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ON THE RECORD: UL 199 LISTINGS AND THE FM SPRINKLER STANDARD (Rev. 1)

By Richard Schulte

After the one million square foot McFrugal's Warehouse in New Orleans was destroyed by fire on March 21, 1996, the insurers of the building and contents filed suit against a number of corporations. The defendants in the litigation, known as *Ian David McAuslin et al v. Grinnell Corporation et al*, included not only the sprinkler contractor and the design/build contractor (Broadmoor Corporation), but also Underwriters Laboratories (UL), Inc., Factory Mutual (FM), the National Fire Protection Association (NFPA) and the Southern Building Code Congress, International (SBCCI).

The expert witness for the plaintiffs who testified against UL, FM, NFPA and SBCCI was Dr. Craig Beyler. The following are excerpts of Dr. Beyler's deposition testimony which address the case against UL and FM. Dr. Beyler's expert report in the litigation was dated February 5, 1999 and Beyler depositions were taken a few months later.

The expert witness for the plaintiffs who testified against UL, FM, NFPA and SBCCI was Dr. Craig Beyler.

Editor's Note: The author of this article has access to Dr. Beyler's expert report and depositions in the *McAuslin v. Grinnell Corporation* litigation because he acted as an expert for one of the defendants, Broadmoor Corporation. In addition to being an expert witness in this case, the author was also a fact witness in the litigation.

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Schulte & Associates acted as the building code consultant on the design team for the McFrugal's Warehouse and developed the variance documentation for the proposed design of the building. One of the variances developed for the building design and approved by the City of New Orleans and the Louisiana State Fire Marshal's Office permitted an exit access travel distance of 600 feet.

Page 256, Line 14

Q. Would you turn to page 8 of your report, please?

A. Yes.

Q. The first sentence there reads “However, a review of FM 8-33 quickly indicates that the expected clearances from the combustibles to the ceiling sprinklers are a serious issue.” What is FM 8-33 that you’re referring to?

A. 8-33, the document I was referring to is called “Rack storage of materials.” The one I have been using is January, ‘84 dated document.

Q. Is that a loss prevention data sheet?

A. Yes, it is.

Q. Issued by one Factory Mutual entity or another?

A. Yes. It says Factory Mutual system. Yes.

Q. And does that provide guidelines for the design of the sprinkler system for rack storage?

A. Yes, it does.

Q. Now, you note in your report here that it makes clear that the clearance between combustibles and ceiling sprinklers are a serious issue. Does the Factory Mutual loss prevention data sheet 8-33 address that clearance issue adequately, in your mind?

A. Well, without, you know, reviewing the whole document, I mean that’s a broad question. Based - - Based on my review for the purposes of this case, it appeared it does deal with that issue effectively.

Q. Let me ask you to turn to page 16 of that loss prevention data sheet.

A. Yes.

Q. The lower right part of the page, the last full paragraph, and let me read - - Well, you read the first sentence, first two sentences of that paragraph for me, would you, please?

A. “When clearance between ceiling sprinklers and the top of storage exceeds 20 feet, install horizontal barriers extending to the full length and width of the racks, three feet, above the top of storage and provide one level of sprinklers beneath the barrier. The sprinkler system under the barrier should be designed the same as the ceiling sprinkler system for the hazard being protected.”

Q. In your opinion, does that adequately address the clearance issue that you have raised in your report?

A. That - - That certainly is a, you know, a technique of protection that, if there’s going to be storage in the open areas as there was to be, is a viable strategy to deal with that, yes.

Q. Let me ask you to look at page 9 of your report, the last paragraph. Read the first sentence of that for us, Mr. Beyler.

A. “An adequate sprinkler design in the east and west high bay areas would have been possible and would have included the use of a barrier above the storage height with sprinklers provided below the barrier.” Directly referring to the sentences we just read from the data sheet.

Q. So that would be an adequate sprinkler design, in your opinion?

What did you mean when you said an adequate sprinkler design if it’s not an adequate sprinkler design?

A. Well, that would be an element of a sprinkler design.

Q. What did you mean when you said an adequate sprinkler design if it’s not an adequate sprinkler design?

A. No, all I’m saying is having the barrier there and putting, you know, quote, ceiling sprinklers below it is something that absolutely, you know, I think needs to be done for protection in this area. The sprinkler system is a broad - - it may be a broader entity depending upon the configuration of storage and how you intend to use the space. So I see this as a necessary element, but you could do things - - you could do this and still do other things wrong and end up with an inadequate system I guess is my point.

Page 261, Line 12

Q. Let me ask the question again. I think you just said yes. But let me ask the question again. If the guidelines set forth in Factory Mutual loss prevention data sheet 8-33 had been followed in this case to provide sprinkler protection for these portable racks, would that have been adequate?

A. I believe - - Yes, I think so.

Page 603, Line 9

Q. . . . You have been critical of FM, NFPA and UL. And I have a short question. I am going to let them address your criticisms. But is it your opinion that it's Grinnell's job to analyze the NFPA requirements and decide it really shouldn't be that, it should be something different in those areas where you disagree with the NFPA requirements? Is that Grinnell's job?

. . . You have been critical of FM, NFPA and UL.

A. Yes.

Q. So Grinnell should just say "NFPA, you believe this, but we don't think you're right so we're just going to disregard NFPA and do it our way"?

A. It is not - - Design standard like 13, 231, 231C are widely regard as minimum standards. It is not at all unusual to exceed those standards. And it is the duty of the designer to treat those documents as minimum standards and to use them to guide his design, but they are not legalistic. If it says 0.4 [gpm/SF], you will never use more than 0.4 [gpm/SF]. They are minimum. And they are - - It is ultimately the designer's job to put in what's adequate to provide proper functioning of the system. It's his job.

Q. And if the NFPA standard, using that illustrative, not picking on NFPA, is, in your opinion, inadequate, we should say it doesn't make a difference what the standards is, we'll do it differently?

It would probably be irresponsible to do less.

A. Yes. In particular, do more. It would probably be irresponsible to do less. Not inconceivable, but probably.

- Q.** When measured as a standard of compliance by authorities having jurisdiction, the code or the NFPA standard is the yardstick, is it not?
- A.** With regard to sprinkler design in the State of Louisiana, - -
- Q.** Yes, sir.
- A.** - - those NFPA codes I believe are called for in the statute.
- Q.** And compliance with that code means that you met the legal requirements. Is that your understanding?
- A.** Notwithstanding the stamping requirements, which have higher standards associated with it.

