



**DEPARTMENT OF FORESTRY & FIRE PROTECTION
OFFICE OF THE STATE FIRE MARSHAL
Flammability Standards for Building Insulation Materials
(AB 127) Working Group Meeting Notes
May 29, 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 PRESENT:

Eric Banks, Technical Specialist- BASF Corporation, representing the Spray Foam Coalition of the Center for the Polyurethanes Industry (CPI)
Jesse Beitel, Sr. Scientist / Principal- Hughes Associates, representing the American Chemistry Council (ACC)
Michael D. Fischer, Director of Codes & Regulatory Affairs- Kellen Company, representing the Polyisocyanurate Insulation Manufacturers Association (PIMA)
Steve Fischer, Ph.D. Chemist- Department of Consumer Affairs, Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation (BEARHFTI)
Andrew Henning, Deputy State Fire Marshal- Office of the State Fire Marshal (SFM) Code Development & Analysis Division
Marcelo M. Hirschler, Ph.D., 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
Justin Malan, Principal/Owner- ECO Consult, representing the U.S. Green Building Council of California (USGBC)
Walter Reiter, Deputy Director- Expanded Polystyrene (EPS) Industry Alliance
Lorraine A. Ross, President- Intech Consulting Inc., representing the Extruded Polystyrene Insulation Manufacturers Association (XPSA)
Adria Smith, Deputy Fire Marshal- Fountain Valley Fire Department, representing Cal Chiefs / SoCal Fire Prevention Officers Association
Paul Wermer, Principal- Paul Wermer Sustainability Consulting, representing the U.S. Green Building Council of California (USGBC)
Kevin White, Health and Safety Director- California Professional Firefighters

MEMBERS ON THE TELEPHONE:

George Combs, Senior Principal Scientist, Product Development and Technical Support, Rigid/Specialties and Raw Materials, Polyurethanes, Bayer MaterialScience LLC
Howard Hopper, Regulatory Services Program Manager- Underwriters Laboratories (UL)
Richard Lam, Ph.D., Toxicologist - Office of Environmental Health Hazard Assessment Cal-EPA
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)
Robert Raymer, P.E., Senior Engineer /Technical Director- California Building Industry Association (CBIA)

David Rich, Ph.D., Principal Engineer- Reax Engineering, Inc.
John Woestman, Codes & Standards Director- Extruded Polystyrene Foam Association (XPSA).

GUESTS/SUBSTITUTES PRESENT:

Payam Bozorgchami, Contract Manager- Efficiency, Renewables, and Demand Analysis Division,
California Energy Commission
David Eisenberg, Executive Director- Development Center for Appropriate Technology (DCAT)
Marjorie Smith, Architect- Siegel and Strain Architects
Bennett Yendrey, Fire Suppression Captain- San Jose Fire Department

I. CALL TO ORDER

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

II. REVIEW/APPROVE MARCH 20 AND APRIL 17, 2014 MEETING NOTES

Chief Reinertson explained that he made additional edifications to the March 20, 2014 meeting notes after receiving feedback from the working group members and he posted the final version of those minutes on the website. The working group members had no objections to the latest edited version of the March 20, 2014 meeting notes and Chief Reinertson advised that if he does not receive any additional emails regarding the notes, then he will remove the “draft” status and officially approve them prior to the next meeting.

Chief Reinertson requested feedback regarding the April 17, 2014 meeting notes that were distributed several weeks ago. Kevin White clarified that his title in the minutes should be “Health and Safety Director” rather than CPAT Director. Chief Reinertson advised that he just received two emails from working group members that he has not had a chance to review and which may contain modifications to the April 17, 2014 meeting notes. Marcelo Hirschler stated that the second paragraph on page 3 of the meeting notes that summarized his statements regarding fire performance and ASTM E176 is unclear and he clarified that fire rating has not been used for the E84 for a long time and the correct terminology is “flame spread index”. Also, the sentence in that same paragraph which mentions “fire test performance classification” is incorrect and should state “fire test response characteristic” instead. Every ASTM E5 standard is a fire test response standard. Paul Wermer stated that the reference to Marcelo Hirschler’s comments about the You-Tube video that are contained in the third paragraph, “F. Current Test Methods, Correct Level of Fire Safety” on page 17 of the meeting notes does not point out the fact that the video showed that it was foam and that it was a flame retardant foam and therefore Marcelo Hirschler’s statement that the video is irrelevant to the discussion is incorrect. Marcelo responded that his opinion remains the same in that he thinks that the You-Tube video is irrelevant because it addresses a construction that’s fire-retardant foam without a thermal barrier. Chief Reinertson inquired if the statements contained in the April 17 meeting notes inaccurately reflect Marcelo’s comments. Paul stated that the meeting notes inaccurately reflect his own opinion about what was demonstrated in the You-Tube video. Chief Reinertson advised that Paul’s opinion about the You-Tube video will be contained in the May 29th meeting notes.

III. PRESENTATIONS (OPEN AGENDA ITEM)

There were no presentations given or discussed at this meeting.

IV. LITERATURE REVIEW

Chief Reinertson stated that the literature review is an ongoing discussion and there has been quite a bit of literature provided by the working group members. Andrew Henning has been reviewing the literature on behalf of SFM. Chief Reinertson asked the working group members to let him know if there were any documents sent to him that were not distributed to the other working group members because there may have been issues with his email. Marcelo Hirschler indicated that he sent several documents to Chief Reinertson that were not forwarded to the working group nor were they posted to the website. Chief Reinertson indicated that he would look into whether or not he received the emails that Marcelo referenced and would let Marcelo know if they should be resent.

Lorraine Ross advised that her group, XPSA, sent a letter to Chief Hoover that identifies some of their concerns, one in particular which will have an impact on the literature review: what's the status of the toxicity information about the flame retardants? There is information currently contained in the reference list regarding flame retardants that are not used in any of XPSA's products but the reference list insinuates that they are; XPSA would like those references removed. Chief Reinertson advised that the letter that Lorraine mentioned was distributed to the working group members, and as is the case with all of the other letters that were sent to Chief Hoover, it will be included in the final report to Chief Hoover as an appendix.

Chief Reinertson clarified that the proposed wall assembly that's contained in the working draft document is not meant to replace what exists today but is an alternative; a choice. If that proposed assembly proves to be viable to the working group, is recommended to Chief Hoover and she agrees with it and it's moved into the regulatory process and is added to the code, then it will provide an option for people to construct to. This type of assembly or any other types of assemblies that the working group creates such as for an attic, underfloor or interior walls- whatever those assemblies may be, they will provide choices to homeowners and/or building designers. The intent to provide choices was specified in one of the letters and/or emails that Chief Hoover received from Assemblywoman Skinner's office as well as in discussions with the sponsors of the bill. Chief Reinertson does not want people who are not sitting in on the AB127 Working Group Meetings to take information that's contained in the minutes out of context.

Chief Reinertson asked Lorraine Ross to clarify her question regarding the toxicity information about flame retardants. Lorraine responded that in January, the working group members agreed that they want to include toxicity information on the flame retardants. Risk assessments that were completed by governmental agencies were submitted and it was agreed amongst the working group members that toxicity information does not belong in the report; no information about the toxicity of flame retardants should be included in the report. However, there are references to toxicity contained in some of the reference documents that are currently on the list. There are also other reports that discuss fire and that contain references to flame retardants that are not used in XPSA's products. Lorraine would like to clarify what's appropriate and what is not in this regard. Chief Reinertson responded that similar to the fact that the Building Code contains thousands of references, there could be references made in the report that are not central to the point that's being made. Lorraine responded that she's willing to set this issue aside for the time being and to later look at whether or not the references are appropriate when considering what's contained in the draft document. Chief Reinertson advised that the working group should decide / narrow down exactly what's being considered because there could be completely unrelated material that the working group never even looked at or touched. As these types of issues arise, in order for the working draft to move along and in-between the meetings, Chief Reinertson advised the working group members to draft a paragraph or bullet points regarding the items so that they can be added to the report as part of the Literature Review section.

