



**DEPARTMENT OF FORESTRY & FIRE PROTECTION
OFFICE OF THE STATE FIRE MARSHAL
Flammability Standards for Building Insulation Materials
(AB 127) Working Group Meeting Notes
September 4, 2014
Office of the State Fire Marshal Headquarters
1131 S Street, Sacramento, CA 95811**



CHAIRPERSON PRESENT:

Kevin Reinertson, Division Chief- Office of the State Fire Marshal (SFM) Code Development & Analysis Division

MEMBERS & GUESTS PRESENT:

Eric Banks, Technical Specialist- BASF Corporation, representing the Spray Foam Coalition of the Center for the Polyurethanes Industry (CPI)
Barry Badders, M.E., P.E., Program Manager- Intertek, Fire Testing and Certification
Jesse Beitel, Sr. Scientist / Principal- Hughes Associates, representing the American Chemistry Council (ACC)
Rian Evitt, Code Compliance Officer- San Ramon Valley Fire Protection District, representing the Northern California Fire Prevention Officers Association (NorCal FPO)
Steve Fischer, Ph.D. Chemist- Department of Consumer Affairs, Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation (BEARHFTI)
Michael D. Fischer, Director of Codes & Regulatory Affairs- Kellen Company, representing the Polyisocyanurate Insulation Manufacturers Association (PIMA)
Pravinray Gandhi, Director of Corporate Research- Underwriters Laboratories (UL)
Andrew Henning, Deputy State Fire Marshal- Office of the State Fire Marshal (SFM) Code Development & Analysis Division
Howard Hopper, Regulatory Services Program Manager- Underwriters Laboratories (UL), Codes and Advisory Services Department
Marcelo M. Hirschler, President & Technical Director- GBH International, representing the American Chemistry Council's North American Flame Retardant Alliance (NAFRA)
Avery Lindeman, Science & Policy Associate- Green Science Policy Institute
Donald Lucas, PH.D., Combustion Scientist- Environmental Energy Technologies Division- Lawrence Berkeley National Laboratory
Justin Malan, Principal/Owner- ECO Consult, representing the U.S. Green Building Council of California (USGBC)
Ernie Pacheco, District 9 Environmental Programs Coordinator- Communication Workers of America
Walter Reiter, Deputy Director- Expanded Polystyrene (EPS) Industry Alliance
Lorraine A. Ross, President- Intech Consulting Inc., representing the Extruded Polystyrene Insulation Manufacturers Association (XPSA)
Paul Shipp, PhD and Principal Engineer- U.S. Gypsum Company, representing ASTM
Duane Sloan, Manager and Principal Engineer- Underwriters Laboratories (UL), Building Materials and Suppression Department
Adria Smith, Deputy Fire Marshal- Fountain Valley Fire Department, representing Cal Chiefs / SoCal Fire Prevention Officers Association
Marjorie Smith, Architect- Siegel and Strain Architects
Paul Wermer, Principal- Paul Wermer Sustainability Consulting, representing the U.S. Green Building Council of California (USGBC)

MEMBERS & GUESTS ON THE TELEPHONE:

Payam Bozorgchami, Contract Manager- Efficiency, Renewables, and Demand Analysis Division,
California Energy Commission

James Carver, Fire Marshal- El Segundo Fire Department, Fire Prevention Division

Richard Lam, Ph.D., Staff Toxicologist- California Environmental Protection Agency (Cal EPA),
Office of Environmental Health Hazard Assessment

Chris Martin, Assistant Legal Counsel- North American Insulation Manufacturers Association (NAIMA)

Nancy McNabb, Manager- Building and Fire Codes and Standards of the Engineering Laboratory
(EL) at the National Institute of Standards and Technology (NIST)

John Woestman, Codes & Standards Director- Extruded Polystyrene Foam Association (XPSA)

I. CALL TO ORDER

Welcome / Self Introductions: Chief Kevin Reinertson called the meeting to order at 1000 hours and the participating working group members and guests introduced themselves.

II. REVIEW/APPROVE JUNE 26 AND JULY 24, 2014 MEETING NOTES

The June 26th Meeting Notes were formally approved.

A working group member opined that there was a typo contained in the fourth sentence of the “**Insulation**” section on page three of the July 24 Meeting Notes. The sentence states that “Chief Reinertson advised that if 2” x 12” stud walls are being used, then one of the provisions is that there’s a maximum of 1” space; there cannot be more than 1” of airspace because of increased flamespread issues.” The working group member thinks that the 2” x 12” measurement should be changed to 2” x 8”, especially when compared against the thickness of the cavity. Utilizing 2” x 8” stud walls is the only way to be consistent with the 1” airspace and the insulation requirement of 6 ¾”. Chief Reinertson agreed and advised that the Meeting Notes will be changed to reflect that fact. Another working group member advised that he found other typos in the Notes and that he would email them to Chief Reinertson who agreed to correct them if necessary.

III. PRESENTATIONS (OPEN AGENDA ITEM)

Lorraine Ross suggested that while waiting for Chief Reinertson to upload the Intertek presentation, the working group should discuss the timeline / where they’re at in regards to meeting the 2015 Code Adoption Cycle deadlines. Chief advised that the working group has been reviewing data since January, 2014 and has developed some potential alternatives to insulation without the use of flame retardant chemicals. When the working group is done and the recommendations are completed, this report will move through the OSFM to Chief Hoover and, based on her decision to move forward, the alternative assemblies may be tested. Assuming that the testing takes place, the working group will move through that process over the next several months. SFM’s timeline to move regulations forward is tied to the Building Standard Commission’s (BSC) timeline. The BSC has produced a draft timeline and April 1, 2015 is their initial submittal date. After the rulemaking package has been submitted to the BSC, then an SFM representative will appear before a Code Advisory Committee (CAC). Technical experts will review the rulemaking package and give a recommendation to the BSC. The working group will have an opportunity to make changes to the rulemaking proposals before going out for an initial forty-five day comment period. If proposals are not made to request that the CAC to review the rulemaking package, they can review the forty-five day language which will probably take place in either June or July, then the proposals will go forward in the rulemaking process without any recommendations from the CAC which puts a lot of onus on the BSC.

Many of the BSC members rely on the CAC which will create a bit of a hurdle for the AB127 Working Group to overcome. Hypothetically, if the working group is able to submit the rulemaking package to the CAC and then into the forty-five day comment period and go through the vetting process and the public comment periods, ultimately it will end up going before the BSC for their adoption and approval. After it's been adopted and approved by the BSC, then it's printed and becomes effective 180 days later. Even though these these items will be proposed early next year, they won't become effective until January 1, 2017. Lorraine asked if the proposal needs to be submitted by April 1, 2015, then where's the RFP on testing? Chief Reinertson advised that the RFP for testing is still in the works; he hasn't gone out to any vendors, consultants, contractors or testing labs to address that because he's waiting for the report to be completed. Marcelo advised that he emailed Chief Reinertson an appendix that contains the abbreviations that he was questioning. Chief advised that he received Marcelo's email and that Avery had also sent him some abbreviations which he incorporated into the report. If the working group gets hung up during the process for some reason, then there will be an opportunity to submit regulations as a supplement to the 2016 California Codes through the regulatory process- there will just be an eighteen month difference in the timeline. Lorraine asked Chief Reinertson to further explain that process. Chief Reinertson advised that if the working group is able to make all of the proposals and they're approved by the BSC and added to the Codes, then they will be in the 2016 California Building Standards Code. If the BSC doesn't approve the proposals, they're hung up in the testing process or need to be refined and changed based on the test results and it don't make it into the 2016 Code, then instead of waiting for another three years for the next Codes to come out, there's an interim cycle that occurs in the middle /eighteen months into it and it comes out as a supplement to the 2016 California Codes. Howard Hopper asked if the 2016 Codes become effective on January 1, 2017. Chief affirmed that's correct. Walter asked if there are any projected dates for the Code Advisory Committee Hearings. Chief advised that they're scheduled to occur next May and June. Walter advised that the forty-five day comment period will therefore be during June and July. Bob Raymer advised that the Code Advisory Committees are scheduled to occur on July 15 – August 15, 2014; it was moved back from June to July. Chief advised that he put up the timeline that was initially vetted by the Commission a month or two ago and the one that he has says June 15 – July 15. Bob advised that has been changed and the reason for the change is that earlier, instead of having all of the Code changes coming in in April, he's now got all of the ICC-related Code changes coming in during April and all of the Plumbing, Mechanical and Green Building material coming in during June. All of SFM's material is still on track but they've moved back IAPMO and Cal Green. Chief Reinertson advised that he's already received the 2015 International Codes to start the rulemaking process. The 2015 Uniform Plumbing and Mechanical Codes are causing the glitch in the timelines. Bob Raymer advised that the forty-five day public review / comment period is now scheduled to occur on September 15 so there are some competing dates but the public review period will take place between August - November. Chief Reinertson asked Bob if the CBSC final action to adopt and approve will take place in late December 2015, through January, 2016. Bob affirmed that's correct. Chief Reinertson advised that after the Commission completes its adoption and approval process, then there will be a publishing date of July 1, 2016 and then 180 days later the effective date will be January 1, 2017. The 180 day period is a statutory provision so usually the Commission is able to time the actual publication date and have that effective date. In order to maintain uniformity and consistency throughout the state and expectations of local building and fire officials as well as the industry and design communities, it's fairly important to keep that date every three years and has a lot to do with local adoptive ordinances. Chief advised that if this proposal has to be done as a supplement to the 2016 Codes, then the only difference is that it will take eighteen months longer; the process is identical.

A. Intertek Presentation on Certification Programs: Intertek's Fire Testing and Certification Program Manager Barry Badders introduced himself and advised that he earned a bachelor's degree in Mechanical Engineering, a master's degree in Fire Protection Engineering and worked for twenty years in the building industry after having worked when he was a teenager as a project gofer for a lath and plaster company that employed his grandfather as a foreman. Barry worked in residential construction to help pay for his college expenses and later transitioned into working for a consulting firm to get

exposure to fire protection for which he developed a passion. He then accepted a position in Southwest Research Institute's fire testing lab and transitioned to Intertek this past year. Barry advised that the goal throughout the certification process is ensuring that the safety standards are met.