Page 611, Line 25

- Q.** Assuming a fire protection designer, fire protection system designer gets to the point where he assumes that or decides that a sprinkler system is the appropriate means of protection, what are the design, engineering design criteria that should be taken into account by a designer in designing a sprinkler system? What are the variables?
- A.** One needs to define the use of - - This is - - again we talked about this before.
- Q.** Okay.
- A.** Define the use of the building. Define how it's going to be used, how it's anticipated to be used, what's anticipated to be there so you can define what will be stored or what will exist at all the locations in the building and use that to define a hazard occupancy or a commodity classification and - - and storage arrangement that are a part of the input to deciding what the system will look like. So commodity classification, acknowledgment of combustibles is certainly something that needs to be set out in the conceptual design to establish the requirements.
- Q.** Once that's done, what other criteria, what are the design variables that a fire protection designer must take into account, should take into account, in your opinion?
- A.** Associated with that will be questions of whether in-racks will be used or only ceiling protection. Design densities and operating areas need to be defined. Activation temperatures of sprinklers need to be defined. There's this whole raft of them that come on the water supply side, which, you know, I don't know if we need to get into.

- Q.** So it's densities and temperatures.
- A.** Operating area.
- Q.** Operating area being?
- A.** The design area over which you anticipate sprinklers may be operating.
- Q.** Okay. What other variables?
- A.** If you have in-racks, obviously there are configurational choices that you need to define. Choices of whether to use a wet pipe or dry pipe system, free [pre-] action systems. Those are variation on different types of sprinkler systems that one would need to deal with. Whether - - If it is a cold environment, how you're going to deal with that. Anti-freeze or dry pipe. I think that's pretty much it.
- Q.** Once a design makes assumptions or conclusions so as to fix those variables or to calculate those variables, is the design then complete?
- A.** No.
- Q.** Once all of the variables are fixed, there's still something more to determine in the design?
- A.** I understand your question to mean when we fixed all the things we just enumerated - -
- Q.** Yes.
- A.** - - and it was done. And it is not, because we don't have a piping system yet. Part of the detail of design is I've got a water supply out in the street and I have to decide, one, exactly where I am going to put the heads in a conceptual design. Usually - - the other part [of] conceptual design. Usually - - the other part of conceptual design, you will nominally choose, establish what the coverage area for each head will be.
- Q.** Okay.
- A.** But that doesn't mean that you have specifically located every head. It doesn't mean you have designed the pipe runs that get a required amount of water to those heads. If there's a fire pump involved, you may - - I mean you haven't done that yet. There are a lot of detailed - - Those are decisions - - Those are choices that are made in the detailed design which only manifest themselves usually in the context of design drawings.

Q. And in a particular application?

A. Oh, all in this is in a particular application.

Q. And those are all determinations made by the person who's design the system?

A. Certainly. Which would include selecting the head to use, which I didn't say.

Page 617, Line 20

Q. Do you agree with the characterization that a UL listing constitutes a statement by UL that the listed product conforms, in this case a sprinkler head, conforms with the standard set forth in UL 199?

A. That's not my understanding of it.

Q. It's not. What is your understanding of UL listing then?

A. I guess the scope statement does it as well as anything for me.

Q. The scope statement in UL 199?

A. Right.

Q. Do you agree with the characterization that a UL listing constitutes a statement by UL that the listed product conforms, in this case a sprinkler head, conforms with the standard set forth in UL 199?

A. That's not my understanding of it.

Page 619, Line 17

Q. Do you understand that when UL lists a sprinkler head that it does so with the express statement that it has listed this sprinkler head in accordance with the standards set forth in UL 199?

A. My understanding, that's excessively narrow.

Q. What is excessively narrow?

A. I don't think that's necessarily done.

Q. You think that UL states that it's something other than approving the product as having satisfied the requirements of UL 199? More than, less than?

A. As I said initially, the - - you know, there are a lot of great tests, you know, outlined in [UL] 199.

Q. All right.

A. If UL decides that there's no need to conduct test 3, whatever that is, that this - - for whatever reason, it will not be run. Does that preclude listing? It does not. If at the same time the engineer involved says "I don't feel good about these tests telling me everything I need to know. I need to do more," he will do more. That's my understanding of the process.

Q. Okay. I'm going to ask this question again and ask you to pay particular reference to my use of the words "express statement." Do you understand and agree that UL, when it lists a sprinkler head, does so with the express statement that it is doing so after having determined that the product meets the standards of UL 199? If you don't know, you can say that. There are some of us who - -

A. I don't know.

Q. - - acknowledge there are things that are unknown, and I imagine that include you as well.

A. I don't - - I don't recall that I can - - you know, such that I can say that when I have seen UL listing of a device that it necessarily - - I mean obviously it calls out the standard because it has to. But using the words that you have used, I couldn't say. I do - - I mean when you look in the book, you know, under the listing of sprinkler heads it will say 199 there. In the exact words, I couldn't tell you.

Q. Do you have an understanding that a listing of a sprinkler head by UL does something more than certify compliance with UL 199?

A. Yes.

Q. Do you have an understanding that a listing of a sprinkler head by UL does something more than certify compliance with UL 199?

A. Yes.

Q. You do have an understanding. What is that understanding?

A. What I described to you earlier about more will be done or less will be done is something that is at a higher level than the specifics of the test protocols that are outlined in 199. 199 is very little more than a description of test methods. While valuable, while necessary, it is a very narrow cut on the process.

Q. Mr. Beyler, I'm not asking you what you think UL ought to be doing.

Mr. Beyler, I'm not asking you what you think UL ought to be doing.

A. No, no.

Q. I'm asking you what UL does on a straight vanilla request by a manufacturer to analyze a component and to determine whether or not it should be UL listed.

A. My answer stands. That is my understanding of what is done. It is - - I mean my company is - - has been involved in that process with UL, and it is not uncommon in our experience that you'll run some tests, and - - and appropriately so. This is not a complaint. Run tests, say, "You know, we have our doubts, we need to do something else." Or "We need to change the test" or "We need to change the criteria" or "We need to do things that weren't anticipated before." So that's a process. And a good process. A valuable process. This is not - - the list process, as you well know, is not close your eyes and run the tests. It's an evaluation to determine in some cases whether it's safe product; in other cases, whether it's an effective product. Actually, you hope both. And, you know, a document that does little more than state what those - - the normal test methods are is a narrow cut on what the listing process is. Not just what I think it should be, but what it is.

Q. Well, let's stay with that then. When you say narrow cut, do you agree that what you're saying is that that is the standard, that is what UL listing constitutes, that is, an affirmation that UL 199 is satisfied, but that in some instances the technical people involved may need to go beyond that in order to satisfy their concerns whether UL 199 has been satisfied?

A. 199 is the tool box, the standard tool box. The listing process is more the tool box. The result of listing is more than the tool box. Just as - - Well, I won't indulge in any analogies. The engineers involved in the evaluation convince themselves through these tools and maybe others that the equipment will perform as required.

Q. As required by what? By UL 199?

A. In the case of a sprinkler head?

Q. Yes, sir.

A. In order to perform to - - to be able to create systems with other listed hardware under - - using a design standard, NFPA 13 and associated design standards. That is, 231 and 231C. The design - - the design standard and the listing married together create a functional system. And the engineer involved in the evaluation to list is using 199 as a tool box and any other tools he needs.

