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)
Payam Bozorgchami, Contract Manager- Efficiency, Renewables, and Demand Analysis Division, California Energy Commission
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)
Andrew Henning, Deputy State Fire Marshal- Office of the State Fire Marshal (SFM) Code Development & Analysis Division
Marcelo M. Hirschler, President & Technical Director- GBH International, representing the American Chemistry Council’s North American Flame Retardant Alliance (NAFRA)
Michael D. Fischer, Director of Codes & Regulatory Affairs- Kellen Company, representing the Polyisocyanurate Insulation Manufacturers Association (PIMA)
Donald Lucas, Ph.D., Combustion Scientist- Environmental Energy Technologies Division- Lawrence Berkeley National Laboratory
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
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:

Jesse Beitel, Sr. Scientist / Principal- Hughes Associates, representing the American Chemistry Council (ACC)
George Combs, Senior Principal Scientist, Product Development and Technical Support, Rigid/Specialties and Raw Materials, Polyurethanes, Bayer MaterialScience LLC
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)
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 MAY 29 AND JUNE 26, 2014 MEETING NOTES

Mike Fischer advised that his last name was misspelled (“Fisher”) in the fifth sentence on page nine of the May 29th Meeting Notes and asked that it please be corrected. Chief Reinertson advised that some of the working group members submitted revisions to the May 29th Meeting Notes directly to him which he incorporated and if he does not receive any additional requests for revisions, then he’s going to remove the “draft” status and finalize them.

Chief Reinertson stated that the June 26th Meeting Notes reflect the fact that the meeting was quite productive and he did not make many edifications to them but if any working group members would like revisions made, then please email any edification requests to him. Lorraine Ross asked that her name be removed from the title portion of section III. B- “Presentations”.

III. PRESENTATIONS (OPEN AGENDA ITEM)

Lorraine Ross inquired about what will occur during the rulemaking process after the working group’s recommendations have been submitted to Chief Hoover. Is there a public comment period and will Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation (BEARHFTI) weigh in on it? What’s the process that finally results in a submission to the California Building Commission (CBC)? Chief Reinertson reminded the working group that he outlined the rulemaking process during the May 29th meeting (see #2 titled “The Rulemaking Process” in page six of the Meeting Notes). This working group will create the recommendations that will go to Chief Hoover who will determine whether or not she’s going to move forward with a regulatory change that will be part of the 2016 California Code adoption process. SFM will conduct pre-rulemaking activities, such as general stakeholder meetings, regarding all of the proposed changes and it’s anticipated that the proposed changes will be submitted to the Building Standards Commission (BSC) in March or April, 2015 and then the more formal process will begin. The BSC will hold Code Advisory Committee hearings. During this rulemaking cycle, SFM is also going to be looking at the International Existing Building Code which will be a new task for the State of California that will result in more work for CA State agencies so there will have to be larger stakeholder meetings. Those stakeholder meetings will not occur until November or December, 2015 or perhaps even January, 2016 depending upon where the working group’s recommendations go and what’s coordinated with the laboratories regarding testing and how long it will take to secure the contracts and bids for testing. Steve Fischer advised that most of BEARHFTI’s comments regarding the flammability requirements for building insulation materials issue will be reflected in their involvement in the AB 127 Working Group. BEARHFTI will adjust their Part 12 revisions to the California Referenced Standards Code to coincide with the changes that may result from the AB 127 Working Group’s recommendations. Lorraine asked Steve if that would happen after the BSC makes their decisions; Steve responded that BEARHFTI has started their process but, as was done last June, they will hold one more informal hearing during which anyone can make comments. SFM will comment, the California Energy Commission (CEC) will comment and the Contractors State License Board (CSLB) will comment. Chief Reinertson advised that SFM will be coordinating with BEARHFTI and any necessary Part 12 revisions will be parallel to the AB127 Working Group’s recommendations once they get to the BSC.
Chief Mike Richwine thanked and congratulated the working group members on the progress that’s being made on the AB 127 issues.

Chief Reinertson advised that the BSC just released their timeline in a draft format a couple of weeks ago during a Code Coordinating Council meeting; they will be revising their timelines again for SFM to submit to them in early 2015. Chief Reinertson will disseminate the BSC’s updated timelines to the working group members as soon as he receives them.

IV. LITERATURE REVIEW

Chief Reinertson has not received any new literature from the working group members to post on the website or to be discussed. Marcelo Hirschler advised that he added some references to the working draft document that discussed two studies that were presented at the June, 2014 NFPA meeting in Las Vegas-one by Nathan White titled “Fire Hazards of Exterior Wall Assemblies Containing Combustible Components” and another by Marcelo and Doug Evans titled “Foam Plastics in Building Construction”. Marcelo advised that each study shows that both in the U.S. and internationally, when there have been incidents with foam plastic in facades, there was no compliance with U.S. codes in every case.

V. WORKING GROUP UPDATES/REVISIONS TO WORKING DRAFT

Chief Reinertson advised that he would like to finish the assembly creations during this meeting and then go back to the beginning of the working draft document and review / discuss each of the recently added revisions (which Marcelo marked with his initials).

A. The Alternative Wall Assembly: The working group discussed the wall construction during the last meeting and solidified it with the exception of one item that remains to be discussed: which specific insulation is going to be used and the UL data regarding that insulation. Unfortunately UL is not present in the current meeting thus the working group members will have to follow up with Howard Hopper at a later date.

1. Insulation: Payam advised that in California, there’s a mandatory minimum requirement of at least R13 (which is filling the cavity up with insulation) for 2” x 4” framing. If 2” x 6” or greater framing is used, then R19 is the limit which is 5.5”. Chief Reinertson asked Payam to define his use of the word “limit”. Payam advised that the requirement is that insulation less than R19 cannot be used in the cavity of 2” x 6” framing thus the cavity does not have to be filled. 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. Chief advised that the least amount of insulation per this requirement would be 6 ¾” so there would be more insulation and it would exceed what the CEC requires. Payam wants to ensure that the AB127 Working Group and the CEC work together properly. Chief advised that both requirements will have to be met; if 2” x 4” stud cavities are being utilized but the calcs indicate that they need R19 because of the Energy Code, then they’re going to have to increase the cavity size. Payam said that if closed-cell spray foam is used with 2” x 6” framing then the highest product is R7 per inch which is 3”. Also, closed-cell spray foam has a combustion issue. Chief advised that there would be a greater insulation value because this requirement would have to be met and the combustion issue is an installation issue as the foam is being applied. The foam would have to be installed in layers. SFM and the Spray Foam Alliance conducted a battery of tests on the effects of spray foam insulation on CPVC during the installation process and then produced an Information Bulletin regarding the results of those tests. There is no exothermic issue when the spray foam is installed correctly, whether there’s 30” or 6” of spray foam on top. Chief advised that the IB is posted on SFM’s website and addresses
plastic piping and the installation of spray foam; when it’s installed correctly, there is no issue. Installers have laid spray foam on too thick in a few instances in the past which created an exothermic reaction to the plastic and changed the actual chemical properties of the plastic that resulted in leaking of the plastic a few years later when temperatures increased above a certain level.

B. The Floor-Ceiling Assembly: Lorraine Ross asked if there’s a requirement in California to insulate between floors of residential construction. Chief Reinertson advised that the only place where it’s required by Code is when there’s a conditioned space above a non-conditioned space such as a garage. This type of insulation can also be found over cantilever areas and large balconies. However, someone may choose to insulate their home for soundproofing between the living room on the lower level and a game room above, for example. This type of sound issue doesn’t generally occur in a typical tract home but frequently occurs in custom homes. Lorraine asked if this type of assembly would be tested on both sides in an E119 horizontal configuration. Chief responded that yes, it would and one of the reasons why is because SFM introduced an amendment to CH 7 of the California Code (that’s unrelated to this issue but that’s specific to firewalls, fire barriers and fire partitions) that requires that it be tested on both sides unlike the International Building Code which requires that it be tested on one side only. Chief doesn’t know if it applies to floor-ceiling assemblies or just wall assemblies. Does the working group need to add different types of floor members or, for the purposes of the results that are being sought, would it matter if it were 2” x 10”, open wood frame joist, TGI joist or other options? Jesse Beitel advised that it would matter which has been demonstrated through testing already by groups such as UL. Chief advised that the testing that Jesse referred to was for the typical one or two hour floor-ceiling assemblies but the working group is not trying to achieve a one or two hour rating. Jesse advised that he’s tested with reference to Section 503 that was added to the Code to protect firefighters when entering residences and to provide a modicum of fire resistance to the floor assembly. The tests were not one hour tests- none of the assemblies would have lasted an hour- but testing demonstrated that TJI joists fell out at 8-12 minutes and 2” x 10’s went up to 15 minutes; there was a big difference. Chief Reinertson advised that perhaps the best way to test the working group’s floor-ceiling assembly would be to use solid frame members because the working group is trying to obtain results regarding how FR insulation materials vs. non-FR insulation materials will react in this type of assembly. The 2” x 10”s or the truss joints are not going to be tested; however, testing an assembly that contains a 2” x 10” will result in a longer test period so that the working group can see what happens to the foam over a longer period of time.

Mike Fischer asked if the assembly can be used over a garage space which is “non-habitable interior space” or cantilevers, then would it be possible to use gyp board over an outdoor area? Chief Reinertson advised that yes, gyp board is frequently used over outdoor areas. Gyp board is used with stucco or some other treatment placed underneath it. Mike then asked if finishes will be part of the test permutation. Chief advised that no, finishes will not be part of the test permutation because there could be thousands of different types of finishes. For example, ¾” stucco is not going to help the working group understand how FR foam vs. non-FR foam will react.

Paul Wermer asked Chief Reinertson if any of the reports that Jesse Beitel referenced regarding the impact on floors could be provided to the working group members / are non-confidential. Chief Reinertson asked Jesse if he was referring to specific reports that he has in his possession or if he was referring to general one-hour assemblies. Jesse replied that he was referring to data that was published by UL regarding light-frame construction. Chief Reinertson advised that the UL data that Jesse referenced is available on UL’s website. Jesse advised that he also completed some work and although he did not publish a full-blown report, he did make a PowerPoint presentation at ICC Evaluation Service which he assumes is in the public domain. Jesse examined the issue of time to failure in TJI’s vs. solid lumber joists in a floor-ceiling assembly; the tests that he performed demonstrated that time to failure was much earlier for the TJI’s. Jesse thinks that if the working group runs a test that includes the
2” x 10”s, then the worst-case condition would probably be the TJI’s. The working group will obtain a determination but won’t know what will happen with anything else and shouldn’t try to extrapolate for an assembly. Chief Reinertson advised that the working group needs to determine how the foams perform comparatively to each other. If an open-web or plywood type of I-joist is failing more quickly than a solid-sawn member, then it would probably be more advantageous for the working group to use the solid-sawn lumber.