1. **Public Safety:** Intertek wants to ensure that the products that are tested and certified are the same products that are delivered to consumers.
2. **Product Path:** This is the first part of the process. When a client goes to Intertek and requests that a product be certified, they want it tested to a standard and Intertek to be a third party entity overseeing that what gets made, delivered and installed is what was actually tested. So, Intertek begins by sending an inspector to a plant to witness the manufacturing of a product which starts a chain of custody. At the same time, they're starting the quality assurance manual so that the manufacturer has a quality system in place to assure that what they're doing is the same. Things can happen when the client purchases raw materials that are outside of their control. For instance, their supplier may have made a change; how are they going to check and catch that? In addition, things can go wrong within their own process; how will they catch and rectify such mistakes? The chain of custody is established and the product is sent to the testing lab where the product is tested and a test report is written. If the results are not favorable, then the client completes more work on the product and it's re-tested. If the results are favorable, then Intertek moves into the certification phase where a quality manual is written, the certification documents are documented, things go out online where they're accessible to the public and an authorization to mark or put a label on the product is issued. The product then moves into the project phase in which a designer, architect or specifier picks a product / assembly and works it into the design specifications and it then moves into the building and commissioning phase.
3. **The Players:** Intertek, FM Global, Underwriters Laboratory, CSA Group and a handful of other companies participate in this process.
4. **The Testing Process:** A standard is developed on a consensus basis; some of the developing organizations are ANC, ASTM, FM Global, NFPA, UL and IMO. All testing is based on the standard and the testing lab is accredited; they have to ensure that what they're doing is consistent and meets a quality standard so that a product test can be repeated. A2LA and IAS are a couple of the agencies that oversee the lab accreditation. The testing process is broken down into three parts: performance, compliance and claim validation.
 - a. **Performance:** How does the product perform; can it be used in a performance-based design?
 - b. **Compliance:** Most of what's being discussed is compliance: a product shall meet X, Y and Z standards. Compliance testing is safety-oriented; it gets tested to the standard and is typically used in performance-based testing as well and is usually required by the AHJ's, consumers, retailers, contractors, insurers, architects and specifiers.
 - c. **Claim Validation:** When a manufacturer makes a claim, they want to have someone standing behind that claim so that the validation is not based solely on their word; it can be said that the claim was validated and is true.
5. **The Test Report:** After all of the above is done, then a test report is generated and it typically contains key components such as whether the material passed or failed, the specific values that were targeted, whether or not it meets a standard, the testing limits, whether or not it was done in full accordance and did it deviate? The report is then used as a tool in the certification phase.

6. **The Certification Accreditation:** The testing accreditation is typically an ISO 17025 accreditation; the certification is 17065. It indicates that the certifying body meets the minimum standards and that the process is being followed in accordance with those standards. A couple of the entities that oversee that accreditation are A2LA and IAS. The certifying entity is typically the same company as the testing company. If there are issues, then a resolution process is entered into to get them resolved before getting to the certification phase.
7. **Product Marks:** Barry displayed some of the marks that everyone is familiar with: the Intertek, the FM, UL, CSA, etc. Products are typically marked on a fire alarm panel, power transformer, fire door or fire extinguisher.
8. **Directory of Listed Products:** If a product is part of an assembly, then most of it is on the internet now which is a great tool instead of there being a library of paper. Intertek and UL both have theirs on the internet with links. Searches can be completed based on the test standard, the manufacturer and the product type; there are different search tools available. Barry showed the working group various examples of product listings.

Questions and Answers:

- Mike Fischer asked Barry to comment on the role of the bibliography of referenced standards that are typically contained in a standard when completing a performance test for a product or material or assembly. Mike explained that when a product is tested for a specific performance requirement, typically if it's a fire or product test, the standard will contain material standards referenced within it so there's a hierarchy of compliance. How is it verified not only that the product is what they produced but also that it meets all of the other requirements? He also asked Barry to describe what happens when there's an existing certification for a product and a change needs to be made- what are the requirements at that point? Barry advised that a test report must be associated with it so frequently when the tests are done, depending on the product and standard, there could be weathering requirements, strength requirements and/or water permeation requirements. Normally it's tested as part of the certification but sometimes the client will already have a report from an accredited testing lab which sometimes can be accepted but at other times the test may need to be run again. Mike then asked what happens in cases such as when a client wants to change the color of composite deck board. Barry explained that it depends on the change. Normally Intertek tries to test so that it can be hedged off in the future; they wouldn't test the darkest color because the pigment can sometimes have an effect on the chemical composition of the product. What's the worst case condition? If that can be tested, then other color changes can be examined and perhaps an engineering evaluation can be completed that doesn't require testing. If that can be justified, then testing doesn't need to be done but if it can't be justified, then testing will have to be done again. Chief Reinertson stated that the working group has created several assemblies- a wall assembly, a floor-ceiling assembly, an attic assembly and an under-slab assembly- that they're looking at moving forward to be tested and would like to create a baseline on current construction practices. If these assemblies are tested, how will equivalents or products that are slightly different be addressed? What if instead of using one layer of 5/8" type X, someone wants to utilize two layers of 1/2" regular gypsum board? Chief asked Barry and the UL representatives to please explain the process of developing an engineering evaluation for such a scenario. If one assembly is tested and it's good but a manufacturer wants to utilize a different assembly, is it possible to complete an engineering evaluation instead of going through a whole battery of testing again? Barry advised that the ability exists but the testing labs must be careful in this type of situation because when one client invests a substantial amount to get a product certified, it would be unfair to allow a competitor to jump on the back of that investment. If the same manufacturer that's done the testing has a change in the assembly, then it can be looked at- especially a minor change(s) and an

engineering evaluation can be completed. It's almost impossible to test every scenario so a binding metric is usually established and engineering evaluations can be completed within that metric.

- Duane Sloane with UL agreed with Barry and opined that it's important to note that the AHJ's rely on the construction information being available on the internet / an online directory. UL used to get requests for the information many years ago and they would write letters that would circulate around and were very outdated and nobody knew whether or not the letters were still valid. UL then decided that when they receive requests for design changes, they would make the engineering judgment by implementing the change into the original design. It's important that the working group ties the judgment to an actual design that can be accessed.
- Marcelo Hirschler asked Barry to explain the difference between the terms certification and listing. Barry advised that the terms are synonymous. A labeled assembly has an individual product as a label (such as a sheet of gypsum) on which there's a description of a listed assembly that contains a group of materials that are put together to make up that assembly. Duane explained that at UL there are three different types of certifications; the term "certification" is the large umbrella at the top and indicates that a product has been tested and is under some type of surveillance program called a "follow-up service" that tracks the mark that has been applied to the assembly or product. The product isn't just tested once but is actually evaluated and inspected after having been tested; the mark indicates that the product is basically the same product that was originally tested. Chief Reinertson asked if this is similar to quality assurance (QA) and if there are periodic inspections. Duane responded that yes, it's similar to QA. UL uses three different words under the term "certification": listed, classified and recognized. UL's listed products fall under a standard that specifies all of the foreseeable hazards associated with that product. Approximately 80% of UL's electrical products are "listed". The classified products are classified regarding specific hazards such as surface burning characteristics only or in accordance with ASTM 1234; their investigations are more limited. The recognized products are marked with a backwards UR which means that they've undergone a portion of a standard but are supposed to be evaluated again in an end-product. For example, a switch goes through its cycling and endurance but when it's actually put inside a television, then the television has to be evaluated as an end-product. All three terms- listing, classification and recognition- fall under the general umbrella term "certification". Marcelo asked what the term "labeling" means. Duane explained that labeling is the actual process of putting a label on a product. Marcelo stated that the Code usually says "listed and labeled" but sometimes it just says "listed"; is it necessary to include "and labeled"? Duane responded that UL prefers to add the words "and labeled" because a product can be listed and can be on Intertek's and/or UL's website but not bear a mark. Simply because a product is listed on an online directory doesn't mean that it's going to be inspected by UL's follow-up auditors because it may not bear a label.
- Chief Reinertson directed the working group to keep the conversation in the context of assemblies rather than specific products such as a fire alarm device that would have a label on it. Individual components that go into an assembly such as 5/8 Type X gypsum wall board are labeled but the 2 x 4 studs or 2 x 6 stud walls are not labeled; they're specced out. Some of the other parts or pieces that go into the assembly may have a label but the entire assembly itself as tested is not going to have its own label. Lorraine stated that it will have a design number. Chief agreed but stated that the working group is not going to try to get a product listed but rather is looking for the test data and report to demonstrate that the prescriptive type of assembly can be moved into the Code. Adria opined that the working group is looking for an engineering evaluation that's equivalent to what's currently in the Code. Marcelo opined that according to the Code today, the components of the assembly need to be listed. Chief Reinertson agreed and stated that the 5/8 type X gyp wall board and the rated boxes will have to comply. The foams and

insulation will be interesting because right now a product without them is not available to purchase in the U.S.

- Jesse Beitel advised that typically what happens in an engineering judgment is there are variations to listed assemblies that somebody creates during a specific job. An appropriate type of engineer could potentially look at such an assembly and opine that based on the listing, certain tweaks could be acceptable to make. Typically it's done only in specific jobs and with specific insulations and uses; it doesn't give broad carte blanche permission to the universe to always be able to go out and make the assembly. There may be other materials inside the building that drive the engineering judgment to be made and to be allowed. Jesse explained that the term "engineering judgment" means to him stating that something can be done for a specific job. Whomever owns or publishes the listing of the assembly that was tweaked can go back at a later time and revise the listing.
- Lorraine Ross opined that another example of an engineering judgment scenario that the working group should discuss is when a manufacturer requests to put 1" of poly-iso into the most basic design in the UL Directory- the one hour rated wall assembly. The manufacturer performs the appropriate test but then mentions that his/her company also makes extruded polystyrene. There's no fire history established to even make an engineering judgment. What is substitutable and what has to be tested? What can be done engineering judgment-wise? Even from foam to foam, it will probably have to be tested because the outcome is unknown. Barry advised that Intertek is frequently asked to make engineering evaluations for products that need to be tested. Sometimes baseline tests can be done rather than full tests but testing cannot be avoided all together.
- Duane asked Chief Reinertson if the constructions are going to be specifically spelled out in the Code; if yes, then the engineering judgment would have to come from an engineering firm to make the judgments case-by-case. Is the assembly going to be listed? It's under certification that the working group will rely on the use of listed components to comprise the assembly and it would be visible to the AHJ's on an online directory. Chief Reinertson advised that similar to when the rulemaking was completed for the building standards for WUI CH 7A, both performance and prescriptive criteria were developed. The Working Draft Report currently contains prescriptive requirements that can be moved into the Code and that are similar to what's found in Chapter 7 in the tables for the different assemblies. They're generic assemblies that have stood the test of time and their performance is known. The proposal is based on the testing that will allow the working group to qualify that these types of assemblies constructed in this manner will fit the criteria. If somebody wants to do something different or above and beyond that or go in a different direction, then that's where the performance criteria is going to kick in. The baseline from the initial testing will still exist and will be either put into an addendum to the report or it will wind up on SFM's website so if another product comes out five years later or if a manufacturer wants to proceed in a different direction on a performance basis, then that company or builder can go down the performance route and get their own testing done. They would then go to the local enforcing agency and say that they completed this testing and have an equivalent and ask for it to be accepted. The other option that they would have is to petition the SFM to write more rulemakings and change the Code again. This won't necessarily be the end / all that can be used because of the performance allowances.
- Lorraine asked if the prescriptive requirements of the assemblies are intended to cover all types of foam as described by the working group. Chief Reinertson advised that the working group has had difficulties in trying to determine the most volatile element contained in the many different types of foam out there that are produced by many different manufacturers. Which product is going to have the highest heat release rate? Which one will ignite the quickest? That's the one that the working group should test to because it will generate the baseline from which to start. Marcelo opined that the issue is not what ignites the quickest but rather what's the heat release

rate; ignition is irrelevant. Chief agreed and stated that's what this working group needs to figure out. Otherwise, the SFM would figure it out.

