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Chief Doug Dupree
Chairman, Task Group 400
San Bernardino City Fire Department
200 E. 3rd Street
San Bernardino, CA 92418

Re: Task Group 400 Report

Dear Chief Dupree: | | | |

Schulte & Associates has reviewed the Task Group 400 report (dated December 20, 2010) submitted to the Office of the California State Fire Marshal in detail. Although the Task Group 400 committee appears to have already submitted this report to the State Fire Marshal without soliciting public comment, the following are Schulte & Associates' comments regarding the report:

1. **Committee Composition.** The roster of committee members shown on page 5 of the report includes Rick Thornberry, The Code Consortium, Inc. The roster of committee members shown on page 1 of the Aon Fire Protection Engineering's report attached to the main report includes Ms. Julie Ruth, JRuth Code Consulting. Mr. Thornberry is listed as an "industry consultant", while Ms. Ruth is listed as representing the American Architectural Manufacturers Association (AAMA).

The ICC Code Technology Committee (CTC) formed a study group on roof vents in October 2006. This group has been working diligently on the issue of the use of smoke/heat vents in buildings provided with sprinkler protection since January 2007 (4⁺ years). Mr. Thornberry was one of four people appointed to the CTC study group representing the interests of the Smoke Vent Task Group (SVTG). The Smoke Vent Task Group is a trade association which represents the manufacturers of smoke/heat vents. Mr. Thornberry has also represented the SVTG on the NFPA 204 committee for years.

In the past year, Mr. Thornberry has been replaced by William Koffel as the SVTG's representative on the CTC study group and Julie Ruth has been named as an alternate to Mr. Koffel. Hence, it seems obvious that Ms. Ruth also represents the interests of the Smoke Vent Task Group.

While the representatives of the Smoke Vent Task Group on the CTC roof vent study group were apparently invited to participate in the Task Group 400 meetings, it is interesting to note that other members of the CTC roof vent study group were not invited to participate in Task Group 400. Given the amount of work that the CTC study group has devoted to the subject of the use of roof vents in sprinklered buildings over the last 4 years, input from study group members, other than Thornberry and Ruth, would have been an invaluable resource.

It is worth noting that the only members of the CTC study group who are being paid for their time are those representing the Smoke Vent Task Group. All of the other members of the CTC study group are serving without funding by any interest involved.

The fact that neither Mr. Thornberry, nor Ms. Ruth are listed as representing the Smoke Vent Task Group is rather interesting. Although Task Group 400 is not associated with the ICC, the ICC Code of Ethics requires that interests be clearly disclosed. It seems reasonable to question why Mr. Thornberry and Ms. Ruth have not been identified as representing the smoke/heat vent manufacturers.

2. **CTC Study Group Resources.** As indicated above, the ICC Code Technology Committee study group on roof vents has been working on the issue of the use of smoke/heat vents in buildings protected by a sprinkler system since January 2007. The study group has developed a library of documents on the use of vents in buildings protected by a sprinkler system. It does not appear that the Task Group availed itself to this resource, although at least one member of the committee, Rick Thornberry, was aware of this resource.

The CTC study group's library of documents can be found at the following internet address:

<http://www.iccsafe.org/cs/CTC/Pages/BalancedFireProtection.aspx>

There are 47 documents on roof vents included in the study group's library at this address.

3. **NIOSH 2005-132/NIOSH 2010-153.** The installation of smoke/heat vents in both buildings protected by a sprinkler system and unsprinklered buildings contemplates the use of interior manual fire fighting operations. Given this, the NIOSH Alerts, NIOSH 2005-132 and NIOSH 2010-153, are of interest in any discussion of the use of smoke/heat vents.

NIOSH 2005-132, *Preventing Injuries and Deaths of Fire Fighters due to Truss System Failures*, is of interest since almost all of the buildings under discussion are constructed with exposed metal deck roofs supported on exposed steel bar joists or exposed long-span steel trusses. Excerpts from NIOSH 2005-132 include the following:

“ . . .Lives will continue to be lost unless fire departments make appropriate fundamental changes in fire-fighting tactics involving trusses. . . ”

“Use defensive strategies whenever trusses have been exposed to fire or structural integrity cannot be verified. . . ”

“Ensure that fire fighters performing fire-fighting operations under or above trusses are evacuated as soon as it is determined that the trusses are exposed to fire (not according to a time limit.)”