V. WORKING GROUP UPDATES/REVISIONS TO WORKING DRAFT

Many of the items in this portion are still outstanding. Chief Reinertson advised that he will leave the outstanding items as they are currently written unless anyone has comments about portions of the document that have been drafted or revised since the last meeting. Chief Reinertson would like to continue developing the alternative assembly that the working group started creating during the last meeting. Marcelo Hirschler pointed out that he provided much data showing that there's a significant difference between the Heat Release Rate (HRR) and Time to Ignition (TTI) values of standard commercial insulation products vs. flame retardant-free materials as is discussed on page 10 of the draft document and as the working group discussed to a significant degree during the last meeting. Marcelo questioned why the data that he provided is not contained in this section of the document and he strongly objected to the second sentence on page 10 that states: "However, most of these data appear to be from experiments using high levels of flame retardants..."- he thinks that it's not true that high levels of flame retardants are necessary.

1. Fire Test Results: Paul Wermer requested clarification regarding the test results; he understands that standard commercial materials were not used in the tests but rather various materials that looked at flame retardant mixtures. Paul would like to know if there's any specific data on existing run-of-the-mill insulations such as XPS and EPS that are used daily in foundation insulation and the spray foam insulations that are used in residential construction. Marcelo Hirschler indicated that he can provide such data; there's data available on every polymer in existence. Jesse pointed out that much of the data out there is from manufacturers' samples which do not indicate the specific ingredients contained in the products. Paul summarized that we generally do not know if the guidance for the materials that are available on the market today provides a statistically significant difference under the conditions where the thermal barrier of a room fails and the foam is exposed to flashover conditions. Jesse responded that that a client has obtained reports through ICC Evaluation Report Service that indicate certain foams are identified as not requiring a thermal barrier; that client has run a full scale test. Paul stated that the discussion should be narrowed down a bit; there are a large variety of polymer foams that can be made and that are limited only by the creativity of the polymer scientists. Therefore, the group should focus on the foams of real concern which are those standard foams used in construction on a daily basis; the foams that architects, builders and/or homeowners may want to make decisions about regarding the materials that are being used. Standard commodity foams used in residential construction both within wall insulation and in below-grade insulation applications are what Paul thinks the group should focus on. Those foams that can be used without a thermal barrier are very special and expensive foams that are not the types of foams that the working group should evaluate. Marcelo responded that all foam is required to pass a fire test that proves that flame retardant additives improve performance. So, if someone doesn't have an individual test result on a particular material, then everything is thrown out the window. Every time that flame retardants are added to a system, heat release will be decreased and fire performance will be improved which has been demonstrated repeatedly.

Jesse pointed out that there are foams being sold at Home Depot and Lowe's right now that meet the requirements and do not need a thermal barrier; they're common foams in practice today. Jesse volunteered to assemble a listing of ICC Evaluation Reports for a series of foams that are not exotic foams used for only one type of application. For example, Thermax sheathing is used in housing and buildings right now all over the U.S.; it's a common foam that doesn't need a thermal barrier. There are certain polystyrene foams that are used in basements that don't need a thermal barrier. It's not a blanket statement that all foams have to meet the thermal barrier.

Justin stated that USGBC agrees with Paul and that the builders and architects who brought this issue forward were not focused on super exotic foams. It's important to note that both the sponsors and authors of the bill were looking at those most commonly used foams because that's what affecting the industry. Justin agrees with Paul in that he doesn't want to have to prove that ten thousand assemblies are safe in order to prove that one is safe. Chief Reinertson responded that the hypothetical assembly that the working group created during the last meeting was based on a foam- not a particular or proprietary type of foam, but a foam insulation inside the wall with 5/8" type X barrier on each side with the other bells and whistles. He advised that the working group should limit the review to the insulation materials that are used in the field for one and two family dwelling construction. If someone chooses to use an exotic type of foam, then they will have to comply with E84 and/or submit an alternate means/method of construction request to the local building official.

Walter Reiter asked Jesse if the presence of flame retardants affects the limiting oxygen index (LOI) fire performance test. Jesse responded that yes, it does. Walter explained that ASTM C578 classifies the different foam types that EPS and XPS use: type 1, type 2, type 15, etc. Under those different types, there will be parameters such as flexural strength, compression, density, R value and LOI. Common off-the-shelf types of foams are classified by C578 and they all have an LOI figure. So, if there's a non-FR option created, then the working group will be venturing outside of the current C578 classifications and there will be no "type" as is currently identified by ASTM. Jesse agreed with Paul's statements and added that densities and R values will change and polyurethane foams are classified by the ASTM C1289 standard. All types have a requirement for the very small-scale LOI test that was originally added to C578 to ensure that the foam contained fire retardants.

Chief Reinertson directed the working group to consider how the current discussion would affect the draft assembly that the group created. Walter responded that the group will not be able to identify what the foam is because EPS and XPS come in one of fifteen types, and all types have an LOI requirement. If a vendor would like to sell ASTM Type 2, then it must meet all of ASTM's requirements and ICC Evaluation Services must test it. Jesse pointed out that C578 is referenced in the codes and polystyrene foam must meet C578. Chief Reinertson asked the working group if there's non-fire retardant foam insulation, then what's the issue? Jesse responded that the issue is that it cannot be classified; it must also be identified as not meeting C578. The code stipulates that EPS foam must meet C578 which means that it has a fire retardant in it. If E84 is going to be used and there's no fire retardant in the foam, then the foam must be exempt from meeting the C578 standard.

Lorraine Ross stated that when the working group members discuss a wall, they're not talking about a gable-end wall. Typically if there's a gable-end on stick construction, a "normal" foam is put on the wall from the attic space down and it would be the same foam going up into the attic space which is left exposed. Chief Reinertson advised that's not the case under these conditions. In order to use the non-fire retardant treated foam, it has to be in both sides of the assembly. Lorraine asked if the foam must extend all the way into a gable-end and Chief Reinertson answered in the affirmative. If foam is run up into the attic, then the construction prevails wherever the foam is located; a premise is that the space is enclosed. Lorraine Ross stated that the same foam is used all the way up in current standard construction. Chief Reinertson advised that the working group is creating an option to construct differently; the studs and exterior face of the 5/8" type X will go all the way up to the roof sheeting line while the interior face inside the attic- the exposures- that 5/8" type X will run all the way up.

Marcelo Hirschler advised that the point of the LOI test is to screen materials in the manufacturing facility. The E84 is not used as a screening test. According to the ASTM C578 specifications, every one of each type of foam has to have an LOI of 24 which is much greater than the LOI of 17 that's required for a non-fire retardant foam. Fire performance is significantly improved when fire retardant is added to any type of foam. Chief Reinertson asked Marcelo what the working group would have to do to resolve

the LOI issue; Marcelo responded that since it has to be listed and labeled, the group would have to exclude compliance with any of the standards that are currently used for specifying foams. C578 is used for rigid cellular polystyrene thermal insulation and there's an equivalent one (C1289) for poly-isos. Walter asked if BEARHFTI recognizes C578 with a BR value; Steve Fischer responded that BEARHFTI looks only at the R value and end performance. Steve explained that any vendor who's selling something in CA must give BEARHFTI information to list in BEARHFTI's directory and BEARHFTI compare the claims to their directory; sometimes sellers claim lower in CA than they do outside of CA. A non-C578 type classified foam would not impact BEARHFTI other than in the labeling for assembly use which indicates to BEARHFTI that E84 is a valid test. Walter asked Steve if BEARHFTI has any other claim or labeling requirements that relate to the other parameters of C578. Steve responded that BEARHFTI is considering adding design density. Jesse advised that there will have to be a rating system for the different kinds of foam. For example, a manufacturer could make a foam, put flame retardant in it and not complete an E84 test. Another example is a manufacturer who makes a foam without flame retardant and then must be exempted from C578 or C1289 and the requirement in chapter 26 to run E84. So a totally non-FR foam must not meet C578, E84 or AC12 and a determination must be made regarding whether or not it's going to be listed and if it isn't, then it will have to be exempt. Walter suggested conducting a CA 578 where the LOI cannot exceed 17 which would prove that it's not FR. Jesse stated that exemptions are going to have to be made so that the foams can be identified and people won't research certain sections of the code.