- Paul Wermer opined that what he's heard in discussions and what makes sense to him is that in terms of performance, it's not just heat release rate or ignition that's significant, it's what are the properties of the insulation in the assembly and how they react to heat in terms of expansion, melting and contraction that affect the integrity of that assembly. He wants to be careful when discussing the criteria not to focus solely on the flame-related characteristics but rather to examine the mechanical and phase changes of the material. A working group member opined that the group should look at the overall assembly and the application- where is it at in the assembly? One foam could present a worse case in one scenario whereas it might not in another scenario. Marcelo stated that he heard Chief Reinertson ask which particular foam is the one that will cause the worst fire hazard when placed in the assembly. Jesse disagreed with Marcelo and opined that if fire resistance is the goal and something is being put into a wall cavity, then he's more concerned about R values because that's what's going to potentially degrade gypsum faster. Although ignition temperature is important, he's worried more about a combination of properties so it's not just heat release or ignition but 5A, expansion and everything that we all know that we can see. So, picking a worse-case scenario would be extremely difficult. A working group member opined that building materials change so today's worse-case scenario is not necessarily going to behave in the same manner that products that are made five or ten years from now are going to behave. A baseline of what's an acceptable performance is needed and then products can be evaluated against that baseline as they come along. Chief Reinertson responded that goes back to the concept of having a prescriptive assembly and then having an allowance for a performance-based design thereafter.
- Lorraine Ross advised that the certification companies sign contracts with the manufacturers that stipulate that it's the manufacturers' responsibility to notify them of any formulation or process changes. Once a change is made, then a judgment is rendered regarding whether or not another full scale evaluation needs to be done or if certain changes can be approved by engineering judgments. It's not just a one-way street; the manufacturers have obligations regarding the composition of their products as do the certification companies who must make unannounced visits to the manufacturing plants to perform quality checks. Barry agreed and advised that his experiences working with the manufacturers have been positive; they have a liability as well and a lot to lose if something happens and their product fails in the field.
- Jesse Beitel asked if there's no specific test called out in the Code against which to evaluate a particular product but he wants to use that product in buildings that the Code regulates, who decides what tests are to be done? Chief Reinertson advised that it depends on what's being done and what part is regulated; it's very specific. A product could be acceptable in one type 5 non-rated building but not acceptable in the same type 5 non-rated building that's located somewhere else which will result in a completely different analysis. The designer, builder or manufacturer who made the proposal to use the product will have to perform some type of testing or an engineering analysis of how the product is going to perform and what it's going to do. There needs to be assurance that the product is reliable and is going to perform; if something goes wrong down the road, then the product designer, builder or manufacturer should assume the liability. Barry explained that there are innovative new products coming out almost continuously which is good and there are cases where Intertek must approach standard writing organizations to close gaps depending upon the situation; ad hoc testing or development of a certification for the product can be done while at the same time moving forward with proposing new standards through the standards organizations.
- Chief Reinertson related a story about a very large building that's being erected and the builder has had to address some interesting annunciator and audibility issues. Current fire alarm and speaker systems that are being installed and are listed for fire alarm purposes cannot achieve

their purpose. So, they're looking at a newer type of speaker technology that's certified and listed for audio applications rather than fire alarm applications. Unfortunately for the purposes here in California there's a statutory provision that requires fire alarms to be listed for a specific purpose- other states don't have such a requirement- and they performed an engineering analysis on an audio speaker that has allowed them to utilize it to meet the fire alarm provision. This was done under the Alternate Materials and Methods provisions in the Code and was purely performance-based. Adria Smith advised that it's up to the Code Authority to determine whether or not such an alternative method is acceptable or if the builder should be pushed out to a third party such as Intertek, UL or some other company to complete testing or an engineering evaluation. Eric Banks advised that it's a project-specific approval. Chief affirmed that's true in most cases. Adria opined that the Alternate Means and Methods cannot be used globally; they're always project-specific. Chief Reinertson advised that SFM has implemented a Statewide application with the Wildland Urban Interface (WUI) provisions and standards. There was no test out there to test attic ventilation for resistance to flame and ember intrusion. Several (four or five) vent manufacturers approached SFM, presented their vents and the tests that they had performed and SFM wrote an alternate acceptance to all of those manufacturers for California's State-owned buildings; it was not done on a case-by-case basis for individual buildings but rather for all State-owned buildings. Local enforcing agencies can decide to utilize that Alternate Means approval on a case-by-case basis if they choose to do so.

IV. LITERATURE REVIEW

Chief Reinertson advised that there is no new literature to review.

V. WORKING GROUP UPDATES/REVISIONS TO WORKING DRAFT

Chief Reinertson advised that he sent out the Working Draft report a week and a half ago and it went through several revisions between the July 24th meeting and the date when it was last sent out to the working group members. Chief gave kudos to Marcelo Hirschler for revising the report and putting it into a more legible format that includes additional information that has been available to everyone since the day that the working group started writing the report. The green highlighted portions of the document were written by Andrew Henning who compared the July 24th report to what Marcelo submitted so that the revisions could be easily identified. Marcelo's work was put in the format that SFM uses as a template for all reports: the Smoke Alarm Report, the High Rise Task Force Report, Residential Fire Sprinklers Report were all written in the same format. Since then, Chief Reinertson received many edifications and revisions to the report which he's going to address in today's meeting.

- A. **Residential One and Two Family Dwellings:** Most of this report has been centered around residential one and two family dwellings which is the target of these assemblies.
- B. **Message From the State Fire Marshal:** Chief Hoover will write this section of the report after it's complete.
- C. **Acknowledgements:** This section will be further formatted and revised; these are the active participants who have been part of the working group. If there's inaccurate or incorrect information or people or industries who aren't mentioned in the report but should be, then please advise Chief Reinertson.
- D. **Preface:** Unless a working group member volunteers to write a preface, then Chief Reinertson and Andrew Henning will write the preface and it will be very similar to the preface that he showed

the working group members on the screen but with different context and more related to the intent of the legislation.

- E. Index:** The Index will be revised accordingly.
- F. Executive Summary:** Changes to this section were sent out a week and a half ago and were made based on comments that were emailed to Chief Reinertson and have been included in the format change. Adria Smith inquired why an Executive Summary needs to be included when the Foreword section pretty much says it all. Chief responded that the Executive Summary may not be necessary / may be omitted at a later date.
- G. Foreword:** The working group discussed the use of the term “current building code methodologies” as written in the foreword. Marcelo isn’t sure that the word “methodologies” makes sense; he thinks that the word “requirements” makes more sense. Marcelo also pointed out that the working group is primarily concerned with the Residential Code- not the Building Code, so perhaps the term “current code requirements” would make more sense. Chief Reinertson explained that several months ago, the working group discussed what types of buildings would be constructed using the alternative assemblies and zeroed in on one and two family dwellings. The baseline is going to be what’s found in one and two family dwellings; whether it be an R1 hotel/motel or R2 apartment complexes- different provisions start kicking in for those buildings and the working group chose not to open the door for those. Marjorie Smith opined that chapter 26 distinguishes between Type 5 construction of foam plastic insulation and all of the other construction types. It makes architects’ work very difficult when there’s a substantial difference between the California Building Code (CBC) and the California Residential Code (CRC). The differences are minor but they exist. Chief advised that one and two family dwellings are required to be designed out of the CRC unless it’s a four-story single family dwelling. Marjorie pointed out that they can be designed from the CBC. Chief agreed that’s possible but much more costly. Marjorie has been in a situation where both the CBC and CRC were referenced and when they’re substantially different it’s more difficult. Chief advised that the revisions would apply across the board to one and two family dwellings whether they’re located in the CBC, CFC or amended in the Fire Code. The proposed assemblies are geared for one and two family dwellings. If the working group wants to spend six more months and open up the proposal beyond one and two family dwellings then that could be done. Marjorie responded that it will be very difficult to add to chapter 26 because it’s not naturally divided by occupancy types. Chief advised that once the working group gets through this, it will be just as easy to make modifications specific to one and two family dwellings that are in the CBC or CRC.

Marcelo suggested cutting out the word “building” and changing the word “methodologies” to “requirements” in the term “current building code requirements”; he thinks that there’s no methodology in the Code. Paul Shipp opined that AB127 applies to all structures; he has no objection to the working group focusing its attention on single family dwellings in residential construction but he thinks that it should be explicitly stated. If the working group only mentions residential and makes no other comment then it’s implied that all of AB127’s concerns have been addressed but that’s not the case because at some point, the CBC is going to have to be examined. Chief advised that it is specified at some point later in the document.

Payam Bozorgchami opined that the word “requirements” should be changed to “regulations” because there are no requirements in California Codes- we have regulations in Codes. Chief Reinertson disagreed and opined that, based on past reports that he’s completed, the word “requirements” is acceptable to use in this context.

Chief Reinertson advised that items 1 & 2 in the Foreword are taken almost verbatim from AB127 and don't need to be changed.

Eric Banks questioned the sentence that includes the words "State Fire Marshal Tonya L. Hoover regarding the use of flame retardant chemicals in building insulation": is Tonya really commenting on the use of flame retardants in building insulation or is it the fire performance requirements that she's commenting on? Avery Lindeman opined that the text of the bill called for a review of the flammability standards, including whether some could only be met using flame retardants for certain materials and, if deemed appropriate, propose recommendations for alternative flammability standards for those materials or alternate means of ensuring fire safety for first responders. Since the ASTM E84 disagreements, the working group has focused on language around flame retardants which is why it ended up phrased that way in this paragraph. However, if this is meant to portray the content of the bill only then perhaps it should be reworded. Adria suggested moving the words "from regarding" to the end of the sentence because the sentence that follows it states that these recommendations could include...which is what the working group is getting at and cuts down on the run-on sentence. Avery agreed with Adria.

Marcelo pointed out that the working group wants to ensure that the alternative assemblies are not just as good as the other ones but that they ensure not to compromise the safety of the first responders which is different from maintaining fire safety. He would like to replace the language regarding "maintaining fire safety" to "not compromising or reducing fire safety". Donald Lucas opined that such language sounds like the standards are being changed and the purpose here is to maintain the current standards for all aspects of the safety. Marcelo disagreed and thinks that the working group has had this discussion in other meetings and it was agreed to go beyond that. Adria and Lorraine disagreed with Marcelo and advised that they don't see the difference; it's purely semantics and they think that the word "maintain" imparts the same meaning. Marcelo disagreed and reminded the working group members about one of their discussions regarding testing; they discussed if testing should be done up to fifteen minutes because that's what existing assemblies have to meet or should testing be done up to failure to ensure that the first responders' fire safety is not compromised? The working group agreed to test to failure so as not to compromise the first responders' fire safety. Chief Reinertson opined that the word "maintain" as it's used in this sentence means not to maintain the specific code requirements but rather the fire safety of buildings. How the working group gets there is in the details later on in the report; he thinks that "maintain" is acceptable in this sentence.

- H. Background and Motivation:** Chief Reinertson explained that this section was derived entirely from within the document but has been shuffled around a bit. Lorraine opined that the word "background" is sufficient; "motivation" has no place in this document and should be omitted. Also, she doesn't think that the first paragraph regarding furniture is pertinent.