Q. To do what?

A. To make sure that the piece of hardware that he's evaluating when used with other listed equipment, when used with the design standard 13, 231, 231C, will perform according to the requirements.

Q. The requirements of what?

A. The requirements for the performance that's anticipated by [NFPA] 13 and other standards. For instance, in storage in particular, something we're talking about here, when systems are evaluated, that is, a design density is evaluated, double row rack, crosses the aisle, failure. Hits the ends of the test array on the - - on the aisle where the ignition happened, failure. That is you take listed hardware apply it in a design - - with design criteria called out in NFPA 13, et cetera, that the performance requirements will not jump - - will not move to the ends of the array, are fulfilled.

Q. Do you agree that UL's part of this marriage is to evaluate the hardware?

A. Yes.

Q. In this case, you identify for us any failure of the hardware, that is failure of the model C sprinkler head?

A. You'll have to define "failure" for me. Of the device itself?

Q. Of the - -

A. You mean the device itself?

I have to define "failure"?

Q. I have to define "failure"?

A. You do.

Q. You don't know what failure means?

A. I know lots of kinds of failure and I don't know which one.

Q. Any kind of failure you want. I'm - -

A. Am I aware of any failure?

Q. I'm asking you what you probably think I'm asking you, which is the head itself, do you know of any facts or any evidence or any suggestion that the heads listed by UL failed?

A. I mean the most obvious thing to say is the fire in this case, the sprinkler heads that were listed failed to control the fire.

Q. Is there a defect, to your knowledge, in the sprinkler heads that appeared in that building?

A. I don't personally believe that there is - - I believe this head is suitable for use in many instances and that it will be effective, and this wasn't one of them, and that limitation wasn't called out.

Mr. Beyler, I have listened to you for two and a half days say that in response to virtually any question. . .

Q. Mr. Beyler, I have listened to you for two and a half days say that in response to virtually any question. But I don't think that's an answer to the question I'm trying to get at, which I think you know I'm trying to get at. Was there anything wrong with the head itself? I'm not talking about the system. I'm talking about a component of the system. The head.

A. I would not - - I would not want to identify in the context of this case a deficiency of the sprinkler head hardware. Simply - - Simply an issue of suited for use.

Q. Do you agree that in UL's listing of sprinkler heads that it is listing a component of a sprinkler system, i.e., the head, as opposed to listing the entirety of the systems into which the heads can be incorporated?

A. UL lists components.

Q. It doesn't list systems.

A. You mean sprinkler systems?

Q. Sprinkler systems. Correct. It doesn't list designs of sprinkler systems?

A. Correct.

Q. Have you been involved - - and you made reference to this just a moment ago perhaps. Have you been involved in obtaining UL listings on behalf of clients of yours?

A. Our firm has. I have not personally been engaged in that work.

Q. What is the basis for your understanding of UL's role in the listing of sprinkler heads?

A. I guess that - - I mean as an undergraduate fire protection engineer I began learning about it, continued to have read about it and have, you know, watched the process in the context of work of our firm.

Q. It is something that - -

A. It is something that I think ever, you know, degreed fire protection engineer has as part of his inherent education.

Q. I would like to ask you, sir, is there any aspect of the model C sprinkler head which, in your opinion, fails to comply with the requirements of UL 199?

A. I don't know.

Q. I would like to ask you, sir, is there any aspect of the model C sprinkler head which, in your opinion, fails to comply with the requirements of UL 199?

A. I don't know.

Page 629, Line 14

Q. Have you made any communication to anyone inside UL or, for that matter, outside of UL outside of the confines of your report that you have prepared here to the effect that UL should state limitations on clearance in its listings of sprinklers for standard sprinklers?

A. Certainly said that to other people in my firm in the context of this case.

Q. Outside of that?

A. No.

Q. You haven't said anything to UL?

A. I haven't.

Q. For that matter, have you made any formal proposal to NFPA that its standards be changed with regard to the clearance issue?

A. No.

Q. Why not?

A. I think that question was answered yesterday.

Q. I'm sorry if I missed it.

A. But, you know, as you indicated, we're all serving on lots of committees and there's, you know, hundreds of them around. I am not in the habit of sending comments in on all the different standards. Hughes Associates has someone on [the NFPA] 13 [committee]. I don't, you know, deal with that. I rely on other people to do that. There are too many committees and too many standards and too many things that we all are involved in. There are committees I have taken specific responsibilities for. I focus on those. I think that's appropriate.

Q. When I asked you to articulate the variable that a fire protection engineer needs to consider in designing a sprinkler system, you didn't mention clearance.

A. I didn't mention any building dimensions, no. I noticed that after the fact as well.

Q. Is that something that should be taken into account by the fire protection engineer as well?

A. Yes.

Q. You haven't said anything to UL?

A. I haven't.

Q. For that matter, have you made any formal proposal to NFPA that its standards be changed with regard to the clearance issue?

A. No.

- Q.** Do you agree that reasonable sprinkler system designers should know of that role that clearance has on sprinkler system performance?
- A.** I so indicated this morning?
- Q.** Yes?
- A.** I did, yes. And I thought in my report.
- Q.** So you agree that the ceiling height clearance issue is one that's well understood among those in the fire protection community?
- A.** I think yesterday I indicated that's certainly something that every - - that people who are involved in sprinkler systems, that is, the design of them, fire protection engineers in particular, should be aware of the issue. And it's important. In some cases apparently that's the case, and in other cases it's not. That is, some people do and some people don't.
- Q.** In your opinion, a reasonable designer would be aware of that problem?
- A.** A designer who's using, for instance, 231C should be quite well aware of the appendix material and take it into account, and that issue is addressed directly in the appendix if nowhere else. It exists lots of other places, but certainly there.
- Q.** Do you agree that UL listings of sprinkler heads is intended for the benefit of providing information to the fire protection community?
- A.** Providing more than information, I hope.
- Q.** Providing information and assurance that the products that are listed are in compliance with the standards to which they have been tested, correct?
- A.** In the case of a sprinkler head, that they are suitable for use in an NFPA 13 design.
- Q.** Fair enough. And that that communication is intended for the benefit of the fire protection community? That is, those who would use UL listings?
- A.** It is certainly the case that designers in particular look to UL, see the stamp, okay, go ahead. And then, of course, the people they're working for are indirectly relying on that.