2. The Rulemaking Process: Chief Reinertson provided some insight into the California Building Standards Commission's (BSC) rulemaking process and advised that the BSC does not write or produce the fire safety regulations. SFM is going to have to come up with a complete proposal, whether it be this barrier, some exemptions here and there for other standards that may be necessary or writing a brand new procedure for foam or other types of insulation. This working group and SFM will create a rulemaking package and submit it to the BSC where it will go through a public review process and comment periods and the BSC will take action on whether or not to approve it and add it to the California Building, Residential and Fire Codes (or whatever codes are appropriate). The BSC's role is a limited avenue for further modifications to the proposal. There may be tweaks here and there but when this package leaves this office and goes to the BSC, if there is something that needs to be added to, revised or changed then the package comes back to SFM (not the BSC) to make the revisions and resubmit to the BSC for adoption.

Justin Malan advised that there's a nine-point step process that the BSC must undergo and he doesn't want the options for this group to be too severely constrained by BSC considerations regarding how practical and expensive and difficult it is; they have a process that they must undergo. Chief Reinertson advised that Health and Safety Code 18930 contains the nine-point criteria that Justin mentioned. There are statutes that must be followed in CA and economic impacts must be considered. Although not the overriding factor, economic impacts will have to be addressed by the working group at some point. The government code as well as building standards law requires every rulemaking activity in CA by a State agency that affects fire and panic safety to go through SFM for review. SFM is currently working with CEC on some issues with regards to insulation requirements and foam on the roofs.

3. The Alternative Assembly: Lorraine Ross asked Chief Reinertson to opine regarding SFM's confidence in the fire safety of the hypothetical assembly and how he will be satisfied that it's a viable, fire safe option. Chief Reinertson responded that SFM has not made a determination that the assembly is fire safe. This working group is creating it as an option to be recommended and there's a lot more work to complete. The working group is developing an alternative and if it's agreed that there's no way to determine that it's a viable, safe method without additional testing or research then that could be added to the report. If it turns out that additional time is needed to vet this through the process, then there are

avenues both within the SFM office and at the legislative level to explore that option and potentially gain more time.

Justin Malan stated that there should be conditions within the context of presenting a non-fire retardant option; USGBC is not expecting SFM to sign off onto unconditional options. There may also be another two step process in getting such conditions met or finding the legal authority or the exemptions required. USGBC members do not want to be irresponsible about this work or put anybody under unreasonable pressure; if there are reasonable conditions associated with this work, then USGBC members can work within the parameters of those conditions.

Adria Smith stated that the working group is at the point in the process where they've figured out that there must be an alternative and are designing that alternative (aka "the box"). The group should take a shot in the dark and try to determine what the box may look like. Then, the group must figure out how to test the box to see how it performs and figure out what the code language looks like. All of this information must go into the recommendation report. The question that ultimately arises is "what does the timing look like?" Testing will be necessary. Should the working group wrap up with recommendations stating that they think that this is going to work, they think that this is what the code language looks like, it needs more testing, and move on from there or should the group extend the timeline and include the testing in the report? The group cannot just carte blanche encapsulate the alternative assembly and call it good without knowing how it will perform.

Chief Reinertson stated that the working group now needs to continue to develop "the box" / the alternative wall assembly. What else needs to be done / what other recommendations need to be made for this alternative assembly?

Steve Fischer asked if since certain foams can melt without igniting when exposed to certain heat, should there be some kind of seal included in the assembly? Chief Reinertson responded that the working group does not know how the alternative assembly will perform. What happens to foam that's inside of some kind of encapsulation when it's heated up from the outside? We know how buildings burn today within the walls; firefighters respond to building fires all the time and see what happens. But, what happens when fire retardant treated chemicals are removed; how does that wall assembly perform now? Do we need additional testing to demonstrate or justify that the alternative assembly will work?

Jesse stated that fire retardant isn't a major portion of the foam so it depends on what type of foam is being used; a thermal plastic foam will melt at the same temperature if it's ignited earlier. It may burn hotter or faster. If it melts, then it will come out in the flooring of a larger surface area. The pool will catch on fire and continue to grow; a pool fire is much more robust than a wall fire.

Chief Reinertson stated that typical one or two family dwelling construction today is 1/2" non-rated gyp board regardless of whether it's steel-framed construction, wood-framed construction, 2' x 6' or 2' x 8' walls; 1/2" non-rated gyp board is the norm. When the working group started creating the alternative assembly, they started with what's typical to use for a one-hour fire-rated wall: 5/8" type X gyp board on each side of the wall. How this will affect the performance characteristics of the foam inside the wall is unknown and needs to be addressed.

4. The Foam Requirements: Marcelo Hirschler asked if there are requirements for the foam other than the fact that it has to be non-flame retardant. He's concerned that the group is focusing only on the fact that the foam has to be "non-flame retardant". For example, in the case of polystyrenes, C578 contains many additional requirements besides the LOI. Chief Reinertson responded that C578 is referenced for roof insulation. Marcelo stated that in the Residential Codes, it's referenced for more than that and in the approvals criteria, AC12 requires everything to meet C578 and E84. The group needs to state exactly what

the foam needs to comply with other than just being non-flame retardant. There should be some sort of minimum basic performance requirement. An absence of only one criterion isn't enough to define a foam.

Lorraine Ross asked to clarify if the alternative wall assembly will contain spray foam inside the cavity insulation with rigid foam on the exterior side. Chief Reinertson advised that the discussion has only been about stud cavities thus far; one coat stucco is a completely different discussion that will be covered later. If there are 16" wall cavities, is someone going to put 3.5" blocks of rigid foam in those cavities? Payam Bozorgchami with the CEC advised that he's seen two situations during the past three years in California in which home builders somehow got a special deal on EPS or XPS foam and put it between 2' x 4's. The code requires that insulation must touch all six sides for air sealing; however, foam cannot be cut or a stud cannot be perfectly fitted to all six sides. Marjorie Smith recounted that as an architect, she's designed foundation walls that stop halfway up and contain a rigid foam on the interior of the walls that's furred out on the face of the concrete and run all the way up to the ceiling with studs on top of the foundation wall. The studs have some kind of filling; cellulose is often used. So, there is rigid foam in the interior of the assembly between furrings. Walter Reiter asked if Marjorie's example is like an ICF (Insulated Concrete Form) or a SIP (Structurally Insulated Panel) and she said that it is like an ICF but not a SIP; the discussion is about frame cavities and an SIP is not a frame cavity but rather a panel. Jesse advised that there are two manufacturers who make steel frame walls with foam cast in place in it and they're now pushing into residential building. Chief Reinertson advised that in California, the pre-assembled walls are regulated by the Dept. of Housing & Community Development and are called factory-built housing. There are quite a few condos and apartments being built throughout California utilizing this building method and there are also single family dwellings built this way. There's typically OSB board on both sides with SIP's. The assembly that the working group is discussing could be spray-in foam insulation; if somebody had 3.5" rigid foam board and chose to cut it to fit the wall cavity, it could apply to that.