“Use extreme caution when operating on or under truss systems.”

NIOSH 2010-153, *Preventing Deaths and Injuries of Fire Fighters using Risk Management Principles at Structure Fires*, include the following excerpts:

“Results of these NIOSH investigations suggest that fire departments, incident commanders, incident safety officers, and fire fighters may not fully consider information related to building occupancy, structural integrity, and fire involvement before entering structures to initiate interior operations and while performing offensive operations. . . ”

“ . . .The top priority at all fire scenes should be saving and preserving lives—both civilian lives and the lives of all fire fighters at the scene.”

“ . . .Risks to fire fighters’ lives must be balanced against gains when deciding whether to use an offensive or defensive attack . . .The challenge for the incident commander is to recognize when the level of risk becomes excessive and to call for a defensive strategy in situations where no lives are at risk.”

“Include the age of the structure, structural integrity, the type of roof structure and supports (i.e., lightweight trusses, bowstring trusses, and heavy timber construction), the type of interior support structures (i.e., floor trusses, wooden I-joists, and support columns), the type of materials used in the structure (i.e., wood, steel, plastics, foam, or materials that produce toxic gases when subjected to heat), storage of flammable or toxic materials, the amount of load on roof structures that could weaken the supports (e.g., heavy heating and cooling units), water supply, and the presence of automatic sprinkler systems.”

“Ensure the availability of adequate resources, such as a rapid intervention team (RIT), backup hose lines, and emergency medical services (EMS) personnel.”

It is Schulte & Associates’ opinion that NIOSH 2005-132 and NIOSH 2010-153 constitute recommended practice for the use of interior manual fire fighting operations and are of particular importance with respect to fire fighting in buildings with travel distances exceeding 250 feet. The report of Task Group 400 contains no mention of either of these two NIOSH Alerts.

4. **Sofa Super Store Fire, Charleston, South Carolina.** Several reports regarding fire fighting operations at the Sofa Super Store fire which occurred in Charleston, South Carolina on June 18, 2007 have been released. These reports document the risk of conducting interior manual fire fighting operations in a building which was only 15,000 square feet in floor area. The construction of the Sofa Super Store building was similar to the construction of typical single-story industrial and storage buildings with travel distances exceeding 250 feet.

The report issued by Task Group 400 contains no mention of the Sofa Super Store fire, nor does the report note the similarities in the construction of the Sofa Super Store building and the buildings being addressed by the Task Group. Given the similarities in the construction, a discussion of the fire at the Sofa Super Store would certainly have been relevant to the Task Group’s discussions and should have been included in the report.

5. **Note h, Table 2306.2, International Fire Code.** Note h to Table 2306.2 in the International Fire Code requires that the floor area of storage buildings containing high-piled storage be limited to a maximum of 500,000 square feet. (The application of Note h is limited to the high hazard commodity classification.) The report issued by Task Group 400 does not include a discussion of Note h.
6. **High Hazard Commodity Classification.** The definition of a high hazard commodity included in Chapter 23 of the International Fire Code indicates that storage which is classified as a Group A plastic, which is not classified as either a Class III or Class IV commodity, is classified as a high hazard commodity. Hence, Note h to Table 2306.2 would be applicable to a building containing storage classified as Group A plastics.
7. **Aon FPE Analysis/Report.** Page 3 of the Aon FPE report included in the report issued by Task Group 400 indicates that the building which was analyzed had dimensions of 680 feet by 1,460 feet (992,800 square feet). Page 5 of the Aon FPE report indicates that the analysis is based upon a building containing Group A plastics.

Based upon the definition of a high hazard commodity, the commodity classification of the building analyzed by Aon FPE would be high hazard. Hence, Note h to Table 2306.2 in the International Fire Code would be applicable to this building. Since Note h limits the maximum area of a building containing high-piled storage classified as a high hazard commodity to a maximum of 500,000 square feet, the building used in Aon FPE's analysis does not comply with code requirements applicable to buildings containing high hazard commodities.