- Q.** Do you consider the design of this sprinkler system, at the time of installation, to be in compliance with NFPA 13?
- A.** We did discuss that this morning. I'll try and do it again. The design process here didn't - -
- Q.** I don't need you to elaborate on that. I'm really asking a more limited question. Does the design, as installed, give the configuration at the time of installation, conform with NFPA 13?
- A.** Given the fuel configurations as they existed at the time of the fire - -
- Q.** Not at the time of the fire.
- A.** I'm sorry.
- Q.** At the time of the installation.
- A.** There was nothing in the building at the time of the installation.
- Q.** At the time it was turned over to the owner.
- A.** There still wasn't anything in it.
- Q.** Is an empty building or - - I mean it doesn't matter if it's empty or if it's packed to the rafters, I assume, for purposes of compliance with the standards. I'm asking at the time that it's turned over to the owner, that building, was that system as designed, in compliance with NFPA 13?
- A.** And it absolutely does depend whether it's empty or filled to the rafters. The contents of the building are not irrelevant here. They are the issue. It is not that -
- Systems do not exist in a vacuum.
- Q.** I'm sorry. I'm sorry, I didn't mean to make assumptions about your field that aren't valid, because I'm not a fire protection engineer. All I really want to know is, this system as designed for the configuration assumed by the people who did the design, at the time the building is turned over, and assuming the building is shortly thereafter occupied as contemplated by the designer, was that design in compliance with NFPA 13?

A. And I still have to answer the way I did this morning, because Mr. Martin never came to an understanding of how the east and west bay would be used, so you can't even evaluate whether the system was in conformance with 13, 231C, dot, dot, dot. Because the requisite work to even get to a place where you can evaluate it wasn't done. If you want to make assumptions that certain areas had certain commodities, which he never really came - - he never came to grips with, I can answer the question. He never came to grips with it. I'm not going to presume, unless we're going to do it on a hypothetical basis, what might be the design basis fire loads to evaluate the question of whether it was 231C or 13 compliant.

Q. I think my question asked you to assume occupancy in accordance with the assumptions made by the people who did the design. Leaving aside whether or not they contemplated something else or whether they knew something else. I'm really simply asking about the building as it was configured the way Mr. Martin said he assumed the building was going to be configured and occupied. I understand what you're saying about conceptual design, but I'm really asking you a really specific set of assumptions. I guess another way - - Go ahead. I was going to ask the question a different way, but if you're ready to answer go ahead.

A. Mr. Martin never took into consideration any fuel loads being present in the east bay. If you assume that there are no fuel load in the east bay as apparently he didn't, though not so stated in its design, then I believe that the system as installed satisfied [NFPA] 13 and [NFPA] 231C.

Q. Okay.

A. And I will add the caveats that I added this morning. I didn't do a detailed design review outside the area of interest for this case.

Page 638, Line 10

Q. Fair enough. When you were discussing your modeling yesterday, you said that one can't model every conceivable configuration. Do you agree that one cannot test for every possible configuration as well?

A. Yes.

Q. Fair enough. When you were discussing your modeling yesterday, you said that one can't model every conceivable configuration. Do you agree that one cannot test for every possible configuration as well?

A. Yes.

Q. Do you consider Grinnell a sophisticated purchaser in the field of fire protection?

A. A sophisticated purchaser?

Q. Or user of equipment. A sophisticated designer, if you will, in the field of fire protection? Grinnell as a company.

A. But there's Grinnell Fire Protection, the design arm, and then there's the people who actually produce the heads and the other components. That's a different - - my understanding that's a different company. I mean we're talking about fire protection. We're talking about the fire protection company, I presume.

Q. Yes.

A. I, like everyone - - most everyone else in the fire protection community, I think, I had at one time thought, like most other people in the fire protection community, that fire - - that Grinnell Fire Protection were sophisticated designers. I don't think that any more.

I, like everyone - - most everyone else in the fire protection community, I think, I had at one time thought, like most other people in the fire protection community, that fire - - that Grinnell Fire Protection were sophisticated designers. I don't think that any more.

Q. Why not?

A. Deposition records in this case. The depositions of Grinnell employees.

Q. Generally speaking, you consider Grinnell Fire Protection Systems a sophisticated entity in the field of fire protection? Correct?

A. The company certainly has generally a reputation of being a sophisticated fire protection company.

Q. Do you agree, sir, in this case that the limitations or criticisms that you have of the fire protection afforded in this case are leveled at this system as a whole as opposed to the use of the hardware?

A. As opposed to the use of the hardware?

Q. As opposed to the use of the hardware?

A. There's no doubt in my mind the sprinkler head was used inappropriately, because it didn't have - - in part because such limitations weren't provided by UL. On the other hand, it is correct that there is a systemic nature to the problems here inasmuch as the design standard fell down, the listings fell down, the design fell down. You could make the argument that having fixed any one of those would have changed the outcome here.

Q. Is it your understanding that Grinnell relied upon UL to provide clearance limitations if they were needed on sprinkler heads.

A. The only way I know how to respond to that is that from the deposition record of Grinnell employees, they were certainly relying on the NFPA standards which are themselves relying on the listing. NFPA 13 explicitly states that - - that components need to be used subject to the limitations provided in the listing.

Q. Right.

A. And so clearly NFPA's relying on the listing, Grinnell is relying on NFPA, they're relying on you [UL].

Q. I see. So NFPA is relying on UL or - -

A. UL and people like them.

There's no doubt in my mind the sprinkler head was used inappropriately, because it didn't have - - in part because such limitations weren't provided by UL. On the other hand, it is correct that there is a systemic nature to the problems here inasmuch as the design standard fell down, the listings fell down, the design fell down. You could make the argument that having fixed any one of those would have changed the outcome here.

And so clearly NFPA's relying on the listing, Grinnell is relying on NFPA, they're relying on you [UL].

- Q.** NFPA is, in its standards, requiring users of the standard to use listed products and that, in so doing, it's pointing consumers back to the listing itself? Is that what you're getting at?
- A.** Well, that - - that that paragraph in [NFPA] 13 is explicitly making reference to this marriage that I have been talking about between hardware listing and the design standard.
- Q.** Right.
- A.** And that the system relies on those two working together.
- Q.** NFPA standards tell one how to design and the UL standards regulate which hardware, which appliances can be used as components in a system designed in accordance with NFPA. Correct?
- A.** If you change the word UL "standards" to UL "listing", I will agree with you.
- Q.** Right. By UL standards I meant UL 199 standard, which is the reference point for the listing.
- A.** It is the listing. It's not the standard.

Page 643, Line 13

- Q.** All right. Understood. Mr. Beyler, at what height, if any, does the [Grinnell] model C sprinkler head, standard sprinkler head deviate from NFPA standards as concerns ceiling height?
- A.** Obviously in principle that is a question that is most directly answered through testing; and, of course, as you indicated, not every test can be done. The best indications that we have of Grinnell [Model] C with regard to ceiling clearance are the tests that were done in support of the development of 231C, which I don't honestly know what sprinkler head was used. So what we have is generic knowledge of what clearances can and cannot work. We don't have any specific knowledge of Grinnell [Model] C, where it will and will not work. I would endorse FM's 20 feet as my best guess.

Q. Is it your opinion that there is no compliant application or use of Grinnell Model C standard sprinkler head where clearances exceed 20 feet?