Payam asked if it matters if the maximum airspace is on the conditioned or unconditioned side. Chief advised that it doesn’t matter because the tests will be run for fire on both sides. Payam asked if rigid insulation is the norm. Chief advised that the working group discussed this issue regarding one-coat stucco during last month’s meeting. The working group will utilize a barrier-type of assembly so that non-FR foam insulation can be used inside a wall cavity. The working group concluded during last month’s discussion regarding foam with a material on top of it that the material that’s most frequently used is one-coat stucco. The working group cannot consider using non-FR foam underneath one-coat stucco because the thin layer, whether it be a vinyl-type of stucco or a cementitious type of stucco, is not enough to provide an ignition barrier.

Paul Wermer asked if the location of the air gap needs to be clarified. For instance, it’s acceptable to have a 1” air gap on one side and a 1” air gap on the other side. Payam advised that the Energy Code stipulates that the 1” air gap should be on the unconditioned side but the working group wants the insulation to be next to the conditioned space with all gaps sealed and weather-stripped. Chief advised that for testing purposes, the test will not reflect whether or not it’s the exterior non-conditioned side; CEC’s regulations will kick in and mandate that if there’s an airspace, it should be located on the outside. Marcelo asked if there’s a regulation regarding where the 1” airspace can be located in this wall construction. Chief Reinertson advised that the regulation is contained in the Energy Code. Eric Banks asked if the 1” airspace is located on the exterior side of the insulation. Payam advised that the CEC prefers that there not be an airspace but if there is an airspace, then it’s required per CEC’s QII (Quality Insulation Installation) mandate to be located on the outside of the insulation because the energy loss goes into the living space. Eric thinks that this is a problem because it will result in every cavity defaulting to a full fill of insulation even if it’s not required in order to meet the R value requirements; or, the exterior sheathing will need to be torn off in order to insulate a building. Payam advised that CEC does not require an airspace. Eric asked if an airspace located between the insulation and the interior finish is prohibited. Payam advised that per CEC, spray foam must fill the cavity of a 2” x 4” (but not for any other size) in every situation in order to achieve an R13. Marcelo asked if the Energy Code requires the airspace to be located on one side for 2” x 6” or other sizes. Payam advised that spray foam is not required to be located on one side because it’s a sealant that seals everything. Chief Reinertson clarified that the CA Energy Code does not require an airspace but if there is an airspace, regardless of the type of insulation that’s being used, it must be located on the non-conditioned side.

Lorraine asked if spacers must be inserted in assemblies where boardstock is being fit between the studs because the exterior sheathing is already up, there’s a 2” x 4” with a cavity and the board cannot be put all the way into the sheathing. Chief clarified that regardless of the insulation type, whether its bat, blown, spray foam or rigid foam, if there’s an airspace then it has to be on the non-conditioned side. There’s no requirement in the Energy Code that mandates an airspace but if the boards that are being cut are 3” thick vs. 3.5” thick, the installer is going to have to ensure that the airspace is on the exterior side. This has nothing to do with the CA Fire Code; it’s in the CA Energy Code. Lorraine asked what the working group will test. Chief advised that the working group hasn’t yet decided whether or not to use an airspace. The working group has specified that if there’s an airspace, then it should be a maximum of 1”. Chief thinks that the assembly should be tested with no airspace in order to obtain the most conservative test results / results that have been obtained under the worst possible conditions. Mike Fischer pointed out that Chief had advised the working group that regardless of the type of insulation that’s used—rigid, bat, spray, cellulose—the airspace should be on the non-conditioned side.
So, the spray foam will have to be applied to the inside of the interior finish. Chief Reinertson advised that he had been referring to any type of foam—not just spray foam—in real world construction, a cavity will be filled solidly. Spray foam insulation always fills the cavity. Eric opined that if there’s a 2” x 6” wall and an R13 or R14 or R15, then closed-cell spray foam will be used and it won’t fill the cavity. Payam advised that spray foam is different in that it’s not air-permeable and is therefore insignificant to the CEC in this context. Mike Fischer advised that bat insulation can be applied from the inside, too, and would have to be stapled. Chief Reinertson asked how an airspace is achieved when spray foam is being used in 2” x 6” single family dwelling construction. Eric advised that the cavity does not have to be fit with spray foam to meet the CEC’s requirements. Chief advised that the exterior sheathing is put on every single family dwelling that’s constructed and the spray foam is sprayed in between the studs from the inside but Payam just told the group that the CEC will not allow an airspace between the gyp board on the interior of the wall and the spray foam. Paul Wermer advised that spray foam doesn’t count; only the other insulations count. Payam advised that QII, which calls for filling the cavity, overrides this scenario and there’s a credit for extra R value. Marjorie advised that it’s not a minimum requirement and since there’s still more than 1”, the airspace would be on the interior side. Paul reiterated that if there’s a gap with spray foam then it would be in the interior space which would be code compliant. Marjorie advised that if a rigid board is fitted between the studs, then the airspace would be on the exterior. Chief Reinertson added a note to the working draft document stating that “CEC Part 6 requires any air gap to be on the non-conditioned side except for spray foam applications”. Chief advised that the tests are to be run with a 1” space. Andrew Henning advised that the report that this is based on stated that gaps > 1” showed propagation while smaller gaps did not show propagation. The size of the gap was the determining factor influencing the propagation of the fire. The flamespread rate and the material used in the test was not a significant factor. Mike asked if the report that Andrew referenced was based on foam insulation that contained FR’s; Andrew responded that no, there were no FR’s. Chief added a note to the working draft document that the tests are to be run with a 1” airspace for all of the insulations that will be tested. Jesse opined that a case could be made either way that one will be worse in a fire resistance test than the other. In reality, the majority of residential installations contain no airspace because 2” x 4”s are being used. Chief advised that more 2” x 6” construction will be utilized in the future due to Energy Code requirements. Jesse opined that it’s been seen in all fire resistance type tests that when something is put up into intimate contact with the gypsum board layer that’s exposed to the fire, that layer tends to dissipate faster. So, the cavity is filled and the gyp sheathing is put up on the interior gyp which falls away and opens up quicker and gets the foam involved faster. If an air gap is put in behind there, it will help dissipate some of that heat for a period of time but is that time significant with a 1” air gap? Jesse doesn’t know if it is. It’s also known that when certain foams begin to see the heat actually expand and grow, the gypsum board is affected in that the heat moves through, it falls apart quicker with foam directly in contact and the foam in contact starts to expand and breaks up the gyp. So, if there’s a 1” air gap, the expansion might not result. The working group should pick just one assembly, try it and determine that for the exact configuration used, there’s either a difference or no difference which can be applied to other materials used in that configuration. Eric summarized that the worst case, all things considered, would be direct contact to the sheathing or the gyp board or whatever material will be contained in the assembly.

Paul Wermer opined that most of the failure mechanisms will be captured but one issue that isn’t captured is the likelihood of flame propagation inside the cavity. Jesse advised that’s not involved in the E119. Chief Reinertson added a note to the working draft document that tests should be run both with and without the 1” airspace. Mike Fischer asked what percentage of construction in California today is done with 2” x 6”. Payam advised that 2” x 6” is used more frequently today to satisfy seismic requirements and because people are building two stories more often. Marjorie advised that her firm does not build anything with 2” x 6” exterior walls but they may be unique. They have built some low-income affordable housing that was 2” x 6” because more insulation can be fit into the walls and they can be built to 24” on center. Payam advised that the cost of going to 24” on center is less than going to
16” on center with 2” x 6” construction and homeowners prefer higher ceilings- 10’ and above- which require a structural engineer’s approval per the seismic code. Chief Reinertson advised that if a trend towards staggered studs develops, then fireblocking will become a more critical issue while at the same time, the solid fill of some of the insulations takes care of that. Payam advised that Meritage Homes is building a lot of costly houses using staggered studs or double wall systems in which the wall separates from the garage and contains the utility lights. Eric spoke about situations that have occurred in which the spec was for 5.5” of fiberglass and the spray foam contractor came in and got the spec changed for 2” of spray foam or 3” of closed-cell spray foam.

Lorraine asked how many tests will need to be run considering the multitude of variables. Paul opined that for each configuration, the working group is conducting interior and exterior tests. Payam advised that 2” x 4” is not going to have a 1” airspace; what’s the difference between 2” x 6” and 2” x 8” in a standard construction practice? Lorraine said that foam loading is the difference. Chief asked Marjorie if she’s seen 2” x 8” stud walls in her experience. Marjorie advised that she doesn’t see 2” x 8” stud walls very frequently. Her firm has used 2” x 8”s to gap the insulation in the wall but it’s not standard practice. Chief deleted the 2” x 8” from the working group’s assembly and directed them to look at stud spacing. The working group is not looking at a one-hour type of wall scenario so when a comparative analysis between two types of foams is done, 16” or 24” on center?

Andrew Henning assumed the Chairperson’s role while Chief Reinertson left the room for a brief period of time. Andrew advised that 16” and 24” on center should have one for 2” x 4” and a different one for 2” x 6”. Marjorie doesn’t think that the 2” x 4” is going to be at 24” on center so it’s a given that the 2” x 4” would be at 16” on center. So, more studs would result in better performance. Fewer studs would result in a weaker performance thus 24” on center for 2” x 6”. Payam asked what would happen if metal was added to the assembly; Simpson Strong-Walls, for example. Marjorie advised that they’re not combustible and are typical in one and two family dwellings where a lot of shear is needed in one location. Andrew asked if it would be a good idea to fund testing of an assembly that contains the Simpson Strong-Walls. Payam thinks that such an assembly would give a better / less conservative result; Marjorie has not used Simpson Strong-Walls in her work. Lorraine advised that they’re mostly wood with specialized Simpson connectors. The working group members agreed that they will need to know more about what’s inside the Simpson Strong-Walls before adding them to the assembly; Lorraine volunteered to start the research. Marjorie opined that this scenario raises the question of having steel in the wall; there are steel studs but there’s also structural steel that’s necessary for a large opening. Eric opined that structural steel won’t matter but aged metal framing of anything isn’t very strong or heat resistant. Payam asked if a header in the wall assembly where there’s a window opening would make a difference or is the working group just considering the standard national framing factor which is that each wall is assumed to have a 25% framing factor associated with it for a 16” and 22% for a 24”.

Paul asked if the E119 testing includes a window. The working group members advised that it includes a window only if a window is being tested; otherwise the opaque wall alone is tested. Lorraine advised that the UL Fire Resistance Design Manual is available online and provides a lot of information about E119 fire assemblies; there are more than 5000 assemblies. Each one of the components is specified and substitutes of components are granted either by testing or UL engineering studies.