The Aon FPE report does not provide an explanation for why an analysis was conducted on a building which does not comply with the requirements contained in the International Fire Code, nor does the Task Group's report provide an explanation as to why a non-compliant building was utilized as a basis of the fire modeling analysis and the results of the analysis used for decision-making by the Task Group.

8. **SFPE Guidelines for Substantiating the Use of a Fire Model.** A draft of a document titled "*Guidelines for Substantiating a Fire Model for a Given Application*" published by the Society of Fire Protection Engineers (SFPE) dated September 2009 was released on December 9, 2009. This document addresses how fire models are to be utilized. In particular, this document addresses the issue of the "validation" of fire models for the purpose for which a model is being utilized.

The Aon FPE analysis/report included in the report issued by the Task Group 400 committee does not comply with the draft SFPE document. The discussion of the "validation" of the Fire Dynamics Simulator (FDS) model in the Aon FPE report is minimal. Stating that the FDS was developed by the Building and Fire Research Laboratory (BFRL) at the National Institute of Standards and Technology (NIST) does not constitute a "validation" of the model for the purposes utilized by Aon FPE.

9. **The Concept of "Ganged" Operation of Smoke/Heat Vents.** Page 9 of the report issued by Task Group 400 makes reference to a concept referred to as the "ganged" operation of smoke/heat vents. The "ganged" operation of smoke/heat vents was proposed for inclusion in the International Building Code in the 2007/2008 code change cycle. (The proponent of this code change proposal was Rick Thornberry, representing the Smoke Vent Task Group.) The basis for this proposal was a fire modeling study conducted by Hughes Associates, Inc. (HAI). This study was funded by the Smoke Vent Task Group. The HAI report on this concept was issued on February 18, 2008.

Presentations on the concept of the "ganged" operation of smoke/heat vents were made to the ICC Code Technology Committee in May 2008 and November 2008 by Dr. Craig Beyler, HAI. At both presentations, the "validation" of the fire model used in HAI's study was challenged. After Dr. Beyler's failure to defend the HAI study, the Smoke Vent Task Group concluded that HAI's study on the "ganged" operation of smoke/heat vents was "worthless".

Dr. Craig Beyler/Hughes Associates, Inc. proposed that the concept of the "ganged" operation of smoke/heat vents be included in NFPA 204. This proposal was rejected by the NFPA 204 committee.

It should also be noted that the concept of the “ganged” operation of smoke/heat vents, as proposed by Hughes Associates, Inc. and the Smoke Vent Task Group, would violate the roof vent provisions now included in the 2010 edition of NFPA 13.

Given the above, it seems reasonable to conclude that the concept of the “ganged” operation of smoke/heat vents in buildings protected by a sprinkler system has been discredited.

None of the above information has been mentioned in the portion of the report addressing the concept of the “ganged” operation of smoke/heat vents. It is unclear why a discredited concept was discussed by the Task Group.

10. **Code Change Proposal E113-07/08.** Pages 6 and 7 in the report developed by the Task Group make reference to code change proposal E114-07/08. The report makes no mention of code change proposal E113-07/08.

Code change proposal E113-07/08 was specifically intended to address the issue being addressed by Task Group 400. The approval of code change proposal E113-078/08 was opposed by the fire service and specifically by Rick Thornberry representing the Smoke Vent Task Group.

Given the information included in this letter, it seems obvious, at least to me, that proposal E113-07/08 was, and is, the correct solution to the issue being addressed by Task Group 400.

11. **NFPA 13 Roof Vent Provision Substantiation.** The substantiation for the roof vent provisions contained in the 2010 edition of NFPA 13 reads as follows:

“The intent of the [NFPA 13] standard is that roof vents and draft curtains should not be used in conjunction with storage protection.” 13-325 Log #CP43 AUT-SSD

A comment made by a member of the sub-committee which drafted the roof vent provisions contained the 2010 edition of NFPA 13 reads as follows:

MULTER, T.: *The following original proposal on ROP documents dated 10/20/2007 should be accepted as proposed but with a change to the annex statement.*

12.1.1 Roof Vents and Draft Curtains. *Roof vents and draft curtains shall not be used in conjunction with the sprinkler protection criteria for storage in this standard.*