Mike Fischer asked if the discussion is about a foam that's mandatorily required to not contain flame retardants or a foam that's exempt from the ASTM E84 test. Chief Reinertson advised that the foam under discussion is exempt from having flame retardant chemicals. An exception will have to be added to the section in the code (1408 or CH. 7?) that requires foam insulation to comply with ASTM E84. For example, "Foam insulations installed in wall cavities complying with section 4101 are exempt from the E84 test". Jesse thinks that a section is going to have to be added to CH 26 to address this issue; it will be impossible to go back into the main sections and add exemptions. Mike Fischer advised that there are other venues (such as ICC Evaluation Services) where this kind of alternative approach is considered. Chief Reinertson advised that justification will be necessary to get the recommendation through the BSC but the working group does not have to be concerned about ICC or ASTM; parties outside of the California process are not of concern to the working group. SFM is currently capable of developing a prescriptive type of robust assembly that wouldn't require additional testing because it's known how certain properties and types of materials work; it would be extremely costly, but it could be done. The wall assembly option that the working group has created that contains 5/8" type X gyp board on both sides of the wall is just a starting point to begin with; there might be data out there that reflects that it could work or does not. The working group can come up with something that doesn't require additional testing and move it forward to potentially be added to the codes right away or move forward with something else that's either more or less restrictive and that does require additional testing and will take more time to be added to the codes; or, the working group can do both- those are the options.

Justin Malan asked if this alternative approach, wherever it's placed in the code, will be an alternative to compliance with E84 or will it be an alternative to adding fire retardants to foam? Chief Reinertson responded that the foam manufacturers have added flame retardant chemicals to foam in order to comply with ASTM E84. Marcelo agreed that Chief Reinertson's statement is true for some foams. Chief Reinertson narrowed his statement down and stated that in order for foam manufacturers to pass the ASTM E84 requirements, they are adding flame retardant chemicals to spray or rigid foam insulation for one and

two family dwelling construction. He then asked the working group members if there are spray and/or rigid foam insulations out there that do not utilize flame retardant chemicals. Marcelo responded that there are foams out there that don't use flame retardants that can meet NFPA 286 because they wouldn't be allowed to meet E84; they're typically used for construction such as ship board. Jesse stated that they're either going to have to meet or be better than the E84 requirements to be sold in construction today. Chief Reinertson advised that the code doesn't require that ASTM E84 be met; the manufacturers choose to use it because it's the simplest method for them to use to achieve compliance. Mike Fischer stated that the utilization of the E84 test is a choice that's driven by the market. Chief Reinertson responded that the alternative approach is about both complying with E84 and serving as an alternative to adding fire retardants to foam. Marcelo stated that the working group is focusing on the wrong issue by discussing the ASTM E84; he thinks that the question that needs to be answered is whether or not foam insulation should meet some fire safety requirements beyond the thermal barrier. The ASTM E84 is an artifact that the code just happened to choose back in the 1970's; another test could have been chosen.

Justin stated that the fire performance of the foam does not need to be better; the working group is constructing a code for California that an architect, builder or designer could use to spec a material that's comparable to providing the same fire protection as E84 because that's what's used everywhere else. Justin agreed with Chief Reinertson's articulation that whether or not E84 is spelled out, the working group is creating a code for limited construction that has a fire protective standard that's equivalent to E84. Californians need to be able to point to a code that says "if you do this, then you will be in compliance with CA law" which will send a signal to the marketplace that there are people who are interested in having an alternative that has comparable fire protection. Chief Reinertson reminded the working group members that the only component that's been discussed thus far by the group is walls; no other building components have been discussed yet.

Paul Wermer raised the issue of "fitness for purpose" and the fact that the essence of the discussion regarding assembly tests is to make sure that the insulation material is fit for purpose in the assembly in which it will be used and the assembly must have equivalent safety to what's being used today. Discussing whether or not a material is suitable for use in an above-roof application with flaming brands is very different than discussing whether or not a material is suitable for use within a cavity insulation that's shielded by a thermal barrier.

LUNCH BREAK 11:40 AM– 1:00 PM

Chief Reinertson reconvened the meeting and advised that the topic of discussion would be the possible alternative assembly that contains 5/8" type X gyp board on both sides of the inside of the wall cavity with either 2" x 4", 6" or 8" wood stud construction (2" x 4" and 2" x 6" are predominant right now). The assembly looks very similar to a one-hour fire resistance rated wall construction which the working group is not trying to create. Chief Reinertson asked the working group members how they would like to address the non-FR foam insulation aspect of the proposed assembly. Eric Banks stated that it could potentially disadvantage or hamstring closed-cell spray-applied foams relative to if it's full-fill; it may require additional insulation as required by the Energy Codes. It's going to be limited to full-fill so the effect of the airspace will have to be evaluated during the testing process. Chief Reinertson summarized the assembly as solid fill with stud wall cavity and non-FR foam insulation with a maximum 1" airspace. According to some of the documentation that Vyto Babrauskas provided and that was discussed at the last meeting, when discussing filling the cavity, whether it be solid fill with spray foam or filled with rigid foam, it's recommended to leave a 1" maximum airspace.

5. What Types of Insulation Will be Targeted? Jesse asked if the group is only addressing foam insulation. Chief Reinertson responded that foam has thus far been the target but there are other insulations

out there that could be addressed, too. Should the wall assembly be robust enough to address other insulations? Payam mentioned that there are hybrids such as foam and cellulose and foam and glass which further complicate the issue. Avery stated that all of the literature that's been submitted and that has suggested that flame retardants may not provide a significant fire safety benefit has been limited to foam insulations so there may not be justification to change the requirements for other types of insulation. The premise is that the current testing requirements for foam insulation often do not result in commercially used foam insulation with significantly improved fire performance when used behind a thermal barrier in certain kinds of construction. Jesse responded that the same premise could be used on non-FR cellulosic foam. Chief Reinertson advised that for the purposes of including other insulations, the group will leave this portion of the topic open until it begins to drag down or hamper the discussion. If that should happen, the discussion will then be limited to a specific type of insulation whether it be foam, spray, cellulose, mineral wool, etc. Marcelo Hirschler stated that there have been hundreds of studies conducted that demonstrate the exact same information about the fact that flame retardants improve the fire performance of foam plastic insulation as they also do in cellulose and every polymer. He added that nothing will be equivalent; it will be potentially sufficient but not equivalent.

Paul Wermer stated that he thinks that his group's (USGBC of CA) position is being slightly misrepresented in that they're not proposing banning flame retardants, requiring that they be eliminated or requiring that people use non-FR foams. USGBC wants to ensure that there are codes that do not unnecessarily drive the use of materials, especially when there's no evidence that they add significant value in critical situations.

Lorraine Ross asked Paul if it's the USGBC's position that the working group should discuss foam insulation only. Paul responded that he's comfortable discussing all insulation but his sense is that it's not clear that all insulation would be able to pass the kinds of assembly tests that have been proposed and considered. Paul thinks that fundamentally, if flame retardant isn't needed to pass the assembly tests that demonstrate equivalent safety performance, then all is good but if it turns out that a material cannot meet the fire safety performance that's being defined through an assembly test without flame retardants, then that material should use a flame retardant. Whether or not to use flame retardant insulation then becomes a decision that's made by the architect, the designer, the specifier or the customer- a market-driven decision made by the people who use and apply it and that's predicated on it passing safety standards that the working group and SFM agree provide the necessary level of fire safety to the occupants and firefighters.

Marcelo Hirschler stated that Steve Fischer raised an interesting point that's worth considering: since there's nothing in the law (AB127) that says that only foam plastics are to be considered, then if the working group expands to cellulose, there's a federal law (CPSC) requiring that cellulose insulation meets certain requirements that cannot be met without adding flame retardants.

Tina Guthrie with the EPA advised that DTSC recently posted a new fact sheet regarding spray foam that specifically asks if there are alternatives to isocyanates and it says to include cellulose recycle paper, natural fibers, plastic fibers, phenolic foam rock, etc. So, they're ambiguous about cellulose. Lorraine Ross responded that she, Avery and other working members attended the May 28th meeting at DTSC and there were two different concepts discussed: 1) A substitute for the diisocyanate itself within polyurethane as a raw material. 2) Alternative insulation products to the spray foam insulation. The working group's conversation is different from DTSC's and includes whether or not to substitute or eliminate flame retardant chemicals from insulation; not substituting one type of insulation for another. DTSC has a completely different program and a completely different set of guidelines for the development of their program. Avery agreed with Lorraine's comments. AB127 addresses building insulation and the working group examined the current California Residential and Building Codes, identified all of the building insulation products used, identified the tests that they have to pass in order to meet the code- that's the working group's grid.