Marcelo advised that a letter from Assembly Member Skinner provided clarification regarding the motivation but was not what the bill says. Justin Malan opined that Assembly Member Skinner is the author of the bill and her intent is supposed to be reflected in the bill. Chief advised that within the context of the California legislature, when the author of a bill writes a letter regarding her/ his intent, it's extremely important, is taken at face value and frequently helps a working group move in one direction or another. SFM is working on several bills right now- a fireworks bill and AB 2188- and seeks clarification from the authors regarding the bills' intents. Chief Reinertson thinks that the letter from Assembly Member Skinner provides accurate clarification regarding her intent behind AB 127.

Mike Fischer opined that there's clearly a disconnect if there's language contained in an original bill that's struck by the legislature and the author retains that language in her statement of intent. It cannot be assumed that the legislature's language contained in a bill has the same intent that the author had when she/he wrote that bill. Chief Reinertson advised that the working group is not assuming anything because the author of the bill wrote a letter of intent. Mike responded that if Assembly Member Skinner included language in her intent letter that the rest of the legislature disagreed with and struck, then the onus is on the working group to not accept that part of her intent letter. The fact that the bill changed cannot be ignored by the working group; regardless of the author's intent, the reality is that she didn't get it passed by the legislature. Chief Reinertson asked the working group to pinpoint where the problem lies in the bulleted items on page 31 of the draft report. Marjorie opined that Assembly Member Skinner's intent wasn't specific to the CRC- the working group focused on the residential environment and thus the CRC. "Code" is broader than "building code" or "residential code". Chief Reinertson advised that he's going to use the technical term "Building Standards Codes" which includes all twelve parts. He would like to keep it broader because it could pose problems if the CRC alone is specified in the report and then the SFM decides to add the modifications for the four story single family dwelling.

LUNCH BREAK 11:35 AM– 1:00 PM

V. WORKING GROUP UPDATES/REVISIONS TO WORKING DRAFT (CONTINUED)

- I. **New Working Group Direction by the State Fire Marshal:** Chief Reinertson asked the working group members for feedback regarding bullet #2 on page 31 of the draft report. Mike Fischer and Lorraine Ross opined that the word "everybody" that's contained in the first sentence is too broad and all-encompassing and should be changed. Donald Lucas advised that Chief Hoover used the word "everybody" when she spoke to the working group during the April 17th meeting and the working group can't just change her words. Mike suggested that Chief Reinertson ask Chief Hoover to confirm whether or not she really wants the sentence to be stated the way that she stated it during the April 17th meeting. Marcelo suggested phrasing the sentence "she believes there's consensus". Chief Reinertson will bring this to Chief Hoover's attention. Marcelo thinks that the working group is not talking about alternatives to E84 and that the sentence should state something to the effect of "recommended alternative constructions without using ASTM E84 testing that would achieve...". Paul Wermer thinks that "alternative standards that do not require E84 as a prerequisite" is a good way to phrase it. Chief Reinertson suggested using the words "construction methods" in the second half of the sentence. Marcelo agreed and elaborated "construction methods that do not require E84 testing and would achieve it". Paul opined that it's not construction methods but rather certifications that were being discussed. The working group members all disagreed. Chief advised that these alternatives that are in the report and the intent that Chief Hoover was discussing is alternative construction methods. It's an alternative to complying with ASTM E84. Paul advised that his point is that the working group has developed a prescriptive set of assemblies. However, presumably in the future, testing that shows that it meets the same performance as an existing assembly might well become a basis for qualification. Chief agreed and advised that covers it. Marcelo opined that "alternative construction methods to testing via ASTM E84" is what should be written. Lorraine suggested copying Chief Hoover's statement verbatim from the April 17th meeting notes. Walter advised that Chief Hoover read from a prepared statement during the meeting and was very careful with her words so the document is out there. Chief Reinertson will review the April 17th meeting notes and make any necessary edifications to the draft report regarding the statement that Chief Hoover made during that meeting.

- J. Sources of Data:** Chief Reinertson asked the working group for feedback regarding the first sentence in the “Sources of Data” section on page 2 of the draft report. Avery stated that she does not know what “potentially unpublished” documents are being referred to in the sentence. Marcelo pointed out that many of the documents that have been included in the report, such as the Appendices, are not published. The working group members agreed that “potentially unpublished” doesn’t add anything and is superfluous because there’s an Appendix that cites the documents that have been considered. Andrew Henning suggested using the words “unpublished works” instead. Walter Reiter opined that nobody has asked the working group members to read potentially unpublished material; materials have been identified, brought to the table, shared and cited. Lorraine stated that she would not comment on the “potentially unpublished” phrase and then made a process check. There were people present at the meeting from the testing labs who were not asked to share their expertise with the working group members for quite some time and Lorraine opined that they should be given the floor. The working group members agreed with Lorraine; wordsmithing during such a large working group meeting is not a productive use of time. Chief Reinertson agreed and stated that he would like to use the last hour of the meeting to discuss the arrangement/format of the document.
- K. Results of New Direction:** This is the section that discusses the assemblies. Donald Lucas suggested changing the word “shall” to “must” in the second sentence of the second paragraph: “the foam plastic insulation to be used for this testing *must* comply with all of the requirements of commercial foam plastic except for the flammability requirements”. Justin Malan asked if there’s a difference between “flammability” and “fire safety”; should the working group create a definition or explanation of those terms? There was extensive discussion about the terms, part of which came from SFM, that was used by the BSC and Bob Raymer and others expressed the importance of using the correct terminology. However, after eight months of meetings with this working group, it’s still unclear whether the group is discussing flammability standards or fire safety standards and if they’re interchangeable. They seem to be slightly different. The bill refers to flammability standards but the group has discussed fire safety standards elsewhere; are they the same thing? Chief advised that they’re not the same thing. Adria Smith advised that fire safety is more all-encompassing than flammability. Fire safety issues are covered by twelve volumes of Title 24. Justin suggested stating the differences between the two terms in the beginning of the report to prevent confusion. Chief advised that in order for SFM to be able to consider something or move something forward, then fire safety has to be considered and so do firefighters on rooftops. Mike Fischer suggested adding a description of the ASTM E84 test standard and its purpose. Adria thinks that there are a whole lot of items contained in the document that should be defined so that the working group can draw a better scope around them; a glossary, for example.
- L. Set of Proposed Assemblies:** Lorraine Ross asked Chief Reinertson if the test methods that have been suggested by the working group members should be discussed with the testing lab representatives who were present at the meeting. Chief advised that he would summarize the assemblies first and then open up the test methods discussion.
- 1. Wall Construction Assembly:** Chief described the wall assembly and discussed firestopping and electrical insulations with regards to rated boxes. There’s a large concern about igniting these unprotected components; having extra protection for those electrical boxes where shorts may occur is of the utmost importance. Chief then described the standard wall assembly for the baseline testing: the typical ½” gyp board on the interior side, 3/8” OSB exterior sheathing or 7/16 structural sheathing, solid fill of a stud wall cavity with FR insulation; the working group still needs to determine what type of insulation should be installed. Donald Lucas commented that the working group has determined what needs to be done in terms of fireblocking if there are penetrations but the number of penetrations that should be in the test assembly has not been

specified. Should the wall assembly be tested with zero, one, two or three penetrations that are fireblocked? Shouldn't that be specified? Avery asked if that's in the test method. Duane Sloan opined that question uncovers a greater issue of if the working group is attempting to replicate an assembly that actually has its listing. There's a whole scheme for how each one of these components plays into a listed design. For example, regarding electrical installations using rated boxes, the same example that was given earlier during the meeting about loudspeakers applies: they are rated boxes but are rated for use in non-rated assemblies. There are many outlet boxes and fittings that get rated whereas there are fewer rated boxes that are rated for use in fire-resistive designs. The designs that they can be installed in are very specific. So, one person's outlet box and fitting may only be acceptable for use in very specific designs by number. Duane is struggling to understand how the working group can make such a great leap of logic by stating that all outlet boxes and fittings will be acceptable in their design. Chief Reinertson advised that the working group needs to be more specific regarding the rated boxes that can be installed. Marjorie Smith advised that there's a reference in the code for the rated boxes that's somewhat generic. Chief Reinertson agreed with Marjorie and advised that typical generic one hour rated box requirements that are not specific to any manufacturer can be utilized with through and membrane penetrations. Jesse Beitel pointed out that the group had decided to call the assemblies "load-bearing" but that's not specified in the report. Lorraine agreed because it's an exterior wall that's going to be tested and it's also the most challenging case or worst case scenario.

Mike Fischer asked what will happen when a door or window is installed in one of these walls; he thinks that topic should not be dismissed lightly and should be considered. Jesse responded that anyone could take a load-bearing one hour rated wall that's listed for one of the designs and add a window without any problems. Marjorie advised that one hour rated walls have penetrations in them and the assembly is listed for those; not a separation, but just rated construction. Duane advised that's a different test. In order to put a penetration or an opening in a resistance-rated wall, UL 9, 10, 10B or 10C is used to evaluate the window or the door. Mike thinks that the working group can extrapolate and allow a vinyl window to be installed with at least one layer of tempered glass to meet Chief Reinertson's window standard and make the assumption that the foam plastic in the wall assembly is going to have to stand up to the same heat requirements. The working group's proposal must be able to be made to the BSC with the understanding that it will not reduce fire safety. If a BSC representative asks if the tests were completed with window penetrations, then what's the answer going to be? Chief Reinertson advised that the working group is trying to create a barrier around non-FR insulation with these assemblies. There's a solid 2 x membrane between the non-FR insulation and the window opening; he struggles to see Mike's point. Adria thinks that as long as the baseline matches the alternative assembly, then what's the difference? The maintenance and installation of the penetrations is going to be the biggest challenge. Adria doesn't know if a window would make any difference but there absolutely has to be penetrations in a wall that contains non-FR foam. The working group could easily spec it out; the Electrical Code indicates where the outlets have to set. Duane advised that there is no evaluation of the wall component in the other test standards (UL 9 or 10B or 10C); only the door or the window is evaluated. If equivalency (FR vs. non-FR) on the fire-rated construction has been established, then it wouldn't make a difference to the other fire performance tests. Lorraine asked if there are designs that have the maximum number of and location of penetrations listed and if yes, then what code category would include them? Duane advised that's the whole scheme for through penetrations. UL has through-penetrating products and through-penetration firestopping and there's a whole scheme for how those are rated that relates back to the designs. Marjorie asked if it's the structure that's protected; in a rated wall next to a property line, the penetrations are protected. If the foam is being protected and the opening is protecting the foam, then why does it matter if there's a

window? Lorraine opined that since this exercise is comparative in nature, will there be electrical box installations in the assembly test and if yes, then how many and where will they be located? Chief Reinertson advised that yes, there will be electrical box installations in the assembly test. Paul Wermer advised that there are code requirements for an electrical outlet to be set every so many feet in a room. Chief advised that the working group could spec out one light switch and one electrical outlet. Lorraine pointed out that the weak point in the wall would not be tested with firestopping; it would be tested without firestopping. Don advised that's the case in a conventional assembly; that's the current standard and the working group is creating something that needs to maintain that fire safety. Chief advised that the standard wall assembly does not have rated boxes; this is for the proposed assembly. Chief advised that he's trying to steer away from writing more one-hour type of language even though it appears that's what the working group has created. What fire-resistance rated boxes should be specced out? Duane thinks that non-metallic outlet boxes should be used. UL has a category called non-metallic outlet boxes and fittings for fire-resistance. Once the box is covered, then it can be used in the design to specify which would be one of the worst-case boxes. Don asked Duane to describe the worst-case cover. Chief advised that there are huge concerns regarding the non-FR exposure; his objective is to prevent exposure to the FR. Duane asked to clarify that if looking at the worst-case test scenario, then a non-metallic box will provide the greatest coverage and ability to use any box because it's been validated in the assembly. If the working group isn't concerned with being able to use non-metallic or metallic, then the metallic box can be written in as a spec; the non-metallic box will then no longer be an option. Chief advised that when considering the issue of arcing inside a box, if there's a room and contents fire then it would have direct access to non-FR foam whereas 5/8" type X would seal it inside a cavity but where there's a penetration there's a 1/8" gap. Howard advised that the code allows a maximum of 1/8" annular space around a box unless listed otherwise. Don asked if that's what would be used for the standard wall assembly- a non-metallic box with a 1/8" annular space around the box. The working group affirmed that's correct.