A. And 231C?

Q. No, period.

A. Period.

Q. You had 231 in your answer to my last question - -

A. Okay.

Q. - - but that wasn't part of my question.

A. I appreciate it.

Q. And it's not in this one either.

A. Okay. As I sit here, I can't think of an application with a clearance over 20 feet that I think it would be a suitable choice.

Q. Well, you agree, don't you, that if there is no storage, for example in the MacFrugal's building that we're discussing, and there's no storage in the east bay area, that the sprinkler head at the ceiling is properly specified? Correct?

A. With no fuel load, the trivial solution indeed is a valid solution. No fire, I don't care what you put at the ceiling. That's rather trivial.

Q. Okay. Let's assume then 10 feet of storage at the floor in the east bay area.

A. Will not work.

Q. It will not work?

A. Will not work.

Is it your opinion that there is no compliant application or use of Grinnell Model C standard sprinkler head where clearances exceed 20 feet?

Q. Okay. Let's assume then 10 feet of storage at the floor in the east bay area.

A. Will not work.

Q. It will not work?

A. Will not work.

Q. Is it out of compliance with NFPA 13?

A. NFPA 13 has no limitations on clearance whatsoever that I recall.

Q. Is it out of compliance with NFPA 13? Yes or no.

A. The previous question was whether it was compliant.

Q. Within [with] 10 feet of storage.

A. I think I may have answered the wrong question.

Q. Okay.

A. The prior questions was, “Well, you agree, don’t you, that if there is no storage, for example, in the MacFrugal’s building that we’re discussing, and there’s no storage in the east bay area, that the sprinkler head at the ceiling is properly specified? Correct?”

“With no fuel load, the trivial solution indeed in a valid solution. No fire, I don’t care what you put at the ceiling.”

“Okay. Let’s assume then 10 feet of storage at the floor in the east bay area.”

My answer was, “It will not work.”

Q. And my question is, is it compliant, the use of that sprinkler head at the ceiling given 10 feet of storage rather than no storage? Is it compliant with NFPA 13?

A. The sprinkler system design compliant with 13?

Q. Yes.

A. It is compliant with [NFPA] 13.

Q. Why do you opine that it will not work?

Q. Why do you opine that it will not work?

A. Because we have test data that’s included in appendix B [in NFPA 231C] with 10 feet of storage burning that is not controlled, and calculations that I performed with eight or nine feet, I am forgetting, which indicated there’s a similar result.

A. Because we have test data that's included in appendix B [in NFPA 231C] with 10 feet of storage burning that is not controlled, and calculations that I performed with eight or nine feet, I am forgetting, which indicated there's a similar result.

Q. Okay.

A. And the predicate commodity, which we haven't actually identified, is a Class II [commodity].

Page 648, Line 12

Q. Could I ask you, sir, if you could, specifically what limitation do you think UL should include in its listing of the [Grinnell] Model C standard sprinkler head?

A. Should limit the clearance allowed for its use.

Q. Specifically.

A. You mean what the should the number be?

Q. What would the limitation look like? What should UL state in its listing that it hasn't stated?

A. I would suggest that a suitable limitation would be Grinnell [Model] C should not be used in installations with ceiling clearance to commodities - - ceiling clearance, that is clearance to commodities - - in excess of 20 feet.

I would suggest that a suitable limitation would be Grinnell [Model] C should not be used in installations with ceiling clearance to commodities - - ceiling clearance, that is clearance to commodities - - in excess of 20 feet.

Q. Do you think it should do so despite its role as inspector and tester of the hardware pursuant to UL 199?

A. Despite 199? I would not have used the word "despite". But I think even, you know, give 199, it should. The 199 - -

Q. It's your opinion then, sir, that it should do more than that which it contracted to do when it entered into its listing agreement, and that - - You're shaking your head no, it shouldn't do that?

A. I'm sorry. I shouldn't be doing that. I should let you ask your question, and I apologize.

Q. Is it your opinion that UL should go beyond that which it states it does, i.e. performing analysis of the hardware for compliance with UL 199?

A. You take this constructively, because I'm trying to be - - 199 is the tool box. The engineer decides whether the equipment can be used. This is just his tool to achieve that. It's not that he will use all of them, it's not that he can use some of them out of it. It's his road map.

Q. I understand. Mr. Beyler, I'm going to ask you to assume - - Since you haven't been involved in a UL listing exercise or process in your own experience, I'm going to ask you to assume as fact that the purpose of and scope of UL listing is for the client manufacturer to ensure that the listed product performs in accordance with UL requirements. In the case of sprinkler heads, that's UL 199. I'm asking you to assume that as a correct statement of fact. My question to you is, with that assumption, is it your opinion that in performing that role, UL should go beyond that which it has agreed with its client is in its role and do something more than ensure compliance with UL 199.

A. With your hypothetical, I think UL should do what they tell their clients they're going to do and NFPA that they're not doing - - that UL is not doing what NFPA expects them to be doing. They are relying on listings to identify limitations. If there's no intention of doing that, please tell them.

Q. Is it your opinion that UL should go beyond that which it states it does, i.e. performing analysis of the hardware for compliance with UL 199?

A. You take this constructively, because I'm trying to be - - 199 is the tool box. The engineer decides whether the equipment can be used. This is just his tool to achieve that. It's not that he will use all of them, it's not that he can use some of them out of it. It's his road map.

- Q.** Is it your position that NFPA was not aware of clearance as an issue in the installation, design and installation of sprinkler systems?
- A.** Their standards reflect that they have an awareness to impose limits in some circumstances.
- Q.** Okay. So NFPA then, we can safely assume, is aware of the issue?
- A.** You can safely assume that the sprinkler committees are aware of the issue.
- Q.** And since NFPA requires listed products in NFPA 13, we can assume that NFPA is familiar with the UL requirements for a listing, correct?
- A.** And the requirements would be what in your view in this hypothetical?
- Q.** UL 199.
- A.** They are aware of the document, yes. They are familiar with the document.
- Q.** So what is it that UL ought to be telling NFPA, in your opinion, if it knows of the clearance issue already and it knows what UL is doing? Because UL says what it's doing in UL 199, what is it, in your opinion, Mr. Beyler, that UL ought to be telling NFPA that it's not doing?
- A.** This is still - - under your hypothetical?
- Q.** Yes, sir.
- A.** You should tell NFPA that you are not identifying limitations on hardware with regard to design configurations that are possible within 13, 231, 231C; that the hardware you're listing won't - - won't satisfy. Their - - Their document currently is relying on the listing to identify when that is - - that limitations exists.

So what is it that UL ought to be telling NFPA, in your opinion, if it knows of the clearance issue already and it knows what UL is doing? Because UL says what it's doing in UL 199, what is it, in your opinion, Mr. Beyler, that UL ought to be telling NFPA that it's not doing?