6. Implications of Federal, ASTM & BEARHFTI Standards: Chief Reinertson advised that he will have to examine the federal standards that Marcelo mentioned before he can opine about how they will affect the course of action that SFM will or will not be able to take in the State of California. He asked Marcelo to please provide the pertinent information regarding federal standards that require “X” performance for a certain type of building insulation. Marcelo will send Chief Reinertson the CPSC standards (16 CFR 1209 and 16 CFR 1404) and Chief will distribute them to the working group members. Marcelo advised that the federal standards require compliance with ASTM E970 and the smoldering test. Chief Reinertson advised that the CPSC standards apply to all foam and all cellulose. Marcelo indicated that they’re referenced in the Building Code for cellulose.

There were earlier discussions about other ASTM standards that may drive the use of flame retardants; Chief Reinertson inquired if this is an area where the working group should start specifying or if it should be done in another chapter (such as 26). Paul Wermer asked what other standards come into play that should be considered; the working group needs to understand what the list of relevant standards are- not just a list of letters and numbers but a reference to the documents that can be reviewed and understood. Lorraine Ross asked Paul if he was referring to standards or references that include E84 and taking them off of the table; Paul responded that the discussion was about a solid fill of a stud wall cavity with non-FR insulation-full stop. If the working group is going to recommend a non-FR insulation, then other standards referenced in the codes need to be addressed as a separate issue. Chief Reinertson agreed with Paul’s statements. Jesse stated that if an FR foam needs to meet a requirement, then a non-FR foam needs to meet the same requirement in an assembly. The manufacturers will figure out a way to incorporate a non-FR foam into an assembly so that it will pass. They may have to add a layer somewhere / do something else but ultimately the goal is to maintain the same level of fire protection; a roof will have to pass the E108 test. Lorraine added that there are other physical properties that the working group should also consider such as dimensional stability, water permeance, density and flex strength. Lorraine explained that if a manufacturer wants to change any raw material in a product, then the manufacturer must make sure that the change is producing a product that meets all of C578’s requirements which include R value, dimensional stability, density, flex strength, etc. It must be demonstrated to BEARHFTI that the R value will not change or complete a whole new registration and UL must issue a fire label. Polyols have been changed in poly-isos; there’s a lot of new technology and even with polyols, fire testing had to be done- not just because flame retardants were changed but because the formulation as a whole changed. Removing flame retardants is not a simple process; all of the other requirements will have to be met. Chief Reinertson asked if flame retardant chemicals are removed from the foam that’s inside the hypothetical assembly, then will the assembly work? Lorraine responded that she doesn’t know if the assembly will work but the manufacturers will have to go through the process that she just described. The C578 test will have to be named something else because manufacturers will not keep labeling products with C578 if it’s no longer needed. Eric Banks stated that, as Chief Reinertson indicated earlier, there’s no prescriptive code requirement for the material standards outside of the roofing applications. Marcelo pointed out that in the ICCES acceptance criteria, there’s a prescriptive code requirement for the material standards so there’s a disconnect. The ICCES acceptance criteria is more restrictive but it ensures that there’s more uniformity in the products. Lorraine added that it’s understood that the labeling and listing portion of the foam plastic section relies on E84 certification; that’s why it’s included. Marcelo reiterated that he recommends that the working group should go through the properties included in C578. Marjorie Smith advised that she’s unsure if foam insulation needs to have the same qualities when testing for fire safety as it needs to have for installation; many of the properties such as strength or tension might be critical in certain applications and not critical in others. How reasonable is it to produce a foam for this test without flame retardants that have all of the properties in the C578? Marcelo responded that the whole point of the discussion is that a test will not occur; the insulation will not be tested. Marjorie stated that if some of the qualities in the C578 aren’t even relative to fire safety, then there doesn’t seem to be a reason to not the run test. Marcelo asked Marjorie if she was talking about running the pair of NFPA 275 tests with a product that isn’t going to be commercial. He said that fire tests of the assembly have to be done with a product that’s commercial; after an entire assembly has been tested,

the product must be able to be used. Marjorie agreed and said that it will have all of the properties that will make it commercially available; it has to in order to be able to sell it. Paul agreed and asked what the tests are for suitability for purpose; when talking about above-roof insulation, the group is talking about a different assembly, a different set of conditions than when talking about the wall.

Chief Reinertson advised that as this proposal moves forward, the working group will write specifics or exemptions such as: “X insulation has to comply with C1029 except for as modified.” As different standards come about, the working group will plug them in. Lorraine asked Steve if BEARHFTI’s standard for thermal insulation will have to be modified and he indicated that they have put their standard on hold pending the outcome of the working group’s recommendation. BEARHFTI provides certification for CEC’s products.

7. Airspacing & Firestopping Requirements: Chief Reinertson brought the discussion back to the topic of the maximum 1” airspacing and said that he will leave it in the recommendation. The fireblocking that Chief mentioned earlier is a building or residential code requirement. If there were a fire or smoldering inside a staggered stud wall cavity, it would prevent it from going beyond ten feet. Fireblocking is used throughout the code in a lot of different areas. Firestopping is specific to penetration; there’s a drain wasting vent and it’s like a caulk. Marcelo stated that there’s no requirement in the code today that thermal barriers be firestopped. Thermal barriers can have many holes unless they’re part of a rated assembly (which they normally are not). Chief Reinertson discussed the firestopping bulletpoint contained in the working draft document and indicated that it’s meant to address all penetrations- not for holes, drain waste, vents, other plumbing or electrical.

8. Labeling and Identification: Chief Reinertson advised that the working group members will have to write some type of regulation so that building and fire officials, contractors and suppliers will mark the non-FR foams correctly and they won’t be used in commercial structures. For instance, regulations should state that every 10”, there has to be a red dot or some type of label because there’s no way to tell the difference between foams that contain flame retardants vs. those that do not contain them. Marcelo stated that there are two separate issues: one is identification on the piece of foam itself and the other is to create an alternative labeling requirement for the labeling bodies, whether it’s ICCES or another listing organization because right now they all require a fire test. Steve Fischer asked Chief Reinertson to add a parenthetical enforcement question to the working draft document and mentioned that drive-by inspections probably won’t cut it. Chief Reinertson agreed that enforcement is critical and he asked the working group members to consider safety glazing. Safety glazing is significant for a multitude of reasons and it has that little tiny etched portion in the lower left corner of the glass which is the only way to identify that the label is there. When SFM wrote the regulations for 7A, one of the provisions was to require one pane of glass to be tempered to comply with the standards of the fire performances that it wound up having. The glass identification is a huge issue because of the impact that the one little change of using tempered/safety glass vs. non-tempered glass will have in a wildland fire event. There are also purchasing issues; if someone were to install a FR insulation inside a building that’s required to have non-FR insulation, then it would be extremely costly to tear it out, purchase the non-FR insulation and install that in its place. Chief Reinertson mentioned that SFM has the Building Materials Listing (BML) Program through the Fire Engineering Division. SFM employees wrote several testing protocols for different types of applications such as walls, roofs, vents, decks, etc. Manufacturers could voluntarily submit their products with their testing criteria to SFM who would use accredited laboratories to add the products to their list. SFM’s BML service is not a full-blown listing service but it does list certain products. So, UL and/or the others would pick up what SFM had specifically done as far as modifications to some of the other products. The working group can recommend utilizing SFM’s BML service. Smoke alarms are one of the products that have to be listed through SFM’s BML Program before they can be bought, sold or used in the state of California.