Chief Reinertson asked which switch boxes and receptacle outlets need to be specced to prevent exposure to the non-FR insulation in electrical insulation. Duane advised that if what's being considered is a prescriptive limitation on what's going to protect the non-FR foams, then the metallic outlet boxes should be used. If the working group is looking to install something that would be the worst case for testing purposes so as to obtain the broadest coverage, then a non-metallic box would be the best choice. The box should be covered for fire resistance in both scenarios and would be able to be used in a fire-resistive assembly. Don Lucas asked if there's any data available on the use of non-metallic boxes in a fireblocked opening. Is that allowed? Duane explained that an outlet box gets its listing by conducting an E119 test on the outlet boxes and fittings that are placed in a fire-resistive wall at the tightest spacing that's recommended by the manufacturer. Andrew Henning opined that the working group should go with the non-metallic boxes and if they quit early on, then that's the point of failure and they can then be changed to the metallic boxes. Eric Banks opined that the boxes could be an item left open for further consideration during the test program. The working group should start with the most basic, cheapest non-metallic box there is and if it works then great and if it doesn't then move up one. Adria advised not to build a structure so fullproof that it's completely cost-prohibitive if the working group doesn't really need to do so. The issue is the hole in the membrane. Chief Reinertson suggested testing with one receptacle outlet and one switch outlet. Plastic is utilized in the standard wall assembly and electrical insulations; every single tract home that Chief knows of uses it except for the dwelling unit garage separating wall. It won't be tested for one hour; the code requires running it for fifteen minutes but it will be run to failure to get all of the results. Duane suggested referencing NFPA 275 instead of E119 which has the connotation that the test will be run until the hourly rating has been achieved. If an hourly rated

test is not being run, then perhaps the working group should use the thermal barrier standard. The working group members disagreed; Marcelo advised that NFPA 275 requires a small assembly which is not being used in these tests; an ASTM E119 type of temperature curve could be used but not the small assembly. Eric advised that one other aspect to consider in regards to the switch and outlet boxes is where they need to be placed in the wall because the test results can be changed by moving them up or down. Mike asked if this means that this assembly will have to be built with the outlet boxes placed in that specific location. A working group member advised that this is for testing comparisons- not building construction. Mike opined that if the baseline is established and outlets add "X" height, then this assembly appears to be of equal fire safety which doesn't mean that the outlets can be moved later on. Chief advised that either the Building Code or the Electrical Code specs the maximum height where standard electrical outlets in a single family dwelling can be placed. There's a given range for where they can be located in single family dwellings; the range is either 12" or 18" off the finished floor for the floor receptacle outlets. Dedicated appliances and kitchen outlets are typically located in the middle of the wall or higher. Jesse opined that it doesn't matter where they're placed when considering that E119 tests are run with negative pressure over the entire height of the wall. He suggested placing the outlets wherever they're usually placed up off of the base and wherever the light switch is going to be located. Chief advised that one thing that's not specced out here but is elsewhere in the code is duct penetrations. The same thing will need to apply, maybe not so much for the testing but for the prescriptive construction- what was specced out for the floor-ceiling assemblies needs to be utilized for duct penetrations whether it be HVAC or other drier vent ducts.

Lorraine asked how many proposed wall assemblies there are now and where's the foam? There's going to be solid-fill that's primarily spray foam; did the working group come to an agreement regarding friction-fitting boards? Chief advised that the topic was discussed but was never agreed upon. Lorraine then asked what should be done about continuous and board stock insulation. The working group has discussed the fact that the proposed wall assembly applies to all non-FR foam including spray polyurethane foam, boardstock, extruded and expanded polystyrene and poly-iso which Lorraine is having a difficult time accepting. Chief Reinertson asked the working group members which foam will present the worst-case scenario. Nobody responded. Lorraine is trying to comprehend the size of the testing program. Chief Reinertson advised that he would like to find out which of today's products has the greatest heat release based on an FR type of material. The working group discussed it and decided that there may be one out there that has the greatest heat release. Lorraine asked the lab representatives if she were to complete one foam test without specifying what type of foam it is, would they give approval to every type of foam on the market? That would not happen. Chief Reinertson advised that the working group is not going to ask the labs to approve anything. Jesse Beitel opined that the working group had agreed to try to complete a proof of concept that says if someone builds a wall with a lot of extra bells and whistles, it's going to perform the same with a non-FR foam as a wall that contains FR foam that's currently used today. The problem occurs when the builder then takes the bells and whistles foam and codifies it; that's a whole different issue than showing that the concept works and this is where Jesse thinks the working group is being hung up. When it's added to the code, it will have to be specified whose foam it is- the fire performance properties of the foam point on the wall will have to be specified so that when an engineering judgment is completed the builder will know what it looks like if a substitute foam is going to be added. Adding a bells and whistles wall to the code is one thing but how are the many options going to be taken care of without being run? How is this whole concept going to be codified? Chief Reinertson agreed with Jesse and advised that's why he keeps asking the working group which foam has the highest heat release rate. Lorraine advised that normally the bells and

whistles wall would be built with non-FR polystyrene compared to the standard FR polystyrene, etc.; that fact would be valid from a test design perspective.

Paul Wermer asked the testing lab representatives if they could give a breakdown of the different categories of foam and their failure mechanisms so that the working group can get an idea of how they might perform in the assemblies. He also opined that when looking at these types of assemblies, spray foam is used primarily in the walls; there's not a lot of press-fit solid foams being utilized. Paul assumes that the same holds true when people are building ceiling or sub-floor insulation if a foam is being used; they're not using a press-fit styrofoam but rather a spray foam. Paul opined that one option is to test the assembly and the foam that's provided by a supplier who's willing to make it and the assembly will be qualified on that foam so that foam will then be useable in the marketplace and other people who want to introduce foams can then test them in a similar assembly and generate their own test data which is how it's done today. The working group would therefore not be adding anything new. Lorraine asked Paul if he has decided to narrow it down further to just spray polyurethane foam. Paul responded that if the working group thinks that more work needs to be done because the market demand for an EPS or XPS in the walls is so high that it's justified, then there's a reason to figure out a way to incorporate it. If it's not that high but the EPS or XPS industries want to play in that game, they know the tests to run and the criteria. Jesse opined that if a spray foam is picked and qualified, then the State of California in their code will recommend one foam over all of the other foams which will give that foam carte blanche for six months to a year. Marjorie advised that's the proof of concept testing process. Jesse advised that one specific foam or product is not specced today. Marjorie advised that since foam is not a commodity material, there is no generic foam. The foam that's going to be used in the test assembly must be specified. Lorraine advised that it's going to be spray polyurethane foam with an LOI of "X" or the flammability characteristic. Justin opined that at the beginning of the discussion, it was assumed and perhaps was an incorrect assumption that the working group is going to be completing these tests on the most widely used foam. Lorraine disagreed that such an assumption was made; the working group discussed residential applications only. Chief advised that the working group had a discussion regarding the worst-case foam but it was never concluded. Justin asked which generic type of foam is being used in this particular application; it can be qualified in the report. As more funding becomes available and the demand for these foams increases, additional tests can be done. All that needs to be done is to establish a benchmark and clarify what criteria has been used to establish that benchmark; not pick winners or losers. The state of California will not be endorsing a foam; all that it's going to do is advise that a particular benchmark is being used and if there's another type of foam that someone wants to use, then a comparable test needs to be run. The state of California or whomever is going to pay for this exercise cannot run scores and scores of different tests; that's assumed and is understood. The working group is going to limit it to a handful or small number of tests. Lorraine opined that this description will go into the CRC and it's going to be specced out as a prescriptive description in the code that will say that the cavity is going to be filled with spray foam; there are certain flammability characteristics. There's currently no place in the CBC's where there are distinctions made between types of foam insulation products. The working group will be giving a particular endorsement to a particular type of foam. Chief Reinertson advised that he would not call it an endorsement. Avery opined that it will be an alternative to what's already in the code; it's not as if people will have to use it. Dona Lucas mentioned that he worked with the Air Resources Board on alternative fuel formulations and had a similar problem in that they set up a certain set of specifications and the fuel had to be either formulated exactly as the specs indicated or if it was changed then it would have to be shown to meet the same emission standards. Chief advised that if it were known which type of foam has "X" burning characteristics that are greater than all of the others, then the task at hand would be much easier for the working group because a

prescriptive standard could be written indicating that foams meeting a certain level, whether they be spray, rigid or whatever, could be used.

Tina Guthrie with the EPA asked if one of the testing labs could test all of the assemblies at once and obtain the data ahead of time independent of a building assembly. The working group members advised that the time and funding necessary to complete such a task is not available. Jesse added that if a manufacturer goes to one of the labs and specifies that one of their foams is the worst-case foam then he would have a problem with that because that manufacturer would be using data that's proprietary. Tina asked if the testing has to be made public or can it be used for internal purposes only. Chief advised that it has to be made public.

Barry opined that the working group is taking the wrong approach. If the foams' effects on the wall are being evaluated, then is it their fire resistance or their contribution to the fire that's being evaluated? The current approach isn't going to measure their contribution to the fire. If the foam contributes or does not contribute to the furnace, then the curve is still going to be run; a room contribution test is more in order here that will determine what kind of fuel the foam is contributing to the fire. The current approach takes the foam's contribution out of the equation. Jesse thinks that both the foam's fire resistance and contribution to the fire need to be evaluated. The tests that the working group is discussing will indicate whether or not the exterior wall will collapse any earlier for the firefighters and first responders. The other type of test that will need to be done is some type of room test to show that at some point into the fire, the foam becomes involved and what will happen with respect to the non-FR and FR foam. Is there a difference in the post-flashover conditions that occur? There is no difference pre-flashover but once flashover is achieved, the differences will show up. There needs to be a test for contribution post-flashover which would show the difference. The issues of flammability and whether or not to change the structural stability of a wall need to be addressed.

Mike Fischer advised that hypothetically if the two tests are run and a performance metric is obtained and then another test is run with the super assembly and a particular spray foam which might be open cell or closed cell or have a certain density or a different density and comparable results are obtained, then what will go into the code? How will the spray foam's performance be measured? When the same manufacturer or another manufacturer produces a new version of the foam for which there is no E84 test requirement because it's been removed from the code, how is the new product compared? How will the test lab say that the test was done with product A which does not have a quantified flamespread because an E84 has not been run and there's no requirement for it and the product could be run to the end of the tunnel and it would never be established. How would the product be qualified? How can the working group extrapolate from the test into codifiable language? Duane agreed and opined that the testing scenario starts with the false premise that all foams in a certain genre are created equal as long as they don't contain FR's. There are different polyurethane spray foams with different additives and different ingredients and are going to perform differently. So, if one is chosen to be tested in the validation wall, it doesn't necessarily generate the data to indicate that all of the foams are going to perform equally.