Andrew asked the working group members if they’d like to perform two tests on the floor-ceiling assembly, one with an air gap and one without an air gap. Marcelo advised that since it’s an asymmetrical assembly, the test must be run on both sides. Eric opined that the airspace is different than a wall. Andrew asked the working group members if four different tests for this assembly will be enough. Marjorie asked if the report that Andrew referenced earlier was concerned with airspace in walls only. Andrew advised that the report he referenced is titled “Flame Retardants in Building
Insulation: A Case for Reevaluating Building Codes” and was published on 11/26/12; the reference is on page 741. Marjorie said that she was questioning if the issue is unique to walls in the vertical propagation and isn’t as much of an issue with the horizontal assemblies. Eric Banks advised that fireblocking is necessary in horizontal as well as vertical assemblies in order to prevent the fire from travelling underneath the floor into a different compartment. Andrew asked the working group members if it would also apply to the floor-ceiling assemblies. Eric asked what the insulation requirements are for floors and ceilings- 38 or 40? Payam advised that it’s R19 for floors and 30 is the mandatory minimum requirement for ceilings. Gypsum board for walls, floors and ceilings is ½”. Paul requested clarification regarding the ceiling; is there no insulation requirement for a two-story building with a floor-ceiling assembly in the middle? Payam affirmed that’s correct. Paul summarized that when Payam is referring to an R19 floor, he’s referring to the attic ceiling or the above-garage or above-subframe floor. Payam advised that the space is required to have insulation on each side and draft stops. Donald asked Marcelo if he thinks that it’s more important to define propagation in the wall cavity for a vertical configuration than for a horizontal configuration and if any studies have been conducted on that topic. Marcelo opined that it’s irrelevant in an E119 test because the concern is the penetration of the fire. The assembly must be examined on both sides because it’s asymmetric. Marjorie asked if the most conservative approach would be to have no airspace so that the insulation is in contact with the membrane that’s being tested. Also, what’s the safest design? The 1” airspace is good for walls but what’s the magic number for floors? Eric opined that standard floor joists are 2” x 10’s thus in the context of R19, an R5 would be 4” for most closed-cell foams and maybe 3.5” for celluloses so it might come close to being filled up but probably not so there needs to be a larger airspace. Donald asked how it’s typically constructed; is the insulation touching the bottom of the assembly and the gap’s on the top? Eric advised that the insulation needs to be in intimate contact with the barrier that separates the conditioned space from the unconditioned space otherwise condensing surfaces are created. For example, bats are pushed in place, rods hold them in place and the spray foams are sprayed there; boards aren’t typically used for this-maybe glued in place? Eric asked Payam if CEC is concerned with intimate contact for condensing surfaces. Payam opined that bat insulation or cellulose adjusted for chicken wiring is put up and the airspace is on the unconditioned side to prevent condensing surfaces. The same concept is used for walls, too, and air movement. Andrew asked the working group members if there’s any reason to test anything other than 2” x 10” floor joists which are the most robust and then, based on that test, default back to the TJI’s. Should the working group look at running a test with a space larger than 1” / what’s the typical insulation size for something that’s treated? Should the working group use a 3” airspace or completely fill the cavity and have a maximum of 1”? Marjorie thinks that it would be best to fill the cavity for testing purposes, especially for the E119. The working group will need additional information before calling out the maximum airspace in the design. There’s 1” for the walls but is anyone aware of any testing of floor-ceiling assemblies? Eric Banks asked if crawl space is the same as floor-ceiling space. Marjorie advised that she’s considering all horizontal assemblies to be grouped together into one generic category. Marcelo opined that many aspects of the crawl space assembly are the same as those for the floor-ceiling assembly. Paul Wermer asked to what extent people put a surface finish in a crawl space. Donald advised that, practically speaking, the bigger the airspace, the less insulation is going to be exposed to the hot surface. So, the bigger the space is, the better it’s going to be for passing a test. The worse-case scenario would be filling the space. Donald advised that the assembly can be flipped around for propagation from one space to another; he doesn’t know if any tests have been done to establish the proper gap in a horizontal type of configuration. Mike Fischer advised that the California Residential Code includes 2” x 6”, 2” x 8”, 2” x 10” and 2” x 12” standard floor joists within a span table. There are four different joist configurations thus the question about the 2” x 10’s seems to be the most prevalent. Marjorie opined that 2” x 12” would allow the most insulation to fill the cavity. Andrew asked if 2” x 12’s are common. Mike advised that it depends; 2” x 10’s limits it to 18’ per span for an SS grade of douglas fir. If the working group wants to go longer than that, then 2” x 12’s will have to be used. Marjorie thinks that 2” x 10” is a good choice. Andrew advised that the assembly will contain ¾” plywood on the topside and 2 layers of 5/8” type X gyp on the bottom. Payam asked what’s going to
be used for the interior finish; Andrew advised that ¾” plywood will be used. Mike thinks that it should be tested with carpet and tile. Foams without FR’s will burn more vigorously. Marcelo thinks that ignition is not the issue; the issue is whether or not the amount of heat release into the room will be fast enough to cause a problem for the firefighters. Paul asked if ignition isn’t an issue, then why is a thermal barrier required? Marcelo said that the thermal barrier exists to protect the individuals who are in the room away from origin to ensure that fire does not penetrate into an adjacent compartment. It’s assumed that ignition will occur; then what happens afterwards? Lorraine opined that the working group really needs UL’s (or another lab’s) opinion in regards to this issue. She’s been looking at UL’s Fire Resistance Directory and there are more than 500 assemblies where the membrane protection is gypsum board for a floor-ceiling assembly, and every component matters. Chief Reinertson advised that if there’s no floor covering and the test is being run on both sides of bare plywood, then it doesn’t matter whether or not there’s a floor covering. Jesse opined that floor-ceiling assemblies are typically only tested from the underside and normally floors are tested- not roofs. There’s plywood decking with leveling compounds and if that passes, then carpet or tile is added. Donald asked why the working group should not use Jesse’s example since it’s already being done; why invent new tests if it’s not necessary? Jesse said that residential assemblies narrow the scope- the “L’s” with joist choices. Once the joists are decided upon, then the working group members will have to look at the assemblies because they depend upon the joists that are used- the assembly will dictate the amount and types of gyp and how it will be installed on the underside as membrane. Typically whatever is normally used as flooring- 15 or 30 seconds- is used as plywood on top. The worst case scenario would probably be to leave the plywood up there and monitor the temperatures on the topside of the plywood and if they never exceed 250 average or 325 single point, then typically anything else can be put on the top of it for a floor. The only potential problem is that if leveling compound is put on top of the plywood, then the heat will be trapped inside of the compound for some designs that are tested. Pick a joist, determine what you want to do, the top will generally be plywood and the joist will determine different options regarding what type of gyp (single layer, 5/8” C, another layer of 5/8” X, channel, etc.) to use and how to put it up. Andrew advised that he wrote “wood leveling compound- check with UL, 2” x 10” wood joists, 2 layers of 5/8” type X gyp” and he asked if the working group members want to leave it as solid fill of stud floor cavity with non-FR insulation or if they want a more non-FR insulation amount is which is roughly 5”. Marjorie advised that the solid fill is more conservative for testing so that’s the best option. The maximum airspace has to be run with one airspace. Andrew asked if it should be run both with and without the airspace. Marjorie doesn’t think that’s necessary but the group should research maximum airspace in the cavity in terms of performance beyond E119. Eric reminded the group that the point of the legislation is to provide protection against transmission of fire into different compartments; will standard fireblocking still work?

Mike Fischer asked if the observation from the report is leading the working group members to assume that 1” is the right number; he thinks that the paper needs to be revisited. Marjorie thinks that the working group needs more information regarding the 1” airspace. Mike thinks that the entire test parameter is going to be based on an anecdotal observation regarding propagation of fire. The comment about the 1” airspace that was contained in the paper was not related specifically to the research but was related to some of the observations. Are the foams that are going to be tested the same materials that will need to meet the same requirements and chemistries that were used in that research paper? More than likely, no- they will not. So, a test assumption on these foams is being based on observations from a test study of a completely different foam plastic that came from another supplier / source. The working group needs to verify that 1” is the right airspace number because it might not be- it might be ½” or 3” and it starts eliminating what can be done in the joist. Otherwise, the working group could end up with such an extremely limited set of options that a builder will have a hard time constructing a house under those limitations. The challenge will be in collating the standard tables, wall design tables and energy requirements down to something that can actually be built to meet the CA Energy Code and other requirements and still perform well under a moisture management standpoint. Marjorie thinks that
the goal is to find conservative assemblies to test and then apply broader parameters in the future. Mike thinks that the working group still needs to determine what’s conservative and what’s not. Andrew thinks that if the working group tests the assembly with the 1” gap and it meets the current baseline construction requirements, then the legislation’s intent is being met. Donald discussed the working group’s assemblies with four Fire Engineers who all told him that they should pass the tests with flying colors. He recommends going back and testing the current assemblies with FR and non-FR foams and they may perform just as well. Eric advised not to forget that the assembly discussion started not on one-hour rated assemblies but rather on performing the E119 as a comparison tool against the standard assembly vs. these assemblies. From an industry perspective, Eric doesn’t think that every wall that contains foam plastic should by default become a one-hour rated assembly; that would be unfair.

**LUNCH BREAK 11:35 AM– 1:00 PM**

**B. The Floor-Ceiling Assembly (Continued):** Andrew Henning continued the discussion regarding the fact that a potential for a large gap may exist. The report that the working group used as a basis for the design of the floor-ceiling assembly was actually about a wall assembly- not a floor-ceiling assembly- thus there’s a potential that there should be a larger gap in the floor-ceiling assembly than previously considered.

1. **Ducting:** Chief Reinertson advised the working group members that one of the remaining discussion items is the ducting. Marcelo reminded the working group that the question under consideration is whether or not plastic duct should be allowed or if only non-combustible duct should be required. The working group needs to be careful about large-diameter ducts. Chief advised that the average floor member in single family dwellings is between 10” - 19”. A 19” floor is a big span for truss joists. Typical single family dwelling ducts that run through the cavities are between 6” – 8”. Eric asked if flex duct is used. Chief responded that flex duct could not be used in this situation.

2. **Labeling & Listing and Electrical Installations:** These items are being addressed in the same manner as they were addressed in the wall assembly.