9. Electrical Considerations/Conduit, Rated Boxes: Chief Reinertson advised that the working group needs to expand upon this topic and how it should be addressed. His concern is not with materials contained in brand new homes that are being constructed but rather those contained in older buildings that are wearing down. Ten years from now, as building materials age, what happens to the non-FR treated insulation as the electrical and junction boxes, light switches, etc. start failing? Without conducting a litany of tests, and knowing that sparks can cause fires, how should the working group address cabling, conduits and junction boxes? Should one-hour rated boxes be required? The standard box is wide open. Marcelo stated that hazards will be decreased if all electrical wiring is required to be placed inside plastic conduit; the probability of arcing will be significantly decreased. Chief Reinertson advised that all cabling is in Romex / NM Cable. The only place in the cable where junctions or splices can be made is inside the junction or receptacle outlet box; it cannot be done just floating out there in the cabinet. Is the standard box good enough? Marcelo advised that he's less concerned about the box than he is about the wear and tear throughout the Romex/NM Cable; the most wear and tear occurs in the kinking of cables along the way. Marjorie stated that the boxes tie in with the membrane protection; she thinks that rated boxes or at least the boxes that are suggested for membrane in the code should be used. Conduit is less of an issue to Marjorie. Chief indicated that when data about electrical fires is obtained from NFRS or CFRS, he doesn't know that there's going to be a large statistic because of the cable running through the walls but he knows that there is a large statistic for boxes. Marcelo recounted a study conducted by UL and overseen by John Wells with FPRF a few years ago in which they went into houses and looked at aged cable and aged electrical parts and found that worn cables were one of the most significant issues. The study is publicly available if the working group wants to look at it. They found that worn cables were one of the most significant issues. Chief Reinertson asked the working group members if they'd like the electrical considerations to allow for new construction only or also alterations and limitations. Adria stated that she doesn't know how to even get there considering that there's construction out there that they call remodels where they give you a wall and get discounts on costs. Steve stated that some sort of evaluation relative to possible increased propensity to thermal degradation or ignition based on overloading of wires- charring or smoking- would be advisable. Chief advised that he's certain that the working group will be able to find something through NFRS and CFRS. Marcelo downloaded the FPRF study "Residential Electrical System Aging Research Project Final Report" from 2008 and said that he will send it to Chief. Paul Wermer asked if, as long as it's brought up to whatever certified assembly standard is part of the design plan, is there any reason to not let it into the remodel? Steve responded that remodels have to be brought up to current code. Chief Reinertson advised if it's proposed and put in the code, then the onus is on the building designer, contractor, owner or whomever is doing the work and the outcome will be all or none; they won't be able to pick and choose and old wiring may have to be ripped out in remodels (not in additions).

Marcelo asked Chief Reinertson what CAIRS is and he responded that it's a Division within SFM- the California All Incident Reporting System; it's specific to California and when there's a fire incident, the local fire department submits the details of the fire (the origin, etc.) to SFM. Marcelo stated that the problem with such a system is that it's very rare that the reporting fire departments will relate enough significant information about the fires; they're too generic. Chief Reinertson agreed and advised that CAIRS is similar to NFRS and the data is limited; some of the jurisdictions are vigilant in providing information whereas others are not. Bennett Yendrey advised that during his work as a fire captain, there's a narrow window when searching for an electrical fire because all other sources of ignition must be ruled out. Marcelo emailed Chief Reinertson a summary of findings; the effect of natural aging of the electrical system's wiring and equipment is the key issue that the working group should address. Misuse or abuse of the electrical system by the occupants and code non-compliance are issues that the working group cannot control. Chief Reinertson asked if there's anything missing from the alternative assembly and stated that he's uncertain if it's necessary to include conduit because he doesn't hear about a lot of issues with standard Romex construction. He hears about problems and fires that result from what goes on in the box. Bennett agreed and stated that's been his experience that very few failures outside of the connection where people try to tie in. Marcelo stated that generally what happens is that when people try to do something, there's an

immediate fire occurrence as opposed to the situation where there's material that's aging inside a wall and gets worn out which is a long-term issue that people don't know about until there's a fire occurrence. Bennett advised that he's seen very few straight midstream wiring failures in buildings located in his jurisdiction. A working group member asked if there's going to be an issue if there's a spray foam sprayed around wire to create insulation and the circuit is overstressed with heat buildup. Marcelo forwarded a website regarding home wiring safety which may have some clues about what's recommended. Bennett advised that he's never seen foam of any kind stop a fire when he's responded to electrical issues in homes. He's never witnessed a break when there's been some heat release in the wall and charring that was stopped because of the insulation around it.

10. The Alternative Assembly Looks Like an Hourly Rated Wall: Lorraine asked Chief Reinertson how he would let people know that the alternative assembly that looks like an hourly rated wall actually is not an hourly rated wall and has not been tested to E119. Lorraine thinks that designers could be confused at the job site; there are requirements for a rated wall between a garage and an occupied space. Chief advised that since the wall between the garage and the single-family dwelling is required to be insulated and the garage requires one layer of 5/8" type X on the exterior side because it's a required fire wall, it's questionable whether this assembly is good enough or will need more to be done to satisfy the garage/dwelling unit separation. Marjorie advised that the wall would be rated if it's within five feet of the property line. Chief asked if it would need two layers on the exterior side. Lorraine stated that the only way of knowing would be to run an E119. Marjorie asked if many foam insulations are tested as one hour walls; Lorraine said that no- there are very few one hour walls that contain foam. Chief advised that the difference is that the foams that are in one hour walls have to comply with E84 and they have a flame and smoke spread rating whereas the working group's alternative assembly will not have a flame and smoke spread rating. Where there are conditions for one and two family dwellings that do require an actual rated wall assembly, the alternative assembly will have to be different. Chief advised that a one-line sentence stating "For required fire resistance rated wall assemblies, see Chapter 7" could be written at the end of the charging general section before writing the detailed criteria of what comprises the wall assembly in order to clarify that the alternative cannot serve as a substitute for a firewall or fire barrier. Chief advised that the primary place where the assembly will be used in a single family dwelling is the exterior walls. The working group members will need to discuss where they'd like to add the alternative assembly in the CBC and CRC. Marjorie mentioned that non-foam insulation is in chapter 7 (720 for all construction). Chief advised that the insulations will not have to comply with ASTM E84 so an exception may have to be written in chapter 7 that says something along the lines of "Exception: walls utilizing foam do not have to comply with ASTM E84 if constructing this assembly which resides in section_____". Steve pointed out that the exception should include not only foam but any insulation material. Marcelo thinks that it could be added to Section 720 which is for insulating materials. Marjorie advised that there is no reference to 26 in Section 720.

George said that he wanted to clarify that the alternative assembly not only looks like a rated wall located between a garage and an occupied space but it also looks like exterior walls for residential buildings that are close together. Chief advised that if a building owner or designer were constructing a single family dwelling and wanted to use one of the prescriptive wall assemblies contained in chapter 7, one of the wall assemblies is 5/8" type X gyp board on each side of the wall, 2' x 4' stud construction and insulation. However, that insulation must comply with E84 in order to be part of the fire-resistance rated wall assembly whereas the alternative wall assembly would violate that prescriptive standard. So, in order for that building owner or designer to utilize the alternative wall in a true one-hour fire rated wall assembly, the wall would have to be tested. The working group could make the alternative assembly more robust by using two layers of 5/8" type X gyp board on both sides of the wall, even though the rating would be for two-hours; since something different from the normal standard is being done to the insulation itself, it might be best to state that it's only good for one hour.