Q. When what limitation?

A. A limitation on the use of the hardware component, i.e. in this case a sprinkler head. If that's not what you - -

Q. This is a listing, I think we have already established, of the head, not of the various infinite number of configurations and systems into which it can be incorporated. Right?

A. Given.

Q. And NFPA 13 sets out the criteria for design and installation. Right?

A. They do. Under the assumption - -

Q. So are you telling me that UL has an obligation to tell NFPA what its design criteria ought to be?

A. No.

Q. So what is it that UL ought to be telling NFPA that NFPA doesn't already know?

A. It's faster if I read my own report.

. . . "In accordance with their listing" implies limitations. What does it mean to be in accordance with a listing if it's usable all the time? That means there's no - - no reason to say "in accordance with. The recognition is that limitations on the use of hardware do exist that may in some cases be with the design envelop defined by 13. And that the listing organization, if such limitations exist, that is, parts of 13 designs that cannot be accomplished with particular heads, then the listing agent should say so. If you don't intend to do that, they clearly think you're going under your hypothetical - -

[NFPA] 13 indicates that only listed sprinklers shall be used in accordance with their listing. In accordance with their listing. "In accordance with their listing" implies limitations. What does it mean to be in accordance with a listing if it's usable all the time? That means there's no - - no reason to say "in accordance with. The recognition is that limitations on the use of hardware do exist that may in some cases be with the design envelop defined by [NFPA] 13. And that the listing organization, if such limitations exist, that is, parts of 13 designs that cannot be accomplished with particular heads, then the listing agent should say so. If you don't intend to do that, they clearly think you're going under your hypothetical - -

Q. Who's "they"?

A. 13.

Q. NFPA?

A. The committee.

Q. Makes the - -

A. The committee.

Q. NFPA 13 thinks what?

A. That UL - -

Q. That UL?

A. - - will identify to the user of a head conditions of use within the envelope of designs possible under 13 in which that head will not perform.

Q. I see. So NFPA 13, as the standard for installation, applies to virtually infinitely broad series of configurations and it's your opinion that UL should identify those configurations where this sprinkler head will not produce - -

A. The intended result.

Q. The intended result being?

A. Control of fires.

Q. Control of the fire. That that's UL's responsibility to do that, to identify all the configurations out of the infinite series of possibilities, to identify the configurations where a fire is going to happen if you a Model C sprinkler head? Is that what you're saying?

A. The use.

Control of the fire. That that's UL's responsibility to do that, to identify all the configurations out of the infinite series of possibilities, to identify the configurations where a fire is going to happen if you a Model C sprinkler head? Is that what you're saying?

Q. Is that correct? Is that the essence of your opinion?

A. The range of design conditions that can exist are infinite just like the number of points you could put on the end of my pen is infinite.

Q. Indeed.

A. That “infinite” as used in your question isn’t relevant. There are - -

Q. It is to me. It is to the people doing the listing.

A. The range - - The range of conditions is very relevant. The number that exists within that range are not relevant. I don’t care and UL doesn’t care, I don’t believe, you know, whether some designs have two-inch clearance, others have five-inch clearance. I don’t, you know, think in general small changes matter. And that’s where the infinity arises. The envelope is what’s important. The area of

. . .The envelope is what’s important. The area of design variables that can be put together to create a system under [NFPA] 13 is the issue. Not the number of designs in it. Where the boundaries are.

design variables that can be put together to create a system under [NFPA] 13 is the issue. Not the number of designs in it. Where the boundaries are.

Q. Out of the endless variety of applications that a Model C sprinkler head can have and in the endless variety of architectural configurations where the system’s going to be installed and the infinite variety of uses to which that space is going to be put, UL has to identify within that envelope all of the possibilities where a fire’s going to happen if you use this head? And it has to do so in its listing of the head?

A. Yes.

Q. Okay. And when it's doing so, should it assume that those in the fire protection community are not capable of discerning the proper use of NFPA standards in the course of their design? Is that something that should be anticipated when it goes to define these various failure modes that can exist?

A. I think it is fair to assume a competent designer, remembering, this is the critical part, a designer doesn't get to do tests on the head. [NFPA] 13 doesn't get to do tests on the head. You're the only person who gets to do tests on these heads.

Q. And the people that get to do the tests -- do the tests that are specified in UL 199. Isn't that right?

A. They do what they need to do --

Q. Mr. Beyler --

A. -- to list.

Q. -- I'm asking you, the UL tests as it says it tests in UL 199. Correct or incorrect?

A. UL designed the protocols in [UL] 199 or otherwise adopted them. Their judgment, they were suitable tests to evaluate sprinkler heads to be used in NFPA 13 and associated standard designs. If UL, having designed the protocols, chooses to say "I do nothing more than satisfy these protocols without taking responsibility for the protocols," I guess UL has fallen to new lows. If that's what UL is about, I guess I'm fairly disappointed.

Q. Out of the endless variety of applications that a Model C sprinkler head can have and in the endless variety of architectural configurations where the system's going to be installed and the infinite variety of uses to which that space is going to be put, UL has to identify within that envelope all of the possibilities where a fire's going to happen if you use this head? And it has to do so in its listing of the head?

A. Yes.

If UL, having designed the protocols, chooses to say "I do nothing more than satisfy these protocols without taking responsibility for the protocols," I guess UL has fallen to new lows. If that's what UL is about, I guess I'm fairly disappointed.

Q. I'm sorry sir. I understood your answer except for the "without taking responsibility for the protocols." What is it that you had in mind there?

A. Your - - your questions says "We just tested to the standard. We just test to the standards." It's your standard.

Q. Right. And it's set out with specificity in UL 199.

A. It does.

Q. So if UL says that's what it does and it says that to NFPA, NFPA hears that and says, okay, fire protection community, we want you to use hardware that's been subjected to these analyses. Now, here are the criteria that you use in designing and installing that hardware. My question to you is, where has UL failed to do that which it has represented to its clients and to the fire protection community what it's done, when it says so very clearly and explicitly in UL 199 what it's done and nothing more? Notwithstanding your opinion about whether they have fallen to new lows.

A. The fire protection community relies on UL listing of fire protection devices to mean that they can be used in NFPA design standards - - in conjunction with NFPA standards to achieve certain results. My view is that this case indicates that that is not being realized.

Q. And my question is, is that because of the hardware or is it because of the application to which the hardware has been put?

A. And you cannot separate the two questions. Hardware isn't unilaterally right. Design isn't unilaterally right. It is a marriage. Both partners do their part and it works - -

Q. And who does the marriage between the choices?

A. I'm going to finish my answer now.

Q. Fair enough.

A. Okay. And like marriage, I didn't intend to use this, but it works, divisions of labor are not "this is my side of the street, this is your side of the street." That's not the nature of marriage.

And like marriage, I didn't intend to use this, but it works, divisions of labor are not "this is my side of the street, this is your side of the street." That's not the nature of marriage.