**C. Crawl Space Construction:** Marcelo asked to clarify the angle that exists in crawl spaces. Chief advised that they usually contain a typical raised wood floor foundation that’s anywhere from 12” – 18” to X feet between the earth and the raised wood floor. Marjorie thinks that the airspace issues are similar to the floor-ceiling assembly’s airspace issues. Payam and Lorraine asked if ventilation needs to be considered. Jesse asked if the working group is considering the insulation that’s in the crawl space on the underside of the floor above or insulation that’s located around the edges of the crawl space. Chief advised that the insulation being considered is located under the floor in the cavities- just like what’s found in the typical floor-ceiling assembly. Jesse advised that manufacturers are now running full-scale room corner tests for crawl spaces and attics in order to qualify foams for use without a prescriptive ignition barrier. Paul advised that the code does not call out a thermal barrier since the insulation is being placed underneath the floor. Jesse advised that either the prescriptive is used in the Code or an alternate for ICC Evaluation Criteria AC12 or AC377 with a full scale room corner test. Marjorie advised that if the exception for the thermal barriers is not accepted, then there will be a thermal barrier. Chief Reinertson agreed and said that it’s because something is being put on the underside and it’s not exposed. Chief reminded the working group members that they had discussed using ¾” plywood on the underside vs. using two layers of gyp board. Marjorie said that plywood is allowable per the exception; if the exception is not allowed, then plywood cannot be used and both sides need to be tested because the construction is asymmetric. Marcelo told the group about a case that he’s working on in which there was no ignition barrier in the crawl space of a $10,000,000 home and a large fire occurred which destroyed the home. Paul asked if the working group members want to specifically call out a thermal
barrier for the assembly that’s being qualified. Jesse thinks that ¼” plywood should be used. Chief Reinertson advised the group to keep in mind that this is the proposal that could potentially be recommended for testing so the comparative testing between the FR foam and the non-FR foam will be done. Paul advised that a standard test will be comparing the performance of the same type of FR foam insulation that’s used in the wall or the floor-ceiling cavity and that’s treated with an ignition barrier to be code compliant to a ¾” plywood barrier or a thermal barrier which is presumably more resilient or robust than a ¾” plywood. Marcelo asked how the issue of firestopping becomes a moot point if there’s no thermal barrier; it makes no sense to firestop ¾” plywood- the firestop wouldn’t burn but everything else around it would burn. Chief Reinertson advised that the reason why firestopping for the penetrations is being added is because if there were a fire, then it wouldn’t immediately get to the non-FR foam. Wherever the board hole is located or the conduit is running through the assembly, it’s preventing the fire or spark from spreading. Marcelo thinks that the fire will not penetrate through the area where there’s firestop; it’s going to penetrate 1” away from the firestop and burn the plywood. Chief Reinertson advised that’s not an issue because the group is not going after one hour walls. Paul stated that the performance of one standard wall insulation product with a thermal barrier is being compared to a non-FR foam with a ¾” plywood that’s firestopped so the working group will at least obtain the performance of the products that are offered now or it won’t pass. Lorraine advised that a thermal barrier is not required for a crawl space. Paul thinks that it requires an ignition barrier and the group is comparing the code-compliant format today which is an ignition barrier applied to the FR foam against non-FR foam protected by ¾” plywood. Mike Fischer asked if the group will have to test all of the ignition barriers that are allowed by the code because they will perform differently. Chief advised that the code allows any of the ignition barriers to be picked. Eric’s company used ¼” plywood as the baseline when they developed the AC377 Appendix X test for the elimination of the ignition barrier because many foams have that approval. Lorraine advised that there are test reports from ICC Evaluation Service that describe crawl space applications or even attics without an ignition barrier. Marjorie said that the other ignition barrier is 1.5” thick with mineral fiber insulation; it seems that the ¼” thick particle board or hard board best corresponds. Paul thinks the reference standard is that which the industry has agreed is an acceptable level of safety. Chief asked the working group members to consider how they addressed walls and floor-ceiling assemblies; the only difference between the two test assemblies is the foam. So, tests will be run to failure (to obtain the results from start to finish) with both FR foam and non-FR foam in this assembly. Marcelo thinks that there’s a difference in that a higher degree of protection is being demanded of the wall assembly than the ¾” plywood which is appropriate. Marjorie advised that there’s a higher degree of protection than the bare minimum ignition barrier that’s allowed. Marcelo opined that it’s being replaced by a very combustible material. Eric stated that the baseline test is 1/4” plywood and then whatever this turns out to be will be the comparative assembly, just like the walls in which the baseline test is being conducted and then the standard assembly will be tested.

D. **Running the Tests to Completion:** Donald asked to discuss the issue of running the tests to completion. Chief advised that running the tests to completion will provide data regarding heat release, whether it be two, ten or twenty minutes- wherever failure may occur. Donald thinks that this is a research question rather than a testing question. The group is trying to compare materials that meet a certain testing criteria and the only thing that has to be achieved is to meet the same testing criteria. For example, if all of the tests are run to completion and material “A” performs to seventeen minutes while material “B” goes to twenty minutes, is that a significant difference? If the testing procedure says that fifteen minutes is the requirement, is that a significant, meaningful difference or does that indicate that material “B” is less fire safe than material “A”? For example, run two different foams that are FR-treated to completion and if they have different results- one goes to seventeen and the other goes to twenty- does that mean that the one that’s performing to twenty is the only acceptable one because it has the highest safety factor and the other one shouldn’t be allowed to be used? It seems like that’s what the working group is trying to accomplish in comparing the FR and non-FR foam tests. Donald’s
concern with running the tests to completion is that if the research is important, then why hasn’t it been done before? Chief advised that the research hasn’t been done before because what the working group is doing now hasn’t been done before. Donald thinks that the group should be going to testing compliance- not research performance. George Combs disagreed because AB127 is quite specific regarding not compromising fire safety. It could be argued that there’s a standard but the E119 standard as its written doesn’t necessarily provide the safety that it’s purported to provide because it’s based on older materials. The point of running the tests to completion is to try to ensure that fire safety is not compromised per AB127. Houses don’t burn in fifteen or seventeen minutes. Donald asked if the working group should be testing the existing materials in the foam insulation to find out which give the best fire performance. George stated that Donald is assuming that they have a wide range of behavior and he doesn’t have the data to answer that question. George thinks that Donald is proposing a comparison that requires data that doesn’t exist. Paul recapped that the data doesn’t exist to show how good the foams are today because they’re being tested to a standard. The working group should maintain that process because obviously that standard must provide adequate fire safety. Surely the working group members wouldn’t be selling materials that don’t provide adequate fire safety based on a standard that they don’t have confidence in. George advised that the code groups that developed the methodologies and standards go through a rigorous process and they have minimum criteria that must be met. However, there’s also a disclaimer every time anything is said about these tests; they don’t necessarily represent the real-world performance. Jesse advised that it depends on the test. If a room corner test is being run, then typically the duration is fifteen minutes to evaluate thermal barriers and foams without thermal barriers, etc. A room corner test is run for fifteen minutes and if it hasn’t failed prior to the end of fifteen minutes, then 99.9% of the tests are shut off at fifteen minutes and one second- they don’t go further than that. An ASTM E119 fire-resistance test is 50/50 because, for example, if a wall system is being tested and it’s still looking pretty good at the end of an hour then the manufacturer may try to push it to failure. However, some people stop the fire resistance test at the end of one hour and one second because the wall must be removed from the furnace and a hose stream test must be completed. If it passes the hose stream test, then only one test is run and it gets a one-hour rating. If the manufacturer runs a wall to failure, then the data is obtained but chances are that when it’s pulled off the wall then it will fail the hose stream test thus another test will have to be run at an additional expense. So, half of the tests that Jesse runs are shut off at one hour and one second while the other half must be run until failure. Most people run a floor assembly test that has no hose stream until they get some type of failure. It depends upon which test is done and how it’s done. Donald understands but thinks that the working group needs to be aware that the testing matrix is growing by the second and since this project is being paid for by the taxpayers of California, there’s a responsibility to manage the funds as efficiently as possible. Additional financial resources will be required for each assembly and configuration that the working group members create for testing. Marcelo thinks that when a test is run, the test administrators should make sure that they obtain the absolutely best information possible from the test and finishing the test at an arbitrary place will not generate the correct information that’s needed. Marcelo stated that in order to better protect the firefighters, the working group should be sure to get the maximum amount of information as possible and it will not be obtained by stopping the tests at an arbitrary time. A greater amount of information will be obtained by continuing the tests to failure which is the key barometer that will indicate how much time is available for firefighters. Also, the working group will not get as much value for the price of running the tests if they’re stopped at an arbitrary time. Eric Banks reminded the working group members that one hour fire-resistance tests are not being run; the E119 is being used to determine a window of data to compare all of the different issues that are being discussed. One of the reasons why a test is run to absolute failure is to determine the margin of safety. The tests are run to failure and no criteria has yet been established other than the understanding that there’s fifteen minutes relative to standard thermal barriers. So, the working group is not arbitrarily setting a higher standard but is gathering the data in order to determine and compare current systems as constructed against whatever is being proposed. Paul becomes confused when trying to compare a current standard system performance to this new system performance considering that
there are many spray foams out there on the market. Testing all of the spray foams to establish their performance windows is cost prohibitive. If the industry actually has data and can provide data about the representative assemblies- how long they last until failure- then a meaningful comparison has been set. But, if that data doesn’t exist, then what’s being compared is one more or less randomly chosen set of polyurethane, one more or less randomly chosen set of polystyrene base and perhaps one more or less randomly chosen comparison of a poly-iso against one particular FR-free material. It’s unclear to Paul largely because he hasn’t seen data from manufacturers regarding how their current range of products perform under this thus how can the working group members interpret that time to failure data in terms of meaningful safety performance given the fact that the segment being examined is so isolated? The working group members will not know what it means even if they look at one sample of FR foam because they won’t be looking at the universe of FR foams and Paul’s experience with material performance is “A” is not equal to “A Prime”.