Walter Reiter asked what's going to happen when HFC 134A is phased out?

Mike Fischer opined that the only logical conclusion regarding how to address this issue is to create a new test standard.

Duane opined that if a super assembly is run and there's no foam involvement, then the leap of logic could be made that all spray polyurethane foams are created equal because the foam did not become engaged.

Chief Reinertson asked Marcelo which document he provided the group that contained a chart that specced out a multitude of different insulation types and different tests completed on different insulations. Marcelo advised that there were two papers on heat release of materials and the effect of FR's and one paper from 1992 that had cone calorimeter tests on 35 different materials including polystyrenes. Chief indicated that the 1992 paper is the one that interests him. Marcelo advised that the paper that he wrote is titled "Heat Release in Fires" and was edited by Babrauskus and Grayson; it has thirty-five materials that were all tested at three different heat flux- 20, 40 & 70- and included no polystyrene foam, included polyurethane, two different flexible foams, Douglas Fir wood and a lot of plastic. Marcelo cautioned that the paper contains cone calorimeter data meaning small specimens (4" x 4"). Lorraine pointed out that the blowing agents and foam formulations are now different. Marcelo advised that his test results demonstrated that the heat release rate for thirty-five different materials that underwent various tests showed a solid crystal non-FR polystyrene as having the thirtieth highest pk RHR and a solid crystal FR polystyrene having the twenty-third highest pk RHR. The only foam that he tested was the polyurethane which showed the twenty-fifth highest pk RHR; he also tested a thermal plastic which had the twenty-seventh highest pk RHR. Avery opined that Marcelo's paper fosters the concept that perhaps small-scale testing could be used to determine which properties are important in terms of speccing foam for larger assemblies. Perhaps small scale testing could be used to compare open-cell vs. closed-cell foam, densities, etc. and the results could be used to demonstrate the worst case of the foams that were tested, or these all have comparable behavior in other tests. Marcelo advised to look at the two papers on HRR that were published during January or February, 2014; the non- FR versions in those papers contains a lot of the information that Avery just described. Avery then opined that perhaps HRR is not the only variable that the working group should consider. Marcelo agreed and advised that the information is available. Jesse disagreed and opined that not all of the information is available; how the foam will perform in a vertical wall assembly is different. For example, if a wall is filled with polyurethane foam, closed-cell and open-cell, one manufacturer vs. another- even though they may have the same R values, the way that they react to the heat is different and affects the way that the gyp board performs. If extruded polystyrene is applied to the exterior side of the sheathing on the proposed wall assembly and there's an electrical box in it, as the heat moves through the electrical box, the foam will melt and come down and ignite the foam in the stud cavity earlier than if that foam was poly-iso sheets on the outside. Will the fire in the stud cavity hasten the burning of the studs to the point that it fails for load? Jesse does not see an easy way to pick a worst-case foam. Avery asked for an explanation of an earlier statement that was made regarding the fact that NFPA 275 is a small-scale test. Jesse explained that there are two parts to the test: one is a horizontal small-scale (4 x 4) fire resistance test that's done only on the material face (Jesse was interrupted and did not explain what the second part of the test is). Paul Wermer opined that there are a host of things- TMA and DSC- that generate a lot of information. Marcelo advised that Vyto Babrauskas is opposed to building "dollhouses". Paul responded that's not what he was talking about; he appreciates Marcelo's and Vyto's expertise but sometimes there are different ways of approaching this issue. For example, the failure of the gyp board. If the working group starts by describing the failure modes at different components in different segments of the board- what it is that contributes to failure? The group can then start thinking about what kinds of analytical techniques can be looked at on a simple lab-scale process to determine how a material performs relative to the probably failure modes. It doesn't give great predictive ability, but it gives screening ability and tells how to bound the problem. Jesse advised that the viability will still need to be proven and a full-scale test will need to be run. Paul advised

that every one of the manufacturers has data on their full-scale tests; these are commercially available materials therefore obtaining lab-scale samples will not be an insurmountable problem. Jesse responded that the problem is that nobody knows how to put it together; everyone has tried to figure out the best way to do this. All of the labs have concluded that the smaller scale the sample, the better it performs in fire resistance tests. Paul responded that the issues of volume, mass, density, scale and structural integrity are not easy. TMA shows when things char and how the volume changes which tell where to start being concerned.

Paul Shipp opined that this issue involves complex physics and there is no cheap or simple way to get past that fact; it will take a very comprehensive research program to answer the questions that are being asked. Tremendous resources were expended both by industry and government after 9/11; there were criticisms of the E119 test that's been around since 1903 and that can surely be done better. The bottom line is that there are not just structural issues but also the fluid dynamics and combustion kinetics; this involves a lot of very extreme and severe interacting phenomenon. Many people have attempted to simplify this because it costs a lot of money to develop products in this environment but the bottom line is that nobody has come up with a substitute for just doing the repetitions with a lot of testing. AB127 came about for some very important reasons and we need to understand its impact on fire safety but there's not going to be a simple solution; this is nowhere close to what it's going to take to answer the question scientifically.

Paul responded that the working group should qualify a proof of concept material in these test strategies and make it clear that a specific category of material was qualified without identifying the supplier or the materials. Anyone else who wants to enter the market would need to complete the test to show it. The company that has provided the sample, if it passes, will have some sort of head start but they will still have to commit the same expenditure that everyone else does and will be able to respond to the market as appropriate with no preferential treatment. The solid foam manufacturers will not be disadvantaged because everyone will have to undergo the same qualification process and that will be a simple path forward. Lorraine asked if the foam will be open-cell or closed-cell. Paul responded that it doesn't matter; just pick one and qualify a proof of concept that the assembly works and that if other people want to use it then they will need to make the business decision of whether or not the risk is worthwhile. Jesse asked if the assembly doesn't work for another foam, then what? Paul opined that if the assembly doesn't work for another foam, then it doesn't qualify. Justin doesn't think that anyone is trying to say that one set of tests is going to validate or prove it for every particular type of foam in every formulation. The working group has to find a way to numerically describe a foam that's clear enough and accurate enough so that its characteristics are known and whatever is agreed to is based on those characteristics: if it's a closed-cell or a spray or whatever, and it should be described generically without using brand names. Eric Banks opined that the working group is looking for another set of acceptance criteria. Mike Fischer opined that ironically the CA Code today has assemblies that are approved and it allows for substitution of materials and different foams because they're all quantified using surface burning characteristics to establish the baseline. Paul is concerned that CA is marketing products based on surface burning characteristics when there's been some general agreement that products that test with a high flamespread rate are really bad actors and even products that look really good on the flamespread behave poorly in other tests and yet the flamespread is accepted. Mike Fischer opined that the super assembly is really a super thermal barrier. The concept of completing a baseline test on the foam and then protecting it with a thermal barrier is going to be jettisoned by using a better thermal barrier. To say that there's not going to be a baseline material test for some surface burning characteristic as the qualifier is now, full scale testing must be done on every product for current prescriptive requirements in the

code. He doesn't know how SFM is going to move this forward and meet the nine point criteria in the regulations.

VI. SETTING A BASELINE FOR THE PERFORMANCE STANDARD

A. Group Discussion: Chief Reinertson advised that the discussions thus far have led him to conclude that the working group is going to have to move forward on a different track. It's impossible for the working group to identify a single most volatile type of insulation material. Also, advances in technology and industry changes will inevitably result in today's products changing and evolving in a different, better direction therefore making them unavailable as they are today. All of the work that the group has completed on the alternative assemblies up to this point is useable and can be utilized for the "proof of concept" discussion. The working group can now take the numbers from the proof of concept and set a baseline for a performance standard which SFM can write and adopt into the Referenced Standards Code- Title 24, CA Code of Regulations, Part 12, just as was done with Chapter 7A when specific test standards were created. It's not mandatory that insulation manufacturers get listed through SFM but if they want to utilize a product then they would have to complete the E119 test and prove that their material works in "X" wall and submit it to SFM who will then list it.

Mike Fischer asked if, assuming that the working group does develop a new performance standard and it requires that in order to qualify a product then other tests have to be passed; what will happen if a product that contains flame retardants passes those tests? Chief advised that the proposal that will be written into the CA Building Standards Code will be specific to non-FR foam. Mike asked if the proposal will state that specific chemicals cannot be used. Will it state that all flame retardants cannot be used? Marjorie Smith opined that it could be passed stating that all flame retardants cannot be used but it would do no good because there would be more latitude with the flame retardants so why remove the choice? Mike stated that it could be done either way; he's just making the point that the standard could specifically state that additional flame retardants cannot be used in a product. Paul Wermer opined that the intent is not to meet the current E84 flamespread smoke developed indices and that's the only criteria; there will be no requirement to meet them and if a manufacturer chooses not to test for them, then there will be an alternative path to show that the material is acceptable. Donald Lucas opined that this standard will be similar to that contained in TB117 2013 in that it won't state anything specific about flame retardants and the product can be advertised as not containing flame retardants; the test can be met either with or without flame retardants. Chief Reinertson doesn't know why a manufacturer would choose to do that. The proponents who want to design a building without FR chemicals would not be spec'ing out the material.

Justin Malan asked to clarify that the newly suggested approach will include an appendix that offers people in California an alternative way to comply with the current requirements. Will this have to go through the Building Standards Commission (BSC) and SFM will then adopt it as a process to use? Chief advised that it will be used for statewide applicability and SFM would be the listing office; it will not go through the BSC. The regulations that will be developed will go through the BSC. For example, WUI's CH 7A was written to require buildings that are built in the WUI to meet certain ignition-resistance specifications. There are two paths that a designer could take in spec'ing out the different types of components of a building. For example, walls either need to be constructed of non-combustible, heavy timber, log or meet the SFM test standard 12-7A-3 (or whatever the # is) because a performance test was created that resides in Part 12. The regulations of CH 7A specify that compliance can be done prescriptively, so comparatively to this process here, a person could create their wall either by complying with the current Code (E84) or go down this performance route

and comply with the SFM test standard that will be created by this working group and that will reside in Part 12. Those regulations are the only things that go through the BSC. If a manufacturer wants to move a product forward through testing, then all of the different testing labs out there will test it but they will not list it because they're not a listing agency for this particular product. Once the product manufacturer has the product tested through whatever standard is created and the test data is brought to SFM for the listing, the listing fee is paid and the product is listed, then it can be specced out in the plans to be constructed. Walter Reiter asked how anyone will know if a product does or does not have a certain FR chemical in it when a manufacturer could pay to have an SFM stamp claim SFM-compliance. Marjorie Smith added that there should be an MSDS or some sort of material listing available. Paul Wermer advised that it may be a requirement from compliance and there are companies out there who are happy to provide the Health Product Declarations (HPD's) and DPT's in great detail. The SFM stamp won't mean that a product doesn't contain FR chemicals. Marjorie opined that the SFM will not be regulating the chemical content. Justin stated that it's already been recognized that AB127 does not require SFM to regulate the chemical content; there was a discussion about that issue with the DTSC and the legislature. USBGC does not expect SFM to determine whether or not a product contains a FR chemical; they would like to have a pathway for a product to be available in the marketplace and that allows a manufacturer to be able to stipulate whether or not a product contains a FR chemical. It's not SFM's job to determine if a FR chemical should or should not be contained in a product; it's their determination that product A and product B are comparable in terms of fire safety and product B is not allowed on the market. Duane Sloan added that other mechanisms such as "no lead content" and "low VOC's" could then be relied on for determining that whatever is being claimed is true. Howard Hopper advised that type testing alone used to be allowed for WUI standards but now if UL or Intertek tests the product to the CSFM standard, then it will also be listed to that standard in order to obtain the ongoing factory audits. So, SFM will be listing it for use in the state but Intertek will also be listing it and ensuring that the formulations are covered. Chief Reinertson advised that a product will only be listed by SFM for specific flammability requirements but all of the other standards will apply.