Marcelo stated that it would fit in well as an exception to exception #2 in 720. “Foam insulation shall comply with chapter 26 except where utilized _____”. Marjorie and Lorraine think that it would be dangerous to bypass chapter 26 because there may be other requirements in that chapter that people should look at when considering foam insulation. Chief advised that the section is specific to all insulation materials. Chief thinks that it should not be added to chapter 7 which includes fire partitions, firewalls or fire barriers because it will cause confusion. Marjorie would like to find exterior protection that isn’t gypsum; to arrive at what’s really needed for exterior protection that’s not gypsum. Exterior exposure is different; what kind of test would work? Chief advised that per chapter 7, 3/4” stucco – not one coat stucco- is equivalent to 5/8” type X gyp board. Would it be advisable to use something like that for the purposes of this wall assembly? Marjorie thinks that it would add options but is the same thermal barrier standard or membrane for a rated wall standard the best standard?

Chief responded that chapter 7A is specific to ignition-resistance; it’s not a rated wall; all that it does is prevent ignition of the home but once it gets ignited, it’s gone. Marjorie pointed out that the exposure issues on the exterior wall are different from those on the interior; perhaps part of the process should be developing the exterior standard. Chief struggles with the fact that a non-treated foam will light up like a roman candle. The exterior exposure may be different from the interior exposure and this is not a conflagration issue, a house-to-house issue or a WUI issue- it’s an issue of creating a protection for the cavity to prevent it from igniting so that if there is a fire from the exterior, it will be an equal to or less than hazard to the firefighters who will arrive on scene. Marjorie wonders if there’s something in-between 5/8” type X and the nothing that’s in the code right now. Chief advised that T111 doesn’t have the same characteristics as 5/8” type X; if he were to go back and look at what’s in the chapter 7 tables for exterior wall construction that give the performances of 5/8” type X, plywood is one of those items. Lorraine asked Chief Reinertson if the exterior layer of type X serves as the structural component of the wall; is there gypsum sheathing and another layer? Payam advised that the gypsum would have to be high density to serve as a structural component. Chief advised that the interior side is gypsum 5/8” type X wall board; he and Marjorie drew an example of the wall to demonstrate what he had described. If structural plywood were to be used on the outside of the wall instead of 5/8” type X gyp, would 3/8” be good enough or should it be 1/2”, 9/16” or 5/8”? Those are the types of questions that arise when the working group members consider removing the 5/8” type X.

11. One Coat Stucco’s Potential: Considering the use of one coat stucco over 1” – 2” of non-rated foam is alarming to Chief Reinertson. Payam reminded the group that CA is supposed to arrive at zero net energy by 2020 which is two code cycles away. The intent of AB 127 is to eliminate the use of and provide options for utilizing insulation without flame retardant chemicals. Chief Reinertson does not know how to address using one-coat stucco on the exterior. Walter asked if the polymeric FR that even Arlene Bloom has said favorable things about could be used in the alternative assembly. Chief said that if it can be used today for one-coat stucco applications either with or without FR chemicals on the exterior then it can be used. Walter advised that it’s been approved by the EPA’s Design for the Environment (DfE) program and it’s used today. Chief asked for input from supporters of AB127 regarding the fire safety impact of using polymeric FR. Avery responded that this case does not involve wall cavity insulation protected by a thermal barrier. The only applications that she’s interested in considering are foam insulations that are protected by code compliant thermal barriers including equivalents like inches of concrete under slab; large scale applications of foam insulation that can be used safely without FR chemicals. Paul agreed with Avery in that the working group is not trying to mandate non-FR containing products but rather find a fire safety compliant option that can be used where FR is not required. The one-coat stucco solution may mandate the use of a FR board and there may be a variant on that consisting of one-coat stucco without foam at all or non-FR foam with something other than the traditional one-coat stucco. Marjorie thinks that another option when considering the “almost mandate” to have exterior insulation in the thermal bridging is to have foam on the exterior of the structural sheathing and wood siding over it or some other type of siding that isn’t thermal barrier. Chief advised that 80-90% of the construction that’s occurring today uses one-coat stucco. George

Coombs pointed out that a non-rated external wall with FR-free foam behind regular drywall has no flammability requirement for the assembly but to demonstrate that the fire protection level has not been affected, the wall would have to be subjected to some type of test to indicate that it performs in an equivalent manner even if there's no standard to what the current one has to perform.

Chief responded that the working group has not answered the question regarding whether or not the assembly provides equivalent to a typical wall constructed with thermal barrier FR foam for occupant & firefighter safety and he thinks that there are two ways to address the issue: 1) Use the knowledge base of the working group members to create an assembly that everyone agrees will work just fine with no testing required. 2) Run testing. The quasi-assembly is just a starting point. If the working group wants to do something right away without any type of testing, then there needs to be some type of data that reflects that it will work. It would cost more to construct but it would be a choice by the building owner/designer/construction manager to choose to use it.

12. The Firefighter Safety Aspect: Bennett advised that in terms of health hazards to firefighters, he's less concerned about flame progression and time to collapse in buildings that contain non-FR insulation than he is with chronic exposure to FR foams over an approximately thirty year career period. Firefighters can search the building quickly, retrieve people and get out before the building collapses but they cannot hide from the toxic gases that are emitted from the FR chemicals. Marcelo asked how the non-FR foam affects the fire in the compartment compared to how the FR foam affects the fire in the compartment. The vast majority of the fires will start in the compartment and then eventually move into the cavity and there will be a difference of performance depending on if the foam is thermal plastic which melts quickly and results in the possibility of a large heat source behind the thermal barrier attacking from both sides. If the foam is non-FR, then the heat source behind the thermal barrier will be larger and the possibility of destroying the wall will be greater. The speed of penetration has no effect on the people who are in the first room; it's the people who are in the next room that are of concern: how quickly will the fire go there. The non-FR foam is going to have a greater heat release and there's more heat release now than there was when the ASTM E119 was developed. Chief Reinertson advised that room and contents fires that occur in buildings that have walls that contain FR treated foam are the same as the room and contents fires that occur in buildings that have walls that contain non-FR treated foam. Marcelo is concerned with the occupants of the "next room"- not the room of origin. Is the penetration going to go through the wall into the next room's wall? That's where there's going to be a significant difference of heat release from the non-FR foam compared to the FR foam. Tests will have to be run to determine how much it will penetrate the 5/8" wall. Walter advised that the chronic combustion toxicity issues are dependent upon the specific FR and contents that are used. Marcelo stated that the polynuclear aromatic hydrocarbons (PAH's) from the fire itself completely overwhelm the miniscule amount of chemicals that are emitted by the FR's.

13. How To Move Forward Without Tests? Lorraine suggested asking UL this question; they run E119's endlessly and have such a large knowledge base. Paul stated that he would be very uncomfortable not conducting an assembly test; he doesn't think that there's a realistic construction method that would help him become comfortable with that. Payam pondered which engineer(s) will sign off on the assembly if it's not tested?

14. Which Assembly Test Should Be Used? Jesse suggested running a full-scale, load bearing E119 test on a standard non-rated exterior wall (1/2" gyp, studs, foam, OSB) which will give it a time- maybe 20 minutes because there's some residual fire resistance in the wall. This will be a comparison test. George stated that the E119 test doesn't require smoke monitoring thus will not satisfy the firefighter safety concerns. Lorraine suggested taking this one step at a time; the E119 test won't satisfy the other items' requirements that are contained in the statute thus other tests would have to be used anyway. Bennett advised that if there's going to be burn testing in any way, he thinks that the technology exists to monitor rough wave for effluent gases and other chemicals that are emitted by combustion products. Jesse advised

that there is such technology in small-scale tests but not in the E119. Chief advised that it's unknown without testing if this assembly is going to perform worse than, equal to or better than the assembly that contained in a standard one or two family dwelling today. Marcelo agreed but added that NFPA 275 includes two tests- one of which is the small-scale ASTM E119 fifteen minute. Jesse stated that 275 is a fifteen minute small-scale test for the thermal barrier; the E119 is the actual test that's used to measure the fire resistance (which 275 does not do), it requires a full-scale which helps put seams and joints into the system and it must be loaded. Jesse thinks that the only test that really works is the E119; it gives more useful data that includes the penetration to the other room. Chief Reinertson asked if the working group members think that the test should not be either NFPA 275 or ASTM E119; it should be just ASTM E119. Marcelo thinks that NFPA 275 should not be done but the NFPA 286 room corner test should be done because what happens in the room needs to be determined. Jesse stated that the E119 test needs to be done first because it needs to be known what causes the wall to fall down earlier and/or burn through quicker. Jesse advised to run the test until it fails. Marjorie inquired that if the large-scale test works and shows that the performance of the non-FR foam is equivalent, then how will variations on that assembly that are in the code be factored in? Some of these tests quickly become very proprietary and they shut out a lot of materials in single family construction that aren't entire systems. Walter suggested using an E84 to show equivalency. Jesse stated that the problem is that a manufacturer who wants to make the foam will have to go through UL or Intertech Listing Services to obtain potential options in terms of how to build the wall. Marjorie asked if there would be an opportunity to pass different materials in a scaled-down test, potentially to have those materials listed. Jesse said that scaled down tests are not typically done for E119 because it's known that smaller tests give better performance. So, full scale tests are typically run for final qualification. Information can be gained from small-scale tests and it will be up to the UL's of the world to make an engineering judgment if they want to expand it.