Chief Reinertson asked the working group members how long they think it will take to complete this project and he reminded the group to keep in mind that the assemblies will not be tested to the current code requirements for a given assembly; ASTM E119 will be used to compare two assemblies. Donald inquired about the variation in products that are on the market today when tested to completion; that information will help him decide whether or not the results are meaningful. All that’s known right now is that it either meets the criteria of the test or it doesn’t. Jesse thinks that the problem is that the working group is not testing one-hour rated E119 walls but is constructing a baseline wall to do something. The baseline wall is a common wall against which a comparison can then be done and it can be used for the two foams. The wall is a non-rated wall so it won’t go in an hour and the working group doesn’t know how long it will take for the wall to go because it has not yet been tested. Walls that are less than one-hour rated are not usually tested. So, the working group will have to test the baseline wall and whatever time that fails at- twenty-five, forty-five or fifty-five minutes- will be the baseline. The wall with the non-FR foam will then have to be tested until it either fails early or fails at the same time or fails at a longer time than the baseline. Donald asked if there will be a difference in times to failure for different foams that are FR treated and if there are certain materials that are used that are not as safe per that criteria. The working group members advised Donald that he has taken a big leap of logic in stating that there are certain materials that are used that are not as safe as others due to differences in lengths of time to failure. Donald thinks that there must be pass / fail criteria or there has to be a standard where the precision, bias and uncertainty of the test is known. Jesse laughed and Lorraine said that won’t happen. Paul agrees with Donald in that there’s a fundamental problem regarding how to use the test to failure data on a one to one comparison when in fact it’s unknown where either one would fall in the universe of actual performance. Donald clarified that if foam “A” with FR’s goes to nineteen minutes and the same foam without FR goes to twenty-one but another foam insulation is tested and it goes to twenty-three and the non-FR foam will not be allowed to be used because it didn’t perform as well as the FR foam but then there’s another foam that’s been FR treated that performs worse; is that foam not going to be allowed to be sold? Marcelo advised Donald that he’s mixing up two different points: one is which tests will be performed to obtain the information that’s needed and secondly what’s the decision that will be made once the data is obtained. If the tests are not performed to failure, then the data will be incomplete and it won’t be clear how to make the decision. If the tests are performed to failure, then all of the information will be available and a decision can be made regarding whether assembly “A”, “B” or “C” is safe or unsafe. The decision can only be made if the data is available. If the data is not available, then the decision cannot be made. Lorraine pointed out that the situation that Marcelo just described is in the codes today. The foam plastic chapter indicates that not all foams can be used in every application because the fire tests discriminate between certain types of foam— they can’t pass the test. So, it’s not surprising that foam “A, B, C or D” in these tests would perform differently. Lorraine might reformulate her product to improve that scenario— it’s a given and that’s why there are fire tests; they’re based on the need for fire safety— they’re not made to discriminate between foams. It just so happens that the tests are either met or they’re not with the products.
criteria is for meeting the tests. Chief advised that what the working group has proposed is that there is no criteria for meeting something; the goal is to obtain data from point “A” to point “Z” so that it can be examined. For example, the first test ran and it went to nineteen minutes and the non-FR went to twenty-three minutes and heat release rates during that process were considerably lower or higher and she’s the SFM going to have that data to examine. Also, there will be data that goes back to a typical house fire if the tests are good and each one lasts for an hour and a half and go to completion for an hour and a half; a single family dwelling that’s burning for an hour and a half in one room. Donald agrees but doesn’t understand how the fifteen minute criteria for the E119 test has stood for over thirty-eight years. Lorraine advised that fifteen minutes is not for the E119. Donald questions whether or not the criteria that’s being used is appropriate or not or if that should be strengthened or changed. Marcelo explained that the code may have to revisit that; it’s neither here nor there. He doesn’t have any problem going to the code and stating that the criteria for the NFPA 275 must be changed; perhaps the working group should debate that. The working group is not running standard tests; they’re running tests to get information. George Combs stated that if the working group is proposing a statistical determination of what’s being done then the costs will be dramatically increased because the only way to obtain the data is to run as many tests as possible. Mike Fisher asked to extrapolate the concept out into a larger problem. There’s an underlying flaw in the working group’s assumption in that it’s trapped in one point in time when considering what will come out of the test labs and making decisions based on that. Products will be tested to failure under today’s code requirements and products that don’t have FR’s in a more robust thermal barrier assembly will be tested and the results will be compared. If the thermal barrier that’s more robust, using that specific set of foam plastics, compares appropriately then it’s going to be used to create code proposals to go to the Building Standards Commission. Assuming that the working group obtains data using four layers of gyp board or whatever assembly is approved coming out of this process, it will be used to qualify a code proposal stating that if it’s built in this manner, then it will be safe because the foam plastics were tested and they had certain foam characteristics for flame spread. The working group is going to move forward with creating a code that has an underlying assumption from that one snapshot in time that future generations of foam plastics will be produced that won’t have a completely different performance during fire testing because they won’t be required to be tested that way. So, when the insurance labs are going into the companies that are producing this new foam where there is no flamespread requirement, they’re not going to care about that but rather tensile strength and shears and compressors and R values; they’re not going to care about the fire performance of those things. This code and code proposals will be based on a false assumption that when the rug is pulled out from under fire testing, future generations of this product will perform in the same manner which is irresponsible.

Paul disagrees with the assertion that there does not need to be testing of the performance of the materials; they need to be tested. However, the flamespread test is not the correct test methodology. A statement was made that once the assembly has been built, future materials won’t have to be tested. Paul disagrees and thinks that new materials will have to be tested in an assembly to prove fitness for purpose. Donald is confused because he understood that what was written was that the super assembly both with and without FR treated foam is going to be compared- not that the working group will be comparing current building practices to the different assemblies that are being proposed. Lorraine advised that there’s a standard wall described on page 517. Donald said that it came up a couple of times earlier that the same wall assembly was going to be built both with and without FR foam. Chief Reinertson advised that he misspoke when he stated earlier that the same wall assembly was going to be built with and without FR foam. Mike advised that the working group is discussing removing the requirement for the ASTM E84 test. Marjorie stated that it’s only for the super-assemblies. Mike thinks that the super-assemblies will be tested based upon a specific product so, ten years from now, he could come up with a new foam product that performs completely differently and he’d like to know if he will be required to go back and redo the entire research project. Marjorie said that will depend on how he would want the product to be used.
Marjorie asked if the working group’s plan includes the addition of a performance component to future code sections after this prescriptive component has been met. Chief Reinertson advised that’s where the run-to-failure data will come into play. If the working group sees that “X” heat release at thirty minutes, forty-five minutes, etc. will be achieved based on this assembly, then the working group may be able to start writing performance measures in the draft report that say “other assemblies meeting this criteria”, but that will happen in the future—not right now. Mike opined that if a prescriptive component is established around E84 and there’s no requirement for the foam, then the working group will be allowing an unclassified foam. Mike suggested that it be written in the code that any foam plastic insulation that meets the definition of foam plastic insulation except for ASTM E84 will be allowed to be used. Chief advised against that and stated that the working group is writing a statement that foam plastic should meet all requirements except for having FR chemicals in it. Mike responded that the working group is not stating that once the test report has been done and the code proposal has been made that foam without FR’s will be sold. However, assuming that foam without FR’s will be sold, the product baseline performance is unknown. The working group is basing this prescriptive exception on a known snapshot of products that will be lab-tested. There is no assurance that any new products that are developed and grandfathered in because they’re foam plastic insulation will have the same results in a lab if they’re tested. Chief asked Mike to please explain how he would like to proceed with this project.

Lorraine thinks that a material test should be conducted.

Mike thinks that if a prescriptive requirement is written without having some baseline understanding of the performance of the foam plastic, then the requirement will be ineffective. One option is to develop something similar to the exception for a freezer wall that’s contained in the IBC in which a different value for the flamespread requirement is used so that there’s a known quantity that’s defined by virtue of the current test. If the working group doesn’t want to use E84, then they don’t have to use it. Lorraine offered an example scenario in which the working group runs the program; they will want to know the flammability characteristics of the non-FR product. Hypothetically, if it’s 300, and the working group knows that going in, then that number is going to be important for the overall performance. Lorraine is most familiar with E119’s; she knows E119’s and how to substitute products there. Lorraine explained that Mike is suggesting that if the working group doesn’t put a box around the flammability part of the foam, then a manufacturer could produce a foam that could be value-engineered and the number could be 600- twice as bad as the flammability of the product that was tested- or even greater and there would be nothing to prevent the manufacturer from using that foam. However, that would not be known in the E119 or this test without testing the material in some way for flammability. There should be some kind of reporting out; it doesn’t matter what test is used- the material should be tested. If E84 were still in the code right now and it was understood that if something in particular was done then E84 wouldn’t be necessary, then manufacturers would deduce that the flamespread is normally 75 in order to meet the code so they would remove the FR’s and get a flamespread and E84 of 400, label their product and then ask an architect to pick one of the products to use for building— it should be reported out.

Marjorie advised that the Swedish codes have Euro Class F foam which is unclassified—either it has not met the testing requirements for the next class or it has not been tested but they do use it with protection. Lorraine explained that Sweden’s construction techniques are very different than ours; they don’t have the light construction that exists in the U.S. George elaborated and advised that with respect to the European classification, all countries don’t allow an unclassified foam. The code varies from country to country; the harmonization just says that a material has to be tested to determine how it performs and it’s up to the code bodies in those countries to determine that they will accept only a certain level of performance for an application— that’s definitely a rating system. Lorraine asked where the Europeans are using the foam. Paul advised that they’re using the foam in assemblies that pass an assembly test. Lorraine asked if they’re using it in 2’ x 4’ construction. Paul is not aware if they’re using it for 2’ x 4’ construction. It’s covered by a thermal barrier so that the assembly passes. George pointed out that all countries in the European Union don’t allow the use of unclassified foam; the classification may exist.
but the UK doesn’t allow any unclassified foam. Lorraine advised that we build different facilities than what they build in Sweden.

Eric expanded on Mike’s earlier point regarding any material that’s classified as foam plastic; one of the concerns is that if it goes through as the way that it’s going to go through, then XPS, EPS, PIR and PUR are common insulation materials used today but they could be substituted by a polyethylene with absolutely no history of fire tests. Mike thinks that a problem is that assemblies made of gypsum board are being discussed and gypsum board is a commodity product. Wood framing and plywood are also members, except for the laminated veneer lumbers (LVL’s) and the engineered beams and even those are becoming commoditized. Is foam plastic insulation a commodity product? No- not even close. Open cell, closed cell, low density, high density, hybrid, extrudeds, poly-iso rigids, different thicknesses, different configurations and formulations are not commodities. That’s why you don’t see in the code as you do for joist stands; you don’t see open cell density R value. It can’t be specified that way; even for fiberglass insulation which is more commoditized today than foam plastics are and the reason why is because you can’t meet the assumptions about it. You can’t say that ten years from now you’re going to have wood / a piece of plywood made out of naturally grown wood that’s likely to have a hugely different fire performance than the plywood that’s made today; the same thing cannot be said about foam plastic products and it’s a dangerous path to go down. Some baseline performance of the product must be captured before it’s put into the assembly and before it’s tested or else the data will be useless. Mike asked if a simple solution would be to capture the flamespread of the non-FR treated foam.