A.12.1.1 *The design parameters in NFPA 13 were developed based upon the absence of roof vents or draft curtains. (See Annex C.6) Fire tests for sprinklers specifically listed for storage applications are tested without vents or draft curtains. References to control mode sprinklers in other building standards pertain to standard spray sprinklers that were not specifically tested by the laboratories for storage applications. With the advent of K-11.2 and larger sprinklers for storage applications and now Specific Application Control Mode sprinklers (being revised to CMSA), we need to realize that ESFRs are not the only storage sprinklers and that the use of smoke vents and draft curtains can be detrimental to all sprinklers that are specifically tested for storage applications. FM Global's recommended storage protection designs are based upon vents not being provided and that the use of automatic vents may increase the sprinkler water demand."*

Both the substantiation for the NFPA 13 provisions addressing the installation of roof vents and the comment above make it clear that automatic smoke/heat vents should not be provided in storage buildings protected by a sprinkler system, regardless of whether standard spray sprinklers or ESFR sprinklers are used. The substantiation statement and comment couldn't be any clearer.

12. **Seismic Activity.** Page 26 in the report issued by the Task Group makes reference to seismic activity in California as the reason that both sprinkler protection and smoke/heat vents should be required in buildings where the travel distance exceeds 250 feet. The rationale for this requirement indicates that seismic activity may cause water supply systems to be incapacitated, hence, making sprinkler protection provided ineffective.

Smoke/heat vent systems in buildings are intended to facilitate manual interior fire fighting operations. Without a water supply at a building, manual interior fire fighting operations cannot be initiated. Hence, the reasoning that smoke/heat vents should be provided as a back-up for sprinkler protection in case the water supply fails is a flawed rationale.

13. **Draft Curtains.** NFPA 204 indicates that draft curtains are required to be provided in order for smoke/heat vents to operate properly. The requirements for draft curtains has been eliminated in the International Fire Code due to the concern that draft curtains may interfere with the operation of the sprinkler system. (Draft curtains may distort the pattern of operation of sprinklers and may permit a fire to jump across an aisle if the draft curtain is located in the aisle.)

Draft curtains and smoke/heat vents work as a “team”. Without the installation of draft curtains, smoke/heat vents will not perform optimally. Given that the performance of smoke/heat vents without draft curtains is degraded, and given that the performance of the sprinkler system may be degraded by the installation of draft curtains, the only logical approach is to eliminate smoke/heat vents if draft curtains are not provided.

14. **McFrugal’s Warehouse Fire-New Orleans, Louisiana.** There are a number of lessons which can be learned about fires in large single story buildings from the fire which almost completely destroyed the McFrugal’s Warehouse in New Orleans on March 21, 1996. The McFrugal’s Warehouse was a building with dimensions of 1,000 feet by 1,000 feet with a travel distance of 600 feet (500 feet horizontally and 100 feet vertically).

The McFrugal’s Warehouse was not provided with either smoke/heat vents or draft curtains, yet the New Orleans Fire Department conducted interior manual fire fighting operations in the building for over 5 hours due to the fact that the fire burned through a portion of the steel roof deck. In effect, the steel roof deck acted as an automatic smoke/heat vent in this fire.

No mention was made that the Task Group either reviewed or studied the McFrugal’s Warehouse fire in detail.

15. **Home Depot Fire-Tempe, Arizona.** A fire occurred in a Home Depot store in Tempe, Arizona on March 19, 1998. This building had a floor area of approximately 100,000 SF with a roof height in excess of 20 feet. The building was provided with both sprinkler protection and smoke/heat vents, along with draft curtains. The sprinkler system protecting the building failed to control the fire. It appears that the failure was, in part, caused by the draft curtains. Even though the sprinkler system was failing, only a few smoke/heat vents opened and the visibility at the floor of the building was zero at the time of the arrival of the Phoenix Fire Department.

The fire at the Home Depot store in Tempe is an excellent example of the failure of smoke/heat vents to perform their intended function in a building protected by a sprinkler system.

Given all of the above, it seems reasonable to conclude that the Task Group 400 committee may not have had sufficient information on which to make a decision and may want to spend additional time reconsidering its conclusions. The California State Fire Marshal may want to return the report to the Task Group 400 committee and request that this Task Group correct the errors in the report and continue to study of this issue further.

Yours Very Truly,

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