Chief Reinertson asked the working group members to consider the worst-case scenario of non-FR insulation material that could be used in the alternative assembly. Avery suggested obtaining information from parts of Europe that don't use FR chemicals. Lorraine pointed out that European formulations are different. Avery responded that hypothetically, if companies in the U.S. start producing non-FR foam due to market demand, they would presumably have to reformulate their current foams by removing the FR's to retain the other properties that they need and presumably they might end up being similar to what's used in Europe. Chief Reinertson advised that if there are no manufacturers in the U.S. that produce a non-FR foam, then he doesn't know how the tests will be conducted. He doesn't know that European foams comply with the other test protocols per ASTM C578. Paul thinks that can certainly be researched; he would be surprised if a building material for building insulation in a polyurethane spray foam were a completely different being given the wide range of products that are offered for sale. Marjorie asked if there are companies such as AASF that market in Europe as well as in the U.S.? Lorraine advised that Dow Chemical has extruded polystyrene plants in Europe, China, Japan, Canada, and the U.S; their blowing agents and FR's are different because they have different compliance standards. Chief Reinertson is concerned that products shipped here from Europe for testing purposes may not comply with the other eight or nine provisions of C578. Paul thinks that a key issue is establishing proof of concept that foams without FR perform in terms of fire safety in a substantially equivalent way that's sufficient to convince the appropriate authorities of its effectiveness.

Chief Reinertson asked if, for the hypothetical scenario of the working group to move forward with testing, will it be possible to obtain non-FR insulation materials to run a battery of tests that still comply with other U.S. and CA standards? Do the non-FR foams in Europe comply with C578 except for the FR aspect? Paul said that he would be happy to do some homework about this issue. Lorraine advised that spray foam is going to have to be used for the alternative assembly. There are many system houses for spray foam, but the working group is not going to get spray foam from Europe. The EPA won't allow non-FR foam to be shipped into the U.S. and it would take time to modify any existing formulation; it's impossible to just remove the FR chemicals- other modifications are going to have to be made to the formulation in order to

make it work without the FR. Eric Banks stated that he was in a development role and learned that there were other technical reasons to use some of the FR's that make products commercially viable. Other tweaks may also have to be made in order for the physical properties to comply with the other performance aspects. A working group member asked if there are some foams that are already exempted in the code. Marjorie said that there are exemptions; roofing is exempt but it has to pass other tests. Lorraine said that the smoke development part is exempt. Marcelo advised that there are exceptions in CBC 2603.3 to the smoke for interior trim. Lorraine said that the E84 must still be run. George advised that the other roofing test that requires FR chemicals must be passed. Marjorie asked if there's foam insulation in Europe that has FR and non-FR equivalents which would be more comparable. Marcelo responded that there's Class E (FR) and Class F (non-FR) foams in Europe. Chief indicated that he would be concerned that European foams might not comply with all of the other U.S. standards that are not fire related; tests would have to be just to qualify the products.

15. What Other Possibilities Exist in Lieu of 5/8" Type X on the Exterior Face? 3/8", plywood and OSB are commonly used now with FR-treated wall insulation. Is that good enough or are there other options? Marjorie suggested using the generic in Chapter 7A that has 3/4" side over 1/2" structural plywood with a limit on the joints. Chief explained that there were two means of compliance created in chapter 7A: 1) Get products tested; a specific test standard was developed for ignition-resistant materials- 12-7A-5. 2) Prescriptive methods. Even though there was performance criteria, the builders wanted a choice of either testing materials or just doing it by picking up prescriptive provisions from Chapter 7A that came from testing that was done at U.C. Berkeley labs and anecdotal data regarding how buildings perform in wildland fires. When considering the exterior face of the assembly, how buildings perform, firefighter safety and the fact that we're completely removing a property from foam insulation that's there for its intended purpose of flame and smoke spread- is there anecdotal data out there and if 3/8" plywood is the norm right now with FR chemicals, should the working group use 3/4" or 5/8" instead? Eric Banks stated that outside of the WUI, Type VB construction is fifteen minutes inside and zero outside; Type 5A is one hour. Chief Reinertson responded that Eric is correct but something is being removed that performs a fire performance characteristic and even though there's a zero rating on the exterior face, what happens to that now? Chief does not know how to address it without either making the exterior siding more robust or performing additional tests. Chief reiterated that he raised the topic of 7A because the Task Force that created it used a performance base and a prescriptive base in completing their work which could be a process that this working group should follow. If the working group is able to conduct testing and compare 1/2" gyp board, non-rated with FR chemicals in the foam to the alternative assembly and the alternative proves to be equivalent, the next consideration would be what other types of materials could be placed on the exterior besides 5/8" type X; that's where UL would come into the picture. Jesse advised that when UL runs fire resistance tests, they select the gyp board; if their customer specifies a specific gyp, that's all that will ever be allowed. If the planning is done correctly with UL, a certain siding will be used over that wall and if that siding passes, then they will issue other sidings.

VII. ADJOURNMENT

Chief Reinertson advised that he will review the information that Marcelo sent to him and insert it into the working document and/or distribute it to the working group members. The working group members should think about under floor assemblies, attic assemblies and roofing assemblies and bring some examples of what could work to the next meeting. Chief asked Paul to write and email him examples of foam insulation that separates the earth from a 4" concrete slab. Lorraine asked if Howard Hopper will give the working group some insights from UL's expert perspective on the kinds of testing that have been discussed. Chief asked what term UL has coined to describe a test that they've conducted on "X" assembly in which someone wants to use a different material than what was specked out and they complete an engineering equivalency. Jesse advised that it's called an engineering judgment and UL will only complete some of them- not all of them. Lorraine stated that there's a reason why the UL Fire-Resistance Directory is as big as it is; they've been doing that test for a long time and have a comfort level with certain materials and enough data to make those judgments. Chief asked the working group members to look at the current draft document sometime over the next few weeks and let him know if it contains any incorrect terminology or if something is missing. Labeling and identification, Chief would like to know the manufacturers' capabilities of identifying their materials differently than FR materials. Jesse advised that labeling has to be completed by a Q.A. agency and they follow their own rules, not the manufacturers'. Marcelo reiterated his earlier statement that labeling is done by the listing agency while identification is done by the manufacturer. There are also some FTC requirements for identification of products. Chief asked the working group members to obtain information from the companies with whom they work if possible. The two standing items on the agenda for the next meeting are the literature review and presentations; otherwise, the group will start writing the recommendations. Chief reminded the working group members that there will be no voting, all sides will be reflected in the report.

The next meeting will be held at SFM Headquarters (1131 S Street, Sacramento, CA 95811) on Thursday, June 26th from 10:00 AM – 4 PM; the last two meetings are currently scheduled for Thursday, July 24th and Thursday, August 28th. Chief Reinertson adjourned the meeting at 1600 hours.