Lorraine asked the working group to forget E84; some kind of flammability characteristic of the material must be determined. Marcelo added that polystyrenes have to run an LOI; some of the information that was added to the report by Howard Hopper shows the difference in testing heat release when you look at the materials that were included in the Rhode Island fire- there were huge differences. It doesn’t matter what’s tested- something has to be tested because otherwise the material is not an acceptable material. The only scenario where Class F insulation material is permitted in Sweden is if it’s not exposed in the final product and is part of an assembly that’s not exposed; otherwise Class F can’t be used. Paul agrees and thinks that it needs to be enclosed by a thermal barrier. Marcelo advised that a thermal barrier doesn’t enclose- it just covers- which is a major difference. The thermal barrier, which is wood, does not enclose a product. Marcelo reiterated that it doesn’t matter what test is used- it could be the E84 or any other test that’s invented by the working group. Perhaps the LOI should be used as the 578 requires- a small scale test- does the working group think that would be better than the 25 foot tunnel? Some test needs to be used to get off the center because otherwise there will be a severely flammable material in place which is not what the working group wants. More and more insulation is being used and is necessary as society continues to move towards constructing more efficient buildings; the last thing that the working group should do is lower the fire safety requirements. Paul asked why defining an assembly test as the method for qualifying the performance of new polymers is not an acceptable method for determining an adequate level of safety. Marcelo advised that when tests like the NFPA 275 are performed, just one product is not being tested but rather two products are being tested- a thermal barrier and the foam behind it: two products. Paul agreed and stated that’s how it’s used in the field- that’s how it’s applied. If that provides equivalent performance to the standard that’s being used now, then why does the product need to be tested? Marcelo explained that’s how it’s used in the field because the FR’s are used- the material itself already has an improved fire performance. Paul stated that when using a FR product, it’s known that it will perform in a certain manner in an assembly and will provide adequate fire safety. Lorraine agreed and said that the product is tested and qualified by E84. Paul understands that’s how the product is qualified but functionally, from the standpoint of the product’s performance in the building, everyone agrees that if there isn’t a good thermal barrier on the product that’s qualified, then there’s a very hazardous situation. Marcelo advised Paul that he’s focusing on only one application- the thermal barrier- but both Lorraine and Jesse have gone through the various applications and the number of places in which there is no thermal barrier. Paul said that in this case, the
non-FR materials would not be acceptable; they’re being approved for a specific application. Mike stated that the working group should complete a separate assembly test method and require every single product that wants to qualify for this to not be a prescriptive requirement.

Chief Reinertson advised that he understands both Donald’s and Mike’s points and thinks that they’re valid points that need to be addressed. He thinks that there’s a way to put a box around “it”. Chief addressed Mike’s point regarding putting a box around insulations that are non-FR, and he used more extreme terminology to make a point that there could be foam products that have a heat release rate of 1500 and next week or next year a manufacturer could produce a foam that’s not only combustible but also explosive. The prescriptive barrier that the working group has created will absolutely allow for that. Today the code requires insulation to have a smoke and flamespread index of “X” which is how explosive-type insulations in walls are prevented. So, what number should be on this type of assembly? Should the flamespread number be 300, 400, 600 or 1000? Is there a maximum heat release rate number based on the test? Keep in mind that the group is considering type 5 non-rated construction so there does need to be some maximum threshold for non-FR insulation that goes into the typical single-family dwelling. Donald asked Marcelo what’s the highest heat release rate number for a non-FR plastic foam since he thinks that the heat release rate is such a significant parameter. If it’s tested by the assembly method, would any plastic foam that has a heat release rate below that value be acceptable? Marcelo advised that the table that was inserted by Howard Hopper on page 14 of the working draft document shows some of the differences between a couple of polyurethane foams and their heat release rates: the FR was 453 whereas the non-FR was 600-1100. Non-FR foam can give up to 1154 kilowatts per square meter which is horrendous. What’s a reasonable heat release rate for insulation material? Probably 200 – 300, perhaps up to 400. Mike advised that doesn’t prove that it will pass the assembly test. Mike’s point is perform the assembly test, determine an acceptable performance level (if that happens) and then quantify that heat release rate or the flamespread or both. Once the assembly test has been passed and the bar has been set, then it can be said that there are products that have a certain level of performance and heat release rate in a certain assembly so if a manufacturer produces something with a greater heat release rate then it cannot qualify under that exception. So, Mike thinks that the working group should start with an assembly test before trying to set some level because it’s not known which rates will meet the other super barrier tests. Donald opined that the only reason for looking for the worse case is to perform the test on that because if something lower is done, then a product with a higher release rate will have to be retested. Mike agreed and stated that there are a lot of unknowns. Donald would like not to use the flamespread index. Mike disagreed and stated that in order to capture a new metric, that metric should also be compared to the existing metric. Marcelo agreed and stated that at the end of the day, that will have to be done whether it’s compared to the E84 or some other test. It will have to be demonstrated that the new foam, in combination with whatever protection there is, will have the same fire performance. Marcelo doesn’t understand how that will be achieved unless tests are run on the material as well as on the assembly. For example, an NFPA 285 will have to be run on foam for facades or any material that’s placed on the exterior of buildings but the first piece that’s put in is a foam that already has some fire performance. If it’s going to be put in under the crawl space then there’s only going to be an ignition barrier which is almost worthless.

Mike thinks that before the working group replaces the E84 with another method of capturing this type of information, it must be at least shown that the new test is going to be correlative and predictive. If those two things are not quantified, then at least there’s a benchmark. If it’s found to be irrelevant, then that’s fine. So, perform the heat release test on the material after it passes the assembly and after the baseline for the heat release has been set, verify the heat release of the material that was tested and then verify the flamespread because the test labs that are doing the quality assurance are going to want to know that piece of information regardless of whether or not it’s added to the code. Paul opined that the table that Howard Hopper added to the working draft document shows only one type of polyurethane foam with different radiant fluxes incident. The heat release rate for the polyurethane and FRB is very
dependent upon the incident radiant flux. Paul thinks that the working group members are going to have
to complete some homework and look at some of the available data to determine what some of the
options could be to propose at the next meeting because there currently isn’t enough information to
make any decisions. Mike agreed and opined that the working group needs UL. Lorraine suggested
calling Mike Beaton at InterTech because he had a lot of experience with foam plastics when he was
with ICCES. The labs run the tests and grant the evaluation reports and certifications. Chief Reinertson
advised that they will be able to provide the data but the working group needs to go back and determine
the top level number. The working group members said that they don’t know and asked Chief to pick a
number. Chief asked if 1500 is explosive; the working group members responded that it is explosive.
Marcelo advised that a reasonable value in a small-scale test is 300-400; anything above that could start
to become problematic. Chief advised to think about firefighter safety; there’s a product that thus far is
uncontrollable because no parameter has been put on top of it. What is the top threshold that the
working group members want to subject firefighters to? Mike reminded the working group members
not to forget about the occupants. Marcelo thinks that there are two aspects that should be looked at: 1)
Ensure that the heat released by the material in the compartment of origin is low enough that flashover
does not occur. 2) Ensure that the material does not penetrate through the compartment or barrier into
other compartments thus preventing the fire from penetrating. Those are the two parts of the thermal
barrier test: the heat release test and the penetration test. Marcelo thinks that 200 kilowatts per square
meter is a good number to use. Marjorie thinks that the real problem is that the working group doesn’t
know how any of these are going to perform in a wall assembly; can there be some small range that’s
tested for heat release with the E119? Marcelo stated that E119 doesn’t test for heat release. Marjorie
responded that her company tests for heat release first; there’s a range of products- 200, 500 or 1000, for
instance and those three are tested in E119 with their heat release being known so the results of E119
are seen and it’s more of an assembly test. Marcelo stated that both tests are contained within NFPA
275 and both tests are assembly tests: both the heat release test and the fire resistance test. Marjorie
asked if the heat release rate could be studied on a material alone and Marcelo affirmed that it can be.
Marjorie said that there’s a desire to have a test for the material which shows that it’s not explosive. So,
can the material itself be tested for heat release? Marcelo said that yes, it’s tested on a small-scale basis—
4” x 4” samples. Marjorie asked if that data could develop a range that could then be tested in E119
with the super assemblies so that if one passed and there was an acceptable performance and it had an
insulation with a heat release rate of 500 or 1000, then the working group would at least know where to
put that threshold.

George Combs opined that one of the questions that was already raised in a past discussion was that
assuming there are two assemblies- “A” and “B” where “A” is a standard FR treated fire rated material
and “B” is an enhanced non-FR new material, then what performance characteristic differential between
those two would be acceptable. The problem that the working group will run into when proposing to do
what’s being discussed is that there may be replicates done in any small-scale cone calorimeter test. The
working group is going to have to come to some resolution about the concern that was raised regarding
how a range of FR foams of similar types- not new classes but similar types only- might have a range of
performance; how will that be taken into account? Whatever measure is chosen, a standard deviation of
the statistically significant difference between the two types of systems will have to be established. A
small scale test does allow that to be done in a reasonable way but the same kind of issue will arise with
the assembly. George said that the working group had discussed the assemblies as being baseline some
time ago but he didn’t recall the issue of where the FR systems will fall in the range of performance. If
the working group is going to be bogged down with trying to establish a limit as a number and the error
bar around that number, then there’s going to be a very complicated situation. Paul thinks that a
problem is that the working group is short on data regarding how things are performing because either
the data is strictly proprietary or it hasn’t been gathered. One approach that might make sense would be
to build a representative test assembly, look at its performance and decide whether or not it performs in
an acceptable manner. Then, either simultaneously or before or after that assembly test, the working

group can look at the material’s performance in terms of heat release rate and LOI, perform lab scale tests and take some reasonable measurements that will establish a benchmark point for heat release rate curve and different incident fluxes. The LOI results will indicate if it’s explosive and how much heat is generated. The working group will have already established or will establish simultaneously that the assembly performs in an acceptable manner. At that point, there will be a material benchmark which establishes that if the material is tweaked, as long as it remains within “X” percent of the values, then it will be within the normal and acceptable window. If it goes outside of the acceptable parameter or window that’s been defined, then the full-scale test will need to be rebuilt. The assembly test shows as closely as anything will a comparative performance to a standard FR assembly and two critical data sets will have been gathered: the heat release rate information and the LOI index which should indicate how likely the assembly is to explode. This approach makes more sense to Paul than picking a number out of what exists because he doesn’t know what those numbers mean in terms of actual performance.

Mike Fischer posed the question that if one of the BSC members requests the comparative E84 data and the response is that the working group decided not to run that test as part of this analysis, then how do the working group members think the BSC will respond? The law indicates that overall building fire safety should be maintained and that standard is in the code today; the aforementioned question will be asked by the BSC. Lorraine thinks that the scenario that Paul just described is exactly what’s done today because the flammability characteristics of the products that are going into the assemblies are being defined, except E84 had being used whereas now heat release is being used. In the end, that fire test will not be predictive but rather comparative. The material needs to be characterized, the tests need to be done, the failure points need to be determined and it will be up to the labs and codes to determine whether or not those two parameters can be used to qualify new foams safely in the code.

