in the code.
- Provisions for the design of roof vents in buildings not protected by a sprinkler system have been revised (simplified) to require that the ratio of the area of the vents to the floor area be a minimum of 1:50. The rationale for this revision is that the case where roof vents will be provided without sprinkler protection will be rare: buildings which contain high-piled storage with an area between 2,500 and 12,000 square feet. Given that this situation will be rare, a complex analysis to determine the required area of roof vents is unnecessary. The ratio of vent area to floor area of 1:50 is conservative based upon the present requirements included in the *International Building and Fire Codes*.
- Provisions for the mechanical smoke removal system permit the system to be designed to handle air at ambient temperature provided that the fan motors are located outside the air stream. The basis for this provision is the thermocouple temperature data for the large-scale fire tests conducted at UL in 1997/1998, specifically Tests P-1 and P-4. (In Tests P-1 and P-4, no vents opened so the ceiling temperatures recorded would be unaffected by the activation of vents. See Pages 40 and 52 of the NISTIR 6196-1 report dated September 1998 (on the CTC web site) for the thermocouple temperature data recorded as a function of time.)
- The exposing temperatures and time periods were reviewed and not considered to pose a threat to the building structure, fans or power wiring.
- The sprinkler activation times and ceiling temperature data for the five large-scale fire tests summarized in NISTIR 6196-1 indicate that the exposure of mechanical exhaust fans and ducts located at the ceiling to high temperatures will be relatively short. Since it is anticipated that the exhaust system will only be activated after the arrival of fire fighters at the scene (estimated to be 7 minutes or longer after ignition), ceiling temperatures should be reduced sufficiently to allow fans rated for only ambient temperatures to be used for the exhaust system.
- The existing provisions for the design of a mechanical exhaust system indicate that the electrical power supply for the system is to be wired ahead of the main building disconnect for increased reliability and to facilitate fire-fighting operations. This existing provision will remain as no adverse experience has been cited.
- The provisions for the design of a mechanical smoke removal system indicate that wiring providing power to exhaust fans located in the interior of the building is to be protected by materials which will provide a 15 minute finish rating protection. The ceiling temperature data collected in the five large-scale fire tests summarized in NISTIR 6196-1 (cited above) show that temperatures at the ceiling will be far less than the exposure temperatures defined by the ASTM E119 time-temperature curve and that the ceiling temperatures will rapidly decrease once sprinklers activate. The ceiling temperature data included in NISTIR 6196-1 indicates that providing 15 minute finish rating

protection for the interior electrical power supply is more than adequate to prevent damage to the power supply wiring for the exhaust system.

- The provisions pertaining to draft curtains included in the code have been removed. The rationale for removing the provisions for draft curtains is that research conducted by Factory Mutual Research Corporation (FMRC) in 1994 and the research conducted at UL in 1997/1998 demonstrated that draft curtains affect the sequence of operation of sprinklers and may have an adverse effect on sprinkler operation.

Although the mechanical smoke removal system or roof vent system outlined above are intended to be utilized to assist fire fighters after fire control has been achieved, either one of these systems can be utilized to assist interior manual fire-fighting operations. In order to utilize the roof vent system to assist with manual interior fire-fighting, it will likely be necessary that the vents will have to be opened manually by sending fire fighters to the roof if this is within the responding fire department's operating procedures.

It should be noted that the effectiveness of manually-opened roof vents will be marginal at best once sprinklers have operated and the ceiling temperatures drop to near ambient. Hence, in order for roof vents to be of assistance for interior manual fire-fighting, fire fighters will likely either need to pressurize the building using positive pressure ventilation (PPV) or exhaust the building with supplemental equipment.

It should also be noted that this proposed code change does not make reference to NFPA 204 for the design of roof vent systems in either buildings protected by a sprinkler system or unsprinklered buildings. The rationale for this is that NFPA 204 does not address the use of roof vents in sprinklered buildings and the design provisions for roof vents presently included in NFPA 204 are too complex for application to relatively small buildings where vents would be permitted without sprinkler protection (i.e., buildings with high-piled storage less than 12,000 square feet in floor area).

The proposed code change developed by the RVSG is intended to incorporate the latest technology and research available on the interaction of sprinklers, roof vents and draft curtains, as well as the evolving thinking on fire fighter safety promoted by NIOSH and the NFFF into the code provisions.

The information on which this code change proposal is based did not exist when the provisions for roof vents were first included in the building and fire codes in the 1970s and 1980s. This proposal is a much needed update in the fire protection provisions for large industrial and storage buildings. A section-by-section summary follows:

910.1: The phrase "...or otherwise installed..." has been removed to clarify that these provisions are specific to required systems. None of the requirements in the section must be mandatory for non-required systems. Terminology was changed from "exhaust" to "removal" for consistency of terminology. This section is a general section but the exceptions are specific to when a smoke and heat removal system is required; therefore, the exceptions have been relocated to Section 910.2.