Eric Banks asked if SFM's listings contain surveillance or quality assurance. Lorraine Ross asked if it's a one-time test. Howard Hopper responded that SFM will take listing reports from other entities (UL, Intertek, Factory Mutual) and the definition of "listing" in the Code includes that those products will have to be covered under ongoing audit programs. For example, UL recently tested a product for ignition resistance and manufacturers are trying to obtain a WUI listing for it and they're not accepting it because it doesn't have the ongoing factory audits. Chief Reinertson advised that listed products have expiration dates and have to be relisted. Howard Hopper added that the products don't have to be re-tested but SFM has to ensure that they're still listed by the original listing agency. Mike Fischer advised that SFM's fee is very minimal and is just an administrative cost. Lorraine Ross asked if UL and/or Intertek would also keep a listing for the product. Duane Sloane advised that yes- for example, UL keeps a listing for decking to 12-7A-4 and then others look at UL's listing program and UL is paid for the additional listing service.

Lorraine asked what process was used for developing the WUI "wall standards" and how long did it take? Chief Reinertson advised that they were creating brand new tests that were funded through SFM and Berkeley Labs whereas the working group is discussing utilizing existing tests. Steve Coral was one of the Project Managers; they developed several concept tests and brought them forward to the CH 7A Task Force who reviewed and vetted them. Those test results met the intent of what SFM was trying to achieve in regards to ignition resistance and they were moved through the BSC process and were adopted. Other than having U.C. Berkeley developing them, the big difference is that there's already a national standard / test to utilize in testing the wall assembly and the working group can take the data from that and determine the level. Howard Hopper opined that in trying to develop a SFM test standard, there will be four tests for the wall assembly alone (two 2'

x 4" and two 2' x 6" tests) so there will be twenty tests if going through all of the scenarios (the wall cavity, etc.). Marjorie opined that the working group hasn't discussed what the tests might be for any of the horizontals; the group has only discussed walls. Lorraine opined that an E119 floor-ceiling or horizontal configuration could be done and the tests that were discussed would apply. Howard suggested picking an existing assembly if the working group is just going to compare baselines; why build a special assembly? There are already a lot of designs out there that include most of the details; openings and/or boxes, etc. can be added.

Jesse opined that if somebody wants to use non-FR foam in a fire-resistance rated assembly, then they're going to have to complete the test that proves that they can make it one hour or two hours or whatever is necessary but if foam is going to be used in normal construction that's not fire-resistance rated and is more like the common wall, then the baseline winds up being that otherwise they're going to have to start adding and increasing and everything will fail the one hour fire-resistance rated walls. Duane asked Jesse if the group is truly trying to demonstrate comparison and no compromise or reduction in fire safety, then why compare to a super wall assembly? Jesse advised that he's not suggesting that; he's saying just build to the baseline wall which is 1/2" gyp- the standard wall. If a stud manufacturer wants to produce a non-FR foam, then that manufacturer can run the same wall and if the same results occur then great but if it fails then that manufacturer will have to try to figure out something different and it will be up to the manufacturer to devise a "super wall". Lorraine advised that what Jesse is describing is specific to a manufacturer whereas what the working group is trying to do is get the super wall that would not require each manufacturer to qualify and just do it on the basis of physical properties alone. Marjorie advised that the discussion began with a super wall with non-FR insulation being anecdotally comparable in performance to the bare minimum wall and from there a standard for testing can be established. Does the working group really think that two assemblies of the same wall, one with FR's and one without FR's, will perform in the same manner? It doesn't seem worthwhile to perform those tests. If the working group can achieve a comparable performance and it can be showed that protection in the assembly itself can provide equivalent fire protection, then there's a reason to have a standard and move forward with adding it to the code. The super wall could also be used as an easier-to-pass testing standard. If the foam insulation is tested in exactly this prescriptive format, then maybe less will have to be done in the test. If a different assembly from the super wall is to be tested, then perhaps it's more complex. Duane Sloane opined that the working group keeps landing on the idea of just testing the standardized wall with the non-FR foam is because one hour ago, the conclusion was reached that every manufacturer is going to have to test regardless. If everyone buys into the fact that the foams are not created equal and different foam manufacturers might have different results, then the conclusion is that every foam manufacturer will have to test. Chief Reinertson agreed. If the idea is that every manufacturer has to test in order to be included, then why not just have them qualify on the basis of a standardized wall? Marjorie asked how the working group is going to determine that qualifying threshold. Duane advised that the comparison data will be used; the standard wall should be run to failure and then that establishes the baseline. Marjorie asked if the standard wall will have to be run with every single type of foam.

Donald Lucas asked if different FR-treated foams are tested and there are different results, then does that mean that the foams that aren't performing up to the best standard are going to be banned? Nobody wants to identify the worst foams but if the best foams are identified, then will that mean that the other ones that do not provide equivalent fire safety should be banned? A problem is that the working group is changing the goal line because the current fire standard says that a fifteen minute test must be met; doing the research is interesting, but the safety criteria is being changed. Chief Reinertson advised that the current fifteen minute criteria is intended only to get people out of a building; it's not intended to apply to firefighters up on roofs. Donald asked what the current criteria is for firefighters on roofs. Chief advised that Type V construction is the standard for firefighters on

roofs. It's what they're used to and what's common in the built environment today. Donald stated that we don't know what the number is. Chief advised that running to failure will generate a maximum number. Donald asked if the test will be done again with different materials as foam and then will only the one manufacturer who provides the most safety be allowed to be used? Chief advised that running the baseline would be FR material to failure and at some point- let's say it's thirty-five minutes before the wall fails- there's going to be a maximum temperature curve / heat release and that will be applied to the non-FR test. Donald asked if the same criteria will then be applied to FR-treated foam. Chief responded no because the current codes already address that issue. Donald disagreed and stated that Chief just said that they don't address the issue because it's unknown how long it goes. Donald thinks that if the working group wants to change the standard for structural integrity and add a test that requires structural stability for thirty minutes or whatever timeframe is agreed upon then that would be acceptable but he doesn't like the idea of using this to say that it's an equivalent standard because a new standard is really being created which isn't the purpose of AB127. AB127 does not direct the working group to create a new standard for structural stability but rather an equivalent standard. Donald thinks that a new standard for structural integrity should be established but not as a part of AB127. Jesse opined that a pertinent question is if the foam causes the existing structure to fail earlier which would affect structural stability. Donald responded that it may or may not but there has to be a method for determining that. Jesse advised that how this has been handled in the real world in the past is that when there was a code requirement and there was a variation to that requirement that was somehow be codified through ICCES or whomever, manufacturers ran the desired change to that code-approved assembly to see if the same timing could be achieved in one way or another (i.e. time to flashover, time to structural failure or whatever it was that was being looked for and the parameters that were being measured). If the variations were deemed code-compliant, then the product was acceptable. Jesse advised that certain constructions are deemed to comply and no longer have to be proven; it must be shown that whatever is going to be done will not change what's already been deemed compliant. Howard Hopper advised that UL conducts a lot of firefighter safety research and legacy construction is what the firefighters have typically encountered; the typical wood ceiling rafters, etc. Firefighters know from their experience with legacy construction and it's in their SOP's that if they're on a roof, are deployed during a fire and they may be cutting their vent openings, when things start happening and the roof starts sagging and they've been up there for a certain length of time while the fire has been going, they know when they need to get down from the roof. There's no test that indicates how long rafters have to remain intact. When the dynamics are changed like when floors went from solid 2 x 10 construction to engineered lumber which is basically OSB, they went from surviving a test for eighteen-twenty minutes to six minutes. The firefighter safety issue is difficult to quantify. UL's testing showed that when floors start sagging, then it's time for the firefighters to get off of the roof and out of the building because sagging is just the beginning of total roof collapse. So, the changeover to engineered trusses led to code changes to protect the firefighters.

Donald asked if it's so important to have data regarding going to failure, then why isn't there any data out there now? If it's so crucial to have the data, then why isn't the working group collecting the data right now irrespective of AB127? Chief Reinertson advised that the working group is creating something new and the data collection has not had to be done in the past. Mike Fischer advised that the reason for this exercise is because there's a fire history in the U.S.- a known and understood phenomenon regarding how fires behave and especially in residential construction. Mike knows firefighters who died in fire events in Syracuse by falling through floors. The law does not say maintain minimum building fire safety; it says maintain overall building fire safety. So, in order to maintain fire safety and to determine that what's proposed will maintain it, it must first be defined. The problem is that the code is not performance-based; it's prescriptive-based. So, SFM must quantify what level of fire safety is contained in those prescriptive requirements and in order to truly evaluate overall building fire safety, the working group must look at a broader spectrum than

just finding one out layer. Bob Raymer agreed and advised that a new dynamic to the performance of fires has been imposed since sprinklers started being installed in 2011 and there's no historical data for that dynamic. Bob asked if the working group could be creating a situation via SFM that could inadvertently increase the framing factor of a wall to maintain equivalent fire safety while at the same time making it more difficult to comply with the energy regulations giving the direction that the CEC is going. Ultimately, where is this going to lead and is the working group going in exactly the different direction that the CEC is pushing for? Chief Reinertson responded that the working group is providing a voluntary method for someone to design a building to- not mandating that buildings be designed in a certain way. If somebody chooses to design to these parameters for "X" wall assemblies and floor-ceiling assemblies, they will still need to comply with the CA Energy Code; designers and energy consultants will have to consider these when building. Bob advised that although the CA Energy Commission allows both prescriptive and performance, most of today's energy compliance in CA is based on performance standards. The structural and framing factors of the wall could induce some people to install more efficient A/C's which will be costly. So, the working group's current direction could result in an unintended consequence for compliance with the energy regulations. The standard will be voluntary with SFM but it will have to be made up for in a mandatory sort of way in the energy regulations and given the fact that the regulations right now heading into 2017 are going to be very stringent, there aren't a lot of alternative options any longer. If the CEC's proposed regulations on walls and attics are not complied with, then other things are going to have to be found to make up for it and there aren't that many affordable alternative options available any longer. Unfortunately, the working group could do a good job of complying with SFM's voluntary standards but inadvertently add a huge cost in order to make up for a deficit created in the energy regulations. Since the CEC regulations are being developed simultaneously as the AB127 Working Group's project, Bob is unable to provide an impact analysis- it will probably be done approximately one year from now. Chief Reinertson advised that hypothetically the spray foam with far less thickness in inches results in a greater R value than the typical bad insulation that's being used now. He doesn't know that if, when it comes to an R value provision whether it be 2 x 4 or 2 x 6 walls or even using staggered 2 x 4 walls to have a larger cavity, the working group will be running afoul of anything that the energy regulations will contain. Bob Raymer advised that it will be a lot easier for the working group to do this work if it were known where the CEC will be in their adoption process next May. There are two proceedings going on simultaneously here with no clear understanding of where this will head which makes this a difficult situation. The working group should have a much clearer idea by this December or next January of the various prescriptive allowances that the CEC will have but that's not going to be helpful during the next three months. Eric Banks added that continuous insulation has still not been addressed. Justin Malan advised that the working group isn't creating a mandatory standard; it may be more difficult down the line for people to meet it but there's nothing here that's mandating people to meet this standard which could be in conflict with or made more difficult because of the CEC's actions. Someone is going to have to make an economic determination if they're going to jump through hoops to provide a product without certain materials in it and if things have to be ratcheted up to meet the energy standard in 2017, then so be it. The advocates of this bill can recognize the economics of it and are not trying to force it ahead of any curve; they just want to make it available.