Chief Reinertson addressed both Mike’s and Don’s earlier discussion in the working draft report: “For all assemblies, need baseline heat release to determine maximum heat release for on-FR insulation.” The working group needs data; how will that be achieved other than to wait for UL to show up? Does UL have that data currently or does the working group need to go out and perform some tests and what are those tests? Marcelo opined that what’s done today in order to characterize thermal barriers is to run the NFPA 286, which is one of the two tests, both with the thermal barrier material and the proposed foam, and if it gets to flashover and 800 kilowatts and 1000² meters then it passes and a number will be obtained but it won’t be a number on the foam but rather the assembly. Sometimes they may not even have that number; all that they will know is that it passed and that’s it. Are there tests on foam materials that can run 286 without using a thermal barrier? Of course there are; there are multiple foams as Marcelo has discussed in the past- there are polyimide foams, phenolic foams and some specialized foams that can run the tests. Nobody runs a room corner test or a heat release test for standard run-of-the-mill foams such as polyurethane or polystyrene because it’s known that they will fail so why bother? Chief agreed and added that the codes don’t mandate it. Marcelo asked why anyone should waste their money conducting a room corner test when the codes indicate that it’s only one option? Run the E84 and the thermal barrier tests.

Chief Reinertson directed the working group to discuss the best route to take in trying to put a box around the non-FR insulation. Lorraine had brought up asking UL to attend a meeting and provide data but is there an existing test to perform a comparative analysis? Could the working group obtain the data by running an E119 on the baseline wall and recommend that if a certain type of assembly will be used for non-FR’s, then “X” parameters should be applied? Marcelo thinks that if the working group is not going to test the insulation alone, then the only thing that can be done is design a particular construction and run a room corner test and a fire resistance test and get the information; get something that’s acceptable and put it in the code. Marcelo thinks that the working group had the right approach before they went back and started discussing the same things over again. George Combs asked if one issue is that a manufacturer could produce a foam that’s much worse than what was ever tested in the alternate
Chief Reinertson answered in the affirmative. George then stated that Don’s issue is that if some range is defined as being comparable in terms of fire safety, how will the working group know if that’s good? That can only be answered by looking at a lot of data. George’s concern could be answered by saying that whatever problem was being tested set the standard; any failures in excess of the time for that particular criteria, if it was longer than the FR system and still acceptable, is the explosive limitation because that’s all that can be hoped for if an independent material test is not going to be conducted. Chief Reinertson stated that without UL being present, he doesn’t know if there’s data out there for the different types of foams and which one has the highest heat release rate on its own if the working group members were to start looking through the typical insulation materials. Chief doesn’t know if that data exists or if there’s enough anecdotal data out there to draw from. Marcelo referenced a study that he completed in 1991 called “Heat Release From Plastic Materials” in which he looked at the heat release rate for each one of 35 different materials- 34 plastics and wood- in three incident heat fluxes. If one looks at and considers Marcelo’s study, it appears that polystyrene has a higher HRR than polyurethane which has a higher HRR than poly-iso’s. These are compounded materials that were used commercially at the time; the most significant changes that have occurred since then have been blowing agent changes. Marcelo completed an array of tests- polyurethane foam, two or three different foams and polystyrenes (none were foams) that generated data.

Chief Reinertson directed the discussion back to the wall assemblies and opined that in using the data from typical construction assemblies that are code compliant, and not knowing what type of insulation is being used but trying to choose a current code-compliant FR insulation that has potentially the worse case fire scenario for it (this is yet to be determined because it’s not known what product that is), running the E119 assembly test on that assembly and going back to running the test to failure generates that number for the maximum HRR for a code-compliant wall which can then be applied to that new assembly. That would provide the working group members a box for non-FR insulation.

E. Attics: The greatest amount of foam, whether it be FR or non-FR, is in the attic thus this is the area of most concern to Chief Reinertson. Marcelo thinks that the angles in attics present an additional problem. Chief stated that the working group had discussed the plywood sheathing on the exterior side, the roof or trusses, top cord and two layers of 5/8” type X on the underside of the insulation. Marcelo asked if the working group is thinking about adding a nail to the roof at whatever slope the roof is. How will this issue be assessed because with ASTM E119, a vertical or horizontal wall can be run but how can a sloped wall be run? It needs to be put on the ceiling as well. The amount of slope can make a significant difference; how can it be assessed? Chief thinks that it’s probably not important because the attic assembly that’s been created is very similar to the floor-ceiling assembly; it has the two layers of type X, the ¾” plywood on top and all of the bells and whistles that were mentioned for all of the other types of assemblies. Mike said that up in the attic there are roof trusses that have bottom cords, top cords and webs up and down. The spray foam will be applied to the inside of the deck and it will be covered with gyp board, another framing assembly with trusses will be built and gyp board will be put up at some level below the insulation with a maximum 1” airspace. Also, the gyp board will have to be notched around any of the web penetrations that are coming up and down through the trusses and then firestopped. Mike would like to see a 3D detail of that assembly. Chief Reinertson advised that this type of application will not be seen in the typical open web truss scenario but rather vaulted ceilings and flat roofs with truss joist types or stick frame roofs will be seen. Payam asked if vented or non-vented or both are done in this scenario. Eric responded that one of the major applications for spray polyurethane foam today is sealing up attics. Chief advised that in most cases of vaulted ceilings with non-open web type trusses or solid sawn members, a 12” or 20” cavity would be solidly filled. Payam asked if there would be a maximum 1” airspace with gypsum board on the bottom. Chief responded that yes, there’s a maximum of 1” airspace, the ¾” plywood is on top followed by the rafters or trusses and then below that the gypsum. Marjorie opined that the 1” airspace causes such moisture and rotting problems that she thinks it wouldn’t be good to have in this assembly. Chief advised that’s a design specification and
that if having more than 1” would create a greater fire hazard condition, then the airspace should be maximized. On the flipside, filling it solidly, if “X” number is achieved with solid fill, then it might be a better way to go. Marjorie asked if airspaces are introduced then do they need to be vented and if yes then that’s a different assembly scenario. Chief advised that the designer would spec it out and fill it up. Mike opined that there will be variations in the material fitness from the function of spraying so unless it’s going to be shaved, there cannot be zero airspace. Mike thinks that will be one of the building code requirements and there are also moisture issues. Payam advised that the CBC requires 1” of airspace and it has to be vented for moisture. Marjorie agreed and added that there are exceptions. Mike thinks that a decision regarding whether or not to bother with this assembly should be made because of the technical feasibility issues and the permutations with this application; should there just be different roof slopes which will affect the propagation issues? Chief asked how this is done at the ceiling level; how is it encapsulated? Jesse advised that typically the UL Fire Resistance Directory contains fire resistance rated assemblies that use open wood joists with plywood on the top and membranes on the bottom and if that passes, then more air can be added into the system by raising the roof or sloping the roof which works better. Sloped roofs are not normally tested in fire resistance ratings; roofs are typically tested flat as a minimum and then more air can be added which creates distance between the fire and the underside and helps as heat goes up because there’s a greater volume to dissipate it. Eric asked if Jesse’s example is from a fire that’s underneath a ceiling and not from a fire in an attic space. Jesse affirmed that his example was from a fire that’s underneath a ceiling; if there’s a fire in an attic space, then go back to AC377 or Appendix X tests and AC12 or AC377. Again, slopes are not tested; flat ceilings are tested just like NFPA 286 for interior finish materials. Lorraine asked Jesse if the insulation goes under the roof deck in order to put the ducts through a conditioned attic space, which is where the Energy Codes are moving today. Jesse said that’s done right now in the Appendix “X” test; the materials are placed on the exposed gyp board. Payam suggested considering the hybrid in which there’s 1” of foam where that insulation is applied right underneath it. Eric advised that there’s still the issue of how all of that is secured. Payam advised that Owens Corning has a new system that does that now so it’s out there. Marjorie asked if it has non-FR foam in it, then would it fall under this assembly? 1” or 2” of spray foam could be used and the rest of the cavity could be filled with cellulose or fiberglass. Payam asked where the cavity starts and ends; does it end at the ceiling level or someplace else? The CEC does not like non-vented attics because of moisture issues; they generally prefer to see ventilation. The CBC contains a scheme that has criteria for non-vented attics that’s passively conditioned as opposed to passively conditioned.

Marcelo raised the point that there cannot be a limit on the maximum amount of ventilation that can be added because it will be increased during the next code change. There’s potential for a huge amount of combustible foam; how will that be limited since this material will have a very high potential for heat release, melting and dripping? Chief Reinertson advised that currently, if spray foam insulation or foam insulation or insulation were to be used in an attic, whatever the current practice is: 7/16” plywood on top, insulation of R42 in the attic, an FR insulation with a thermal barrier- that assembly is tested, a maximum heat release rate is determined and the box is put around the FR assembly. Payam asked if ducts are significant. Chief advised that much like the floor-ceiling assembly, the working group has discussed ducts briefly. For this type of assembly, the typical vaulted ceiling has a solid sawn member or open-webbed truss that’s not the typical 4” or 12” ceiling line that’s level. Ducts could be running through it but Chief doesn’t know how it would be possible to get around the insulation. Eric stated that the 2015 Energy Code in the higher climate zones is up to 49. Chief asked what the thickness of 49 is; Payam responded 10” – 14”. Chief advised that 12”, 14” or 16” members are necessary to get the desired spans. Marjorie advised that chapter 8 of the CBC calls out the airspace for the venting for the roof and she thinks that would perhaps be a good number to use as a minimum. “An airspace of not less than 1” shall be provided between insulation in the roof sheathing”. That would be like a vaulted ceiling, for instance, but there are exceptions that are better spelled out in the Residential Code. Chief Reinertson advised that Exception #3 has been utilized in California for a multitude of reasons in a
Chief Reinertson directed the discussion to Section 2603.3- Surface Burning Characteristics- of the CBC which has the provisions for a flamespread of 75, a smoke development index of 450, is in accordance with ASTM E84 or UL 723 and gets into specific Exceptions. Exception 6 was provided which Chief asked the working group members to read; he then showed the detail. Marjorie thinks that keeping the insulation completely below grade won’t work; the maximum that it will come up is 12” which would be adequate for that grade clearance that’s required of wood. It doesn’t seem like this is an area of much fire exposure or risk- it’s continuously separated from the interior by the concrete and if there are combustible concealed spaces for the cladding, like those in a rainscreen type of system, then it would be separated from those with fireblocking or materials that meet the fireblocking standards. The foam plastic insulation would be in direct contact with the wood but it’s an area of fairly low fire risk. Marcelo advised that’s where all of the fires start in siding- in the mulch that’s attached to the building. The working group is now going to ensure that people push the mulch against the insulation? Chief advised that there will be a ½” cement board over it. Marcelo stated that it won’t be over the 12” above ground; that’s not what the code language says. The code language says that it’s just covered with an ignition barrier. Marjorie agreed and said that could be different; one of them is listed as cement board and one is listed as a modification of the ignition barrier. Marcelo thinks that this would create an incredible exposure. Chief asked if the exposure issue is the maximum 12” area. Marcelo advised that anything that’s above ground is going to be highly combustible. Chief directed the working group to write a provision to address that area. Payam asked Marcelo what protective barrier is usually used when trying to prevent UV or pest (termites) damage. [The workgroup discussed the termite requirements at length. Since it is outside of the scope of this workgroup, the discussion was removed from the minutes.] Lorraine thinks that the termite issue is important in California because it’s identified as a heavy termite area. According to R318.4, there must be a 6” space between grade and the foam plastics; there cannot be foam plastics directly on grade or against wood. Lorraine doesn’t know how it would be done but it’s not allowed by current CA Residential Code because of the termite provision. Marcelo asked why there’s a requirement to go above grade. Chief advised that it’s an energy requirement. Marjorie explained that radiant slabs have to have insulation on the exterior per the code and it has to come all the way up to the top of the slab or the top of the footing. There has to be insulation on the exterior and it has to come up above grade. Beyond that, Marjorie knows that it’s only
Payam advised that if there’s a radiant floor, whether it’s heated or cooled, it has to come all the way up and is a prescriptive requirement for all slabs. There has to be insulation in radiant floors. Chief advised to take the Energy Code discussions out of the equation because if it’s a radiant floor, it’s required. If there’s a radiant floor home, it’s required to have foam insulation.