Q. I see.

A. And it's not the nature of the cooperation that's required between Underwriters Laboratory and the National Fire Protection Association.

Q. Do you have any facts or evidence or knowledge of any dissatisfaction on the part of NFPA with the role played by UL or the performance of obligations undertaken by UL with regard to its listings of sprinkler heads?

A. Well, I wouldn't - - I wouldn't presume to represent NFPA's views.

Q. So you don't know one way or the other whether NFPA is satisfied with its division of labor - -

A. Recognizing - -

Q. - - in the marriage as you put it?

A. Recognizing NFPA as an organization, whether the president thinks that or not is not the organization thinking that. It is a member organization.

Q. Those - -

A. You will find every conceivable view of that marriage with that organization, and probably find quite a range of views - -

Q. Right.

A. - - even with the committees in question. So the question isn't really a question, because the entity can't speak in the way - - I don't view the entity to be able to speak.

Q. And I wish we could say, but I guess we can't, that the answer is not an answer.

A. You can say that if you like.

Q. Do you have any facts or evidence or knowledge of any dissatisfaction on the part of NFPA with the role played by UL or the performance of obligations undertaken by UL with regard to its listings of sprinkler heads?

A. Well, I wouldn't - - I wouldn't presume to represent NFPA's views.

And I wish we could say, but I guess we can't, that the answer is not an answer.

- Q.** Is it your opinion that the listing of the component should specify the limitations of the systems into which it can be incorporated?
- A.** That's another way of stating what I have already said and something that UL does.
- Q.** Did it do it in the case of the Model C sprinkler head?
- A.** Not that I am aware of.
- Q.** What do you mean when you say that it does? Something that UL does?
- A.** Mr. Laverick in his deposition discussed a particular sprinkler head that - - that did have limitations on its use that - - with the context of 231, 231C and 231D.
- Q.** And that's at the request of a client manufacturer to look at that as an issue. Right?
- A.** I would expect that if that's - - that's as you indicate. You do work for clients and won't do things they don't ask you to do.
- Q.** Right. Are you aware of whether or not Grinnell or NFPA or anybody else has asked UL to undertake tests on clearance as a variable in the performance of a sprinkler head, Model C sprinkler head?
- A.** I'm not aware of any.
- Q.** Do you think it should have undertake to do so on its own?
- A.** I think it [UL] had two choices. You always have two choices. Having them, UL also like other people, recognizing clearance issue can either impose the limitation, that is, do the tests required for them to understand the limitation, or help - - work with NFPA to change the envelope. As if we're talking in the nature of the marriage, you can either - - you can change - - they work together. And UL, having - - having recognized the problem, has the option of dealing with it in their sphere or cooperating with NFPA to change the nature of the interface to make the problem go away.

Q. But NFPA recognizes the problem already. Right?

A. I think both - - I think both parties understand the problem.

Q. Okay. And so NFPA, as a consensus organization - -

A. The committees understand the issue.

Q. The committees understand the issue and the committees know what's in their standards, and the committees decide what goes into the standards. Right? The NFPA standards.

A. Yes.

Q. I'm sorry, but I just don't understand what it is that NFPA doesn't know that you say UL ought to be telling them. Could you identify that for me if there is something? If everybody knows, the committee knows, NFPA knows, what is it that UL's not doing here that you think it ought to be doing? And how does it do it?

A. UL does not have the limitations on a Grinnell [Model] C - -

Q. I know that.

A. That it knows it's listing it with knowledge of limitations that are not acknowledged.

Q. There is nothing inherent about the Model C sprinkler head or the tests performed in the course of coming to the listing that has anything to do with clearance at all, right? Clearance is a function of application, of installation, isn't it?

A. Clearance arise in installations and are parameters of performance of sprinkler heads. Both.

Q. But NFPA recognizes the problem already. Right?

A. I think both - - I think both parties understand the problem.

Page 667, Line 18

Q. Well, if NFPA knows that UL is testing to a certain protocol that's defined in the standard and that it lists in accordance with that protocol defined in UL 199, and they're also aware of the clearance as an issue that's not addressed in UL, I have trouble understanding why you're going to look to UL to tell NFPA something that's superfluous to its function, superfluous to what it's doing. It tells everybody, "Here what we're doing. See you later." I'm still looking for an answer. What is it that UL need to tell and to whom?

A. When listed sprinkler won't work.

Q. And who does it need to say that to? NFPA?

A. It needs to say it to the person who buys the head. That's what a limitation - -

Q. You're talking about the fire protection community that's using the listing?

A. UL needs to identify limitations on use for pieces of hardware so that the users community will know that this piece of hardware will not

work in configurations they otherwise would have assumed it would work. Because they are relying jointly on UL and NFPA. And it is a marriage. It is not them on the other side of the street, which is what's portended by you question, is the attitude.

Q. Mr. Beyler, I want you to answer my question.

A. Whoa.

Q. Mr. Beyler, I want you to answer my question.

A. Whoa.

Page 671, Line 5

Q. Do you agree that the NFPA standards are consensus standards that are arrived at through a process implemented by the American National Standards Institute?

A. Yeah, I don't know if all of the NFPA standards are ANSI, but otherwise I would agree.

- Q.** In terms of the process that is followed in implementing standards, you agree with that?
- A.** It's consistent with the ANSI process. Whether or not it's designated as ANSI or not.
- Q.** But could you define what is meant by the term "consensus standards"? NFPA says those standards, its standards are consensus standards in accordance with ANSI, so I'm asking you to explain what consensus standards mean.
- A.** Yes. No one ever asked me that question before. The key to a consensus process in the context of code development is participation of a wide range of all the relevant interests with regard to a particular piece of hardware system or process, and through input from that broad constituent based and through a process of comment and review, the hope is that a result will be achieved which is responsive to the community as a whole.
- Q.** Are you aware that the UL standards, including UL 199, is arrived at - - that those, too, are consensus standards, that they're arrived at by the same process?
- A.** I'm aware they're both ANSI processes, but I'm also aware that they're done by different ANSI processes.

Page 684, Line 14

- Q.** Apart from this case, have you ever before been critical in UL in any respect or UL 199 in particular?
- A.** You mean in a public sense?
- Q.** Any sense.
- A.** I have always looked at [UL] 199 and questioned how do these tests relate to the way sprinklers are really used?
- Q.** Did you ever get an answer?
- A.** No, I raised the question in my own mind in reading it. Said this looks far away from the kind of uses that I am aware of, you know. That's not something I, you know, asked the world to answer for me. But I questioned it myself, and I am sure other people have.

I have always looked at [UL] 199 and questioned how do these tests relate to the way sprinklers are really used?