B. Part 12 Referenced Standards Provision for E119 Test: Chief Reinertson advised that SFM has the ability to write Part 12 of the Referenced Standards Provision for an E119 test based on the data obtained from the baselines and it's a performance measure- not something prescriptive that goes into the code that says if a wall is constructed with some type of non-FR foam then it will be acceptable. A manufacturer has to test their product to meet the standard and whatever product level that's been determined by SFM and then it must be submitted to SFM for listing. Chief Reinertson then asked Howard Hopper (UL) and Barry Badders (Intertek) to discuss the testing process and what it entails.

C. The Testing Process: Chief Reinertson advised that the working group has discussed the E119 as a test to compare the two scenarios. Are there other, better tests out there that should be considered? Pravinray Gandhi asked what would be measured in terms of performance. Eric Banks advised that load and how it affects the structural stability should be measured. Chief asked if there's a way to draw data from the wall assemblies contained in home-involved fires; how much heat release is in the two walls that are being compared? Marcelo Hirschler stated that he understood that two tests were going to be performed- the E119 test and also the reaction-to-fire test that's like an NFPA 286 so that both the reaction to fire issues as well as the fire resistance issues will be examined. Chief agreed. Marcelo advised that the working group doesn't necessarily want to complete the standard test but should look at getting both fire resistance properties and reaction-to-fire properties. Perhaps a modified ASTM E119 should be used because the working group doesn't want to go to an hour and a modified 286. The desired results need to be achieved regarding both fire resistance properties and reaction-to-fire properties- standard tests do not necessarily have to be run. Duane Sloan advised that UL will be looking for structural failure in the modified E119 so that if it burns through or collapses then the time that it happens can be recorded. Then, in the standards, thermal couples are on the unexposed surface with an average of 250 degrees Fahrenheit and any individual thermal coupling will not be any greater than 325 degrees Fahrenheit. At the time that this occurs in the baseline performance test, UL will be looking for that same time or a comparative time in the assembly with non-FR foam. Pravinray Gandhi asked how the walls will be designed. Jesse opined that what's normally done in the room test is to use some backing on the backside of the studs but here the entire wall system and/or floor system will have to be built up more so than in the standard test; 4160 cannot be used nor can 100 or 300. It will have to be brought up to flashover and will then have to sit for a little while. If there's a big enough hood then the heat release rate can be measured which will also help to understand what happens to the assembly. Barry Badders agreed that it won't do any good to run a straight 286 test if the foam is not going to be involved; gyp board may as well be used. The working group members agreed. The foam needs to get involved at some point. Marcelo stated that's why the working group is discussing "time to failure" rather than just fifteen minutes. Barry Badders opined that "failure" needs to be defined and since the wall is being standardized, the load should be stated and not left for the client and test lab to calculate because it will be all over the map. The load and the wall should be established; the number of studs and the spacing. Eric Banks suggested running a modified NFPA 285; the exterior part is unnecessary- the room will burn through and the propagation vertically. Jesse advised that the NFPA 285 test it's not set up to mimic anything in residential construction.

Howard Hopper inquired about crawlspace construction, attic construction and under floor. What tests were going to be applied to that? Jesse advised that the AC377 Appendix X test is used to evaluate foams used in crawlspaces where there's something other than an ignition barrier. If someone were to use an ignition barrier and switch out the foams then that would be the test to use. It's similar to a room corner test and flashover occurs when testing plywood with the standard code ignition barrier at approximately four minutes and eighteen seconds into the test. Intumescent coatings can be used to replace the plywoods and other things can be used; this is how an evaluation is done on something to be used as an ignition barrier. Duane Sloane asked to clarify if that test is done in a crawlspace configuration. Jesse advised that the test used to be done in crawlspace configurations but not any longer because there were too many problems. Now AC 12 or AC377 are used; they have the Appendix X test for crawlspaces and attics. It's used for ignition barrier replacement. Pravinray Gandhi suggested drafting a modified NFPA 286 room test for the working group's next meeting. Chief advised that he and Andrew Henning were working on creating a sub-group to discuss the tests so that this issue can be flushed out by the next meeting.

D. The Sub-Grade Proposal: Marjorie Smith asked to discuss the changes that she made to the sub-grade proposal. The first item in her revised proposal addresses the exterior condition, item two addresses the insulation to the interior of the stem wall and the exposure is also addressed. Marjorie doesn't know if the sub-grade assembly can be done with a radiant slab because of the issue of not having separation. She advised that she just added random numbers to the proposal and that it's not completed/needs work. The way that she detailed it (see the 3rd image in her proposal) is done so that it doesn't crack; there's a 1/2" minimum but it could be 1". Less is better thermally for the insulation and the energy. Chief Reinertson discussed a scenario where the concrete isn't there and there's linoleum, carpet, hardwood flooring or some other material on top; how big of a consideration is the little piece (1 1/2" wide) of exposed foam on the floor in a fire event? What's it going to contribute to a fire? Jesse opined that he wants everyone to be aware that there's been a change and he doesn't have a problem with doing 1/2" or 0" – as long as everyone is aware of the change. Chief Reinertson advised that by the time the building is engulfed in flames, the linoleum or hardwood flooring over the top of the 1 1/2" exposed layer won't matter. So, Marjorie's original drawing showing it up to the top with the wood (or some other material) above it is probably fine. Marjorie added that another issue is that the foam should be protected from the interior by the thermal barrier aside from this exception to the flamespread. Inspectors don't call out on that detail. Lorraine Ross asked if this would be written in as a prescriptive exemption for E84 testing with no test being conducted so the foam could be anything. Lorraine Ross opined that foam that has not been fire tested and that's stacked up on a jobsite is a liability concern for the manufacturers. Chief agreed and advised that he isn't sure how to address that issue yet (but it will need to be addressed). Walter Reiter related a story about how an Australia company conducted an experiment and experienced enough jobsite fires that their OSHA intervened. A product that was called "Waffle Pod" was produced with non-FR foam and it resulted in several fires. Rebar was laid over the top of it and the grinding of the rebar resulted in a lot of jobsite fires. Walter has some news reports indicating that the equivalent of their OSHA issued a bulletin, his company's sister organization in Australia also issued some information and the molders transitioned out of using non-modified resin to manufacture this product. The product went to FR-foam because of the experience with jobsite fires that resulted from improper grinding and open flames. Avery asked when this happened and if they've experienced fewer fires after switching the product to FR-foam. Walter guessed that the dates of the fires were between 2002-2006 after which time it was addressed and is not a problem any longer. He pointed out that they were jobsite fires that are outside of the working group's scope, the research was incomplete and he doesn't have news reports about non-fires. Marjorie clarified that she wanted to know if there were reports of fires that occurred after the buildings were built using the Waffle-Pod product. Walter said that the fires occurred during construction; not after the buildings were built. Mike Fischer reminded the working group that they agreed not to try to figure out all of the logistical issues but the BSC will zero in on them. Chief Reinertson advised that the working group will also have to provide references to the Residential Code since these assemblies will be used primarily in one and two family dwellings.

Duane Sloane discussed the sparking issue with the outlet boxes and the fact that there's no scenario-based testing that simulates fires of the assembly in the cavity and fires that are initiated at the outlet box. Perhaps there's some scenario-based testing that should be done to demonstrate equivalency.

E. Closing Discussion: Chief Reinertson asked if perhaps Don Lucas, Paul Wermer, Justin Malan and one or two industry representatives can create a small work group and work with Andrew Henning either through conference call, Go-To Meeting or physically coming to SFM to meet and flush out a lot of the testing details. Justin Malan asked if SFM is going to consider making any recommendations in a report regarding the development of budget change proposals (BCP's) for next year; if yes, then it will need to be done in October. These tests are going to cost somebody some money; is SFM's budget going to absorb some costs associated with this? Chief Reinertson does not know the answer; perhaps it should be discussed during the next meeting. April 1, 2015 is the

deadline to submit to the BSC. Continuous work on the project can still be completed after April 1st but something needs to be done by then because if the proposal is submitted after the Code Advisory Committee meets then their recommendation will not be obtained which ultimately gives the BSC ammunition to turn down the proposal because they don't fully understand it and the Code Advisory Committee was not involved. Justin asked if the testing representatives could give some indication of ballpark costs. Marcelo asked if it's realistic to plan to be completed by April 1, 2015. Chief would like to remain optimistic about getting something done by then but there are some hurdles to overcome: the E119 test, NFPA 286 (if that's the route that is taken) and obtaining non-FR material. During the last two meetings, the working group agreed that testing is warranted. Chief Reinertson cannot go out to Intertek, UL or any of the other labs yet to ask how much it's going to cost to perform the testing since the report isn't done and he doesn't know what they will be testing. Bob Raymer suggested using ½ hour at the beginning of the next meeting to discuss where the working group is at and plan what needs to get done by April 1st so as to avoid having a stack of tasks that are impossible to complete build up before the deadline. SFM and other agencies are going to have to look at the existing code and the fact that the IBC has changed and that gap will somehow have to be filled which is going to take a huge time commitment by SFM's staff. Bob thinks that it would be beneficial to put together a game plan to accomplish specific tasks like HCD has done with disabled access regulations over the years so that Chief Reinertson won't have to work three-four days non-stop prior to the Code Advisory Committee only to find out that they have a lot of unanticipated questions. Chief liked Bob's idea.

VII. ADJOURNMENT

Homework: Chief advised that he would like to convene two smaller task groups- one to address the assemblies and testing and another to edit/make smaller changes to the working draft document. Chief assigned Avery, Jesse, Marcelo, Paul, UL representatives, Intertek representatives to teleconference about the assemblies and testing. Chief assigned Avery, Eric, Lorraine, Paul to teleconference about editing the working draft document.

The next meeting will be held at SFM Headquarters (1131 S Street, Sacramento, CA 95811) on Thursday, November 20th from 10:00 AM – 4:00 PM.

The meeting was adjourned at 1600 hours.