910.2: Exceptions 1 and 3 in this section have been relocated here from Section 910.1 as they are specific to when a smoke and heat removal system is required. In Exception 2, terminology has been changed from "exhaust" to "removal" for consistency of terminology. Additionally, the use of a mechanical smoke removal system is made mandatory instead of optional since it is the only practical way to provide smoke and heat removal in multi-story buildings.

910.2.1: This section has been editorially reworded into a complete sentence and mechanical smoke removal has been made an option for smoke and heat removal without requiring specific approval. Companion changes to the remainder of Section 910 have been made to move mechanical smoke removal as an option to smoke and heat venting.

910.2.2: This section has had a reference to IFC Table 3206.2 added and the reference to Section 3206.7 removed because Section 3206.2 sends the code user to the table first and then the table sends the user to Section 3206.7. The phrase "...stock or rack..." were removed because high-piled storage is not limited to stock or rack storage. The intent of the overall code change is to require smoke and heat vents as the method for protecting unsprinklered buildings and provide the option of vents or mechanical smoke removal for sprinklered buildings. This section was revised to accomplish that goal by referencing Section 910.3 for design of roof vents in non-sprinklered buildings and either Section 910.3 or 910.4 for sprinklered buildings.

910.3: This section has been revised to remove the reference to draft curtains as explained in the general reason statement. Additionally, the section and table references were updated to address section format changes.

Table 910.3: The table has been deleted and replaced with new Section 910.3.3 for calculation of required roof vent area.

910.3.1: The option to use FM Standard 4430 as an alternative to UL 793 has been added. Some manufacturers of roof vents only maintain an FM approval of their product, not a UL listing. Hence, making the UL standard the sole standard would require vents with only a FM approval to have their products tested by UL. FM 4430 and UL 793 are very similar in content. Permissive language contained in previous FM standards has been replaced with mandatory language in the most recent edition of the FM standard.

Current 910.3.2: Specific requirements for vent operation have been deleted. In (storage) buildings protected by a sprinkler system, the roof vent provisions contained in NFPA 13 dictate the temperature rating of the fusible element. Hence, there is no need to specify the temperature rating of the fusible element of the vent. With respect to the use of vents in unsprinklered high-piled storage areas, the temperature rating of the fusible element is not all that important. A listed fusible link or listed drop-out vent will operate when exposed to temperatures in excess of 1,000 degrees F. This issue is addressed in both the UL and FM standards for roof vents.

Proposed 910.3.2: This section has been relocated as indicated and revised to remove the reference to draft curtains as previously explained in the general reason statement.

Current 910.3.3: This section is to be deleted and replaced with new Section 910.3.3 that provides a simplified calculation for vent area. With respect to the minimum size of the vents, installing vents with dimensions less than 4 feet is not practical or economical. The more holes put in the roof, the more likely there is to be roof leakage problems. Hence, the minimum size of vents is "self-policing" from a practical and economic standpoint.

Proposed 910.3.3: The design of roof vent area has been simplified with two equations, one for sprinklered buildings and one for non-sprinklered buildings. A detailed explanation of the derivation of the equations is provided in the general reason statement.

910.3.5: The section on draft curtains has been removed. As detailed in the general reason statement, draft curtains can interfere with sprinkler operation and the RVSG found no evidence that they provided a valuable enhancement to roof vent performance.

910.4: This section has been revised to remove the qualification that a fire code official must approve the use of mechanical smoke removal systems. This code change changes mechanical smoke removal from an optional method that requires additional approval to an equally recognized, if not superior, method of smoke removal that can be chosen without additional approval required. To address the qualifications for mechanical system use, additional prescriptive conditions were added to replace the case-by-case approval method.

910.4.1: This condition of mechanical system use requires that the building be sprinklered to protect the mechanical equipment from excessive heat.

Current 910.4.2: This section is deleted and replaced by new Section 910.4.3.

Proposed 910.4.2: This section requires exhaust fan motors be located out of the exhaust stream to protect the mechanical equipment from excessive heat.

Current 910.4.3: This section was deleted and replaced with **Section 910.4.4** and requires that mechanical systems are to be activated manually so that the fire department is in control of the system. In some situations, automatic operation could cause a fire to grow or spread, opening an excessive number of sprinklers. Automatic operation of the mechanical smoke removal system could be detrimental to the operation of the sprinkler system in a manner similar to draft curtains. The effect of the automatic mechanical smoke removal system on sprinkler operation would depend upon when the system was activated. The sooner the system is automatically activated, the greater the detrimental effect. The fire department will retain the option to shut down the exhaust system, as well.