Chief asked the working group members if the materials that are specified are adequate. Lorraine thinks that it needs to be vetted against the code’s termite provisions because wood is a pathway for termites. Marjorie’s company typically uses cement board covered with sheet metal although it’s not required. Mike thinks that somebody is going to have to obtain an evaluation report because the code says that the method of termite protection has to be approved. Marjorie agreed. Marjorie asked what the foam manufacturers recommend for termite protection. Although it’s in code, it’s never come up for Marjorie with a Building Inspector; her choice of materials has never been questioned. Lorraine advised that it’s installed on the inside of below grade applications (basements); that’s the easiest and simplest way to go. Marjorie asked if there’s a recommended covering and Lorraine advised that it’s up to the manufacturers; there are manufacturers of certain products that have termiteicide included within their product and there are evaluation reports regarding those products. So, they’re adding other materials in addition to the FR’s. Lorraine then mentioned the 6” separation at which point a termite shield is being added which begins the siding. Marjorie asked if insulation is in the interior, then what would the protection be at this point? It would be some equivalent to the fifteen minute thermal barrier. Mike asked if the insulation would be run between the slab and the foundation wall? Marjorie said that yes, there would be a stud wall and the slab would be separated and the insulation would be run all the way under the slab and up the sides. Sometimes the slab is isolated so that the insulation can be run under the slab and up the sides and then it’s on the interior. It still means that the foam is not 6” below grade—it would be separated from the interior. The foam is usually 1” thick but sometimes it’s 1.5”. Mike asked if that creates a pathway for the termites that are below the slab to come up through the foam into the inside of the house. Chief advised that the issue of this discussion is not an issue that the working group needs to consider; he added that it is allowed by the code, though. Lorraine and Mike disagreed and opined that it isn’t allowed by the code. Marjorie advised that this issue involves the Energy Code being in conflict with this portion of the CBC. Chief advised that unless the SFM is proposing a provision that’s in conflict with the termite requirements contained in the CRC and CBC, then the termite issue doesn’t need to be discussed. The CRC requires termite protection; it’s up to the designer to account for that; the working group needs to focus on the fire issue.

The attic assembly contains up to 1.5” of exposed non-FR insulation or, it could be put on the exterior. What does the working group want to spec? Chief is concerned with the nailer for the carpet and asked Marjorie what goes over the top of the insulation when it’s put on the interior side between the stem wall and the slab. Marjorie advised that the condition she explained is finished concrete slab; there’s no carpet going over it. It’s tough because there has to be some cheating done in some way; there either has to be a little concrete put over the top of it which is not supposed to be done or some other material has to be put over it which isn’t quite a thermal barrier. There isn’t really anything good to put over it. If the plate is cantilevered to the interior, then the insulation can be pulled up under the plate and the gypsum board can be put over the face of it so then there must be a thermal barrier. Chief described a scenario where there’s 1.5” of exposed foam with ½” gyp board sitting on top of it and another ½” piece of baseboard around it; how big of a fire issue exists? Marjorie opined that if the insulation drips, it will drip down, there will be concrete on the other side and the slab is not combusted. Mike opined that the code language requires the insulation to be covered so perhaps another fitness of cold molding should be added; something has to be done to cover it up. Marjorie advised that the exception is not for the thermal barrier so the thermal barrier is still needed for the inside; the exception calls out that the foam be separated from the interior by 4” of concrete. The language should be changed to “4 inches of concrete or a thermal barrier” or it needs to be faced on one side with concrete. Marjorie thought about
the situation and started writing some language to address the interior and it got very complex; she thinks that it would take some time to work through what the language should be for the interior and she volunteered to do that homework.

Chief advised that Marjorie’s proposal allows for one ¼” cement board with a corrosion-resistant sheet base metal thickness of 4 millimeters or an approved UV-resistant material; he does not know what an approved UV-resistant material is. Mike advised that “Board-Approved” means that there’s an evaluation report for that application. Chief asked the working group what products they think would be good to put on the exterior face when considering the exposure issue. Marcelo asked if the concrete could extend to cover below the insulation. Chief advised that the Energy Code requires the exposure to be insulated because it’s not typical slab. Marcelo asked if there’s electricity underneath the radiant heated floor. Chief advised that no, there’s no electricity—there’s typically water. Chief Reinertson doesn’t have an issue with using ½” cement board. Eric asked how to address the fireblocking if a hole somehow occurs in the cement board—it’s a combustible concealed space and a fire could work its way around the house. Marjorie advised that there’s no protection required with the FR foam that’s currently being used for this application. Mike pointed out that it’s not left exposed. Marjorie agreed and said that it can go straight up behind the cladding. Mike pointed out that there’s an exception in 316.5.1 against a thermal barrier which says that the thermal barrier specified in 364 is not required in a masonry concrete wall for a roof when the foam plastic insulation is separated from the interior of the building by a minimum of 1” thickness of masonry concrete. The bar was set for that exception at 1”. Chief stated that’s not for fire propagation. Mike acknowledged that fact, asked how it could be used as a point of comparison and if the cement board industry has ever tried to qualify their product as an ignition barrier. Marjorie advised that there’s cement board on the market that can be used in a one hour assembly; there’s tile backer for a one hour assembly. Lorraine pointed out that tile backer cannot be installed in an outdoor environment. Marjorie advised that certain types of tile backer can be used; Dura Rock has a one hour assembly.

Chief directed the working group to go back four months ago to when Paul was asking the question if foam were covered with 4” of concrete and the other side of it was earth, would it be an issue? No working group member could answer the question so Chief Reinertson completed some research and concluded that the ½” cement gyp board for the limited application is not going to be a big deal and he thinks that it will be acceptable to the powers that be. There’s 1/2” of non-combustible material for a maximum of 12”- that’s the most foam that’s going to be exposed out there. Marjorie asked if certain climate zones require 2” of foam. Payam affirmed that’s correct. So, she thinks that the maximum thickness of foam should be 2” if the working group wants to specify that. Lorraine asked if the working group will be testing the product to E84 when it says “not restricted” so there will be a 500 flamespread index number. Chief advised that the working group should devise more explanatory language regarding what “unrestricted” means. Paul suggested using the word “exempted”: foam plastic insulation exempted under this criteria. Lorraine thinks that Paul’s language could be read in two ways— as an exemption from E84 or an exemption from the limitation of 75450. Paul asked if the language “determination of flamespread index and smoke develop index shall not be required for” would work. Chief Reinertson advised to wordsmith this language later. Marjorie was looking for language regarding what to protect it with and when the definition of non-combustible is examined, it says that it’s not to be applied to coverings but just structures. However, Chapter 7A calls out that coverings are acceptable, non-combustible and ignition resistant. Chief advised that Chapter 7A was written specifically to do that. Marjorie thought that the definition of “non-combustible” covering was a murky area. Chief advised that “non-combustible” was brought back from the 2001 building code and defined. Marjorie had difficulty finding the definition for non-combustible covering. Chief advised that 7/8” stucco and plaster are non-combustible materials as defined. George asked if the 4” is supposed to be 100 millimeters to keep consistent. Chief advised to eliminate the word “millimeter” for now because what often happens is that a calculation is made and then when the proposals are submitted to ICC, they...
come back with a different number so he’d prefer to leave it to them to write it. Chief advised that as soon as Marjorie sends out the additional details or language for the Residential Code, he will forward it to each of the working group members. Lorraine opined that it’s particularly important to describe how the non-FR product will be identified since the working group is discussing a limited application. How will the labeling appear and how will it be done? If it’s limited to what the working group discussed, then the wall above it will probably have FR insulation on it and it won’t be a bulletproof assembly. Chief advised that there will be an inspection issue, so whatever the labeling requirement is for the foam, there’s going to be a minimum of 6” exposed but the code will require it to go up 6” because that’s where the top of the stem walls are going to be. If there’s a typical T-wall foundation, then the minimum that will be seen there is 6” below grade so there’s going to be a 12” piece of foam there and the working group will need to ensure that the labeling requirements reflect that information. Marjorie advised that it’s not uncommon to switch types of insulation from that foundation to above for many different reasons and her company does so frequently; she has many details for such switches. Chief Reinertson is thinking about labeling every 6” on center in both directions.

VII. ADJOURNMENT

The next meeting will be held at SFM Headquarters (1131 S Street, Sacramento, CA 95811) on Thursday, September 4th from 10:00 AM – 4:00 PM. **Homework:** Chief Reinertson asked the working group members to please start at the beginning of the working draft document, add any pertinent information, concerns or comments and email them to him prior to the next meeting and he will incorporate them into the document. Marcelo volunteered to incorporate the work that was completed in this meeting and create a structure for the draft document. The meeting was adjourned at 1600 hours.