Proposed 910.4.3. and 910.4.3.1: These sections specify the design requirement for the minimum number of air changes, maximum fan capacity, and requirements for the provision of make-up air. Based on NFPA 92-2012, Annex Section A-4.4.4.1, the maximum air velocity through the make-up air inlet is 1 m/sec or 200 ft/min. The area requirement is then derived as follows:

- Effective Vent Area = $(1000 \text{ ft}^3/\text{min})/(200 \text{ ft}/\text{min}) = 5 \text{ ft}^2$ per 1000 cfm
- Assume an orifice coefficient of 0.6
- Gross Vent Area = $5 \text{ ft}^2/(0.6) = 8.33 \text{ ft}^2$ per 1000 cfm, which is rounded down due to the conservative nature of the requirement

The reason for this limitation is to prevent significant deflection of the plume, which will cause more air entrainment into the plume and more smoke production. This criteria is conservative as the requirement above assumes an active fire and the design philosophy for this code proposal is to provide post-fire smoke exhaust.

Current 910.4.5: This section has been deleted and replaced with more specific make-up air requirements in Section 910.4.3.

Proposed 910.4.5: This section establishes the required placement, access and protection of the manual controls to ensure the fire fighters will have quick and protected access to the controls.

910.4.6: This current section has been renumbered from 906.4.4 and addresses wiring and control. New Section 910.4.5 addresses the control system so the control provisions were removed from this section. The remaining text is unchanged.

910.4.7: This section has been revised to require that if a mechanical smoke removal system is integrated with a standard HVAC system, then the system must shut down upon detection of smoke as required by the IMC. This is a to the new requirement in proposed Section 910.4.4 that mechanical smoke removal systems shall be manually operated only.

910.5 and Table 901.6.1. The reference to NFPA 204 for the maintenance of smoke and heat vents was retained; however, the reference to NFPA 204 for mechanical systems was removed and replaced with prescriptive testing and maintenance requirements placed in proposed Section 910.5.2. The RVSG determined that the maintenance requirements in NFPA 204 were not specific enough to ensure the necessary maintenance. In Section 910.5.1.1, the statement that vents cannot be modified was removed because it is not a maintenance issue. Modification of vents can be accomplished in a code compliant manner and such modification would require a building permit.

[Item 11. The SFM proposes to adopt additional Sections.]

1403.5

Rationale: The SFM proposes to only adopt Sections 1401, 1402, 1403.4, 1403.5, 1404, 1405, 1406, 1407 and 1408 of Chapter 14 without amendment. Furthermore, the SFM is maintaining the adoption of those existing California amendments or building standards in Chapter 14 without modification.

The actions described above are reasonably necessary to carry out the purpose for which it is proposed. The rationale for these actions is to establish minimum requirements for the prevention of fire and for the protection of life and property against fire and panic in occupancies that are addressed in the 2012 International Building Code and published as the 2013 California Building Code pursuant to Health and Safety Code Section 13108, 13113, 13114, 13131.5, 13143, 17921, and 18949.2.

TECHNICAL, THEORETICAL, AND EMPIRICAL STUDY, REPORT, OR SIMILAR DOCUMENTS:

(Government Code Section 11346.2(b)(2))

The SFM did not rely on any technical, theoretical, and empirical study, report, or similar documents outside of those contained in this rulemaking in proposing that CBSC adopt said model code as a reference standard for the placement of existing SFM regulatory amendments for the California Building Standards Codes.

CONSIDERATION OF REASONABLE ALTERNATIVES

(Government Code Section 11346.2(b)(3)(A))

The SFM has determined that no alternative considered would be more effective in carrying out the purpose for which the regulation is proposed or would be as effective as and less burdensome to affected private persons than the proposed adoption by reference with SFM amendments. Therefore, there are no alternatives available to the SFM regarding the proposed adoption and amendment of this code.

REASONABLE ALTERNATIVES THE AGENCY HAS IDENTIFIED THAT WOULD LESSEN ANY ADVERSE IMPACT ON SMALL BUSINESS.

(Government Code Section 11346.2(b)(3)(B))

The SFM has determined that no alternative available would be more effective in carrying out the purpose for which the regulation is proposed or would be as effective as and less burdensome to affected private persons than the proposed adoption by reference with SFM amendments. Therefore, no alternatives have been identified or that have otherwise been identified and brought to the attention of the SFM that would lessen any adverse impact on small business.

FACTS, EVIDENCE, DOCUMENTS, TESTIMONY, OR OTHER EVIDENCE OF NO SIGNIFICANT ADVERSE IMPACT ON BUSINESS.

(Government Code Section 11346.2(B)(4))

The SFM has made a determination that this proposed action will not have a significant adverse economic impact on business. Health and Safety Code Section 18928 requires the SFM, when proposing the adoption of a model code, national standard, or specification shall reference the most recent edition of the applicable model code, national standard, or specification. Therefore, there are no other facts, evidence, documents, testimony, or other evidence on which the SFM relies to support this rulemaking.

DUPLICATION OR CONFLICTS WITH FEDERAL REGULATIONS

(Government Code Section 113465.2(b)(5))

The SFM has determined that this proposed rulemaking action does not unnecessary duplicate or conflict with federal regulations contained in the Code of Federal Regulations that address the same issues as this proposed rulemaking.