- Q.** Do you agree that the fire protection community must have defined protocols for the various factors which have to be taken into account in determining whether or not a particular piece of hardware functions properly?
- A.** Description of a baseline test series required for that evaluation I think is valuable and necessary, what I called previously a tool box, yes.
- Q.** Is it your testimony that UL's role is to do something more that provide to the fire protection community the assertion that a given piece of hardware, when tested against the tools contained in the tool box, is up to snuff? When you use these tools, this hardware is fine?
- A.** Is more required that that? Is that - - was that the question. Let me read it.
- Q.** Does your answer to that question depend on what the people that are in the marriage or in the community think about what UL's role is?
- A.** Well, it's hard to say that one would be indifferent to that, because obviously what UL does is used and the world depends on.
- Q.** What UL does.
- A.** And what is perceived as well.
- Q.** Okay.
- A.** If it's perceived, and I am saying hypothetically, that UL does nothing, you know, then nothing will be - - no credence will be taken from it and it won't have any - - you know, then it doesn't matter. But under the realistic situation of it, UL does something and proffers test methods and does certifications, listings that indicate that equipment is suitable, it's hard to imagine the perception of UL's role and the view of UL - - one has - - you can't be indifferent to that. It has an effect.
- Q.** Well, then, if you accept as fact that NFPA and the fire protection community, that is, the people that use UL listings, understand and accept that UL's role is to ensure that a given piece of hardware performs in compliance with the protocols set forth in UL 199, would your opinions change about the suitability of UL's listing of the Model C head.
- A.** If that's all UL meant to the world, yes. It isn't. It's not the role that UL puts forth of itself as I understand. The design of those tests protocols are UL's. The world has faith those tests mean something in the context of the evaluation.

Q. They do indeed mean something, don't they? Those tests are fairly elaborate tests on the characteristics of the corrosion and density and pressure and water demand and everything else that's gone through in UL 199. You're not characterizing that as nothing, are you?

You're not characterizing that as a new low, huh?

A. Not at all.

Q. You're not characterizing that as a new low, huh?

A. I would not.

Q. Okay.

A. Those are valuable tests.

Q. These are simply baselines for performance of hardware components, correct?

A. Which - - which the fire protection world is relying on UL for.

Q. Right.

A. And needs.

Page 688, Line 6

Q. When I asked you earlier about if you were designing this sprinkler system and you responded that you saw no reason why the standard sprinkler head couldn't be used, what would you as a designer have done differently, assuming your specification of sprinkler was the Model C sprinkler head in this application?

A. I would have invoked limitations that neither UL or NFPA made me aware of with regard to ceiling clearance.

Q. I'm asking you specifically. I understand you're the designer and I'm not asking for the gun to be put back on my head. I'm assuming you're the guy put in charge of the design and you're going to use Model C sprinkler heads. You would do so with a height limitation, how? I assume you would do so with a height limitation. How would you do that?

A. Well, presumably we're talking about the east bay area.

Q. Right.

A. I think - -

Q. Presumably.

A. I don't know any design that I could come up with that wouldn't include the barrier we discussed this morning. And obviously ceiling-only sprinklers below that barrier might be suitable, depending on what we decided was going to be stored there. In-racks might be required depending on other ones. But indeed, the barrier would have been there and the ceiling clearance would have been 10 feet or less.

Q. Okay. And you would have done that notwithstanding the absence of the limitation which you call for in the UL listing?

A. The answer is yes.

Page 875, Line 10

Q. On page 45 of your report, the top paragraph, you make the statement, "The NFPA sprinkler standards, 13, 231, 231C, do not provide appropriate maximum ceiling clearance limitations for standard sprinklers." Is that your only criticism of the NFPA?

A. Yes, the only deficiency that I'm aware of in NFPA suite of sprinkler codes that relevant to this case would be that.

Q. At the same time, later in that paragraph, and also on page 9 of your report, I think you acknowledge the fact that any designer should take NFPA standards as just minimum requirements. Is that correct?

A. That is how they are generally understood and should be understood by a designer.

Q. Okay. And you would have done that notwithstanding the absence of the limitation which you call for in the UL listing?

A. The answer is yes.

- Q.** Specifically what would you have added to the NFPA standards to solve this problem? What would you have done? What would you have written into the standard?
- A.** Yes. As indicated in my report, other sections of 231C other than the Class I-IV areas do include ceiling clearance limitations. Most of those cases are ten foot clearance limit. Those are for higher hazard of commodities, plastic commodities. As well as advanced sprinkler technologies beyond the standard spray sprinkler. And it would seem to me if those limits are appropriate for those other commodities and those more advanced sprinklers, the same limitation should rationally appear for standard spray [sprinklers] for commodity class I-IV.
- Q.** Okay. You have to be a little clearer for me, at least.
- A.** Okay.
- Q.** And that is, to help me understand what would you have put in, for instance, 231C to solve the problem that you see exists? What specifically would you have put in there? A limitation of ten foot clearance?
- A.** Yes. I think that's consistent with the approach taken in other parts of the document.

Discussion

Prior to discussing the excerpts from Dr. Beyler's deposition, a little bit of background would be helpful.

The McFrugal's Warehouse had dimensions of approximately 1,000 feet by 1,000 feet (1 million square feet) with an attached two story office building. The office building was separated from the warehouse by a fire wall with a 4 hour fire resistance rating.

The center one-third of the warehouse had a ceiling height of roughly 70 feet and the ceiling height of the warehouse on either side was roughly 40 feet. The high bay portion of the warehouse was intended to house double-row storage racks with the top of storage approximately 65 feet above the floor. The other portions of the warehouse were intended to be utilized to facilitate the flow of merchandise into and out of the warehouse.

The center one-third of the warehouse had a ceiling height of roughly 70 feet and the ceiling height of the warehouse on either side was roughly 40 feet.

The double-row storage racks in the high bay portion of the warehouse were protected by in-rack sprinklers and large orifice high temperature sprinklers at the ceiling, while the portions of the building with lower roof heights were protected only by ceiling sprinklers.

The building was designed with excess capacity to accommodate the anticipated storage needs of the company, so initially storage racks were only installed in portions of the high bay section of the building. The portions of the high bay section of the building without storage racks were only protected by ceiling sprinklers (located roughly 70 feet above the floor). The portion of the high bay section of the building without storage racks was utilized in a similar manner as the lower roof sections of the building. These portions of the building were utilized for the staging of merchandise which would eventually be stored in the high bay racks or be shipped out of the building without ever entering the high bay racks.

The overhead portion of the sprinkler system protecting the high bay portion of the building was designed to provide a density of 0.45 gpm/SF applied over 2,500 square feet. The spacing of the sprinklers in the high bay portion of the warehouse was 77 square feet per sprinkler.

Several years after the building was completed, it was determined that the excess storage capacity provided in the high bay section of the building would never be required. In fact, the building was obsolete when the building construction was completed-the building owner had decided to utilize a different form of materials handling. Given this, the unneeded portions of the warehouse were leased to other companies.

Prior to the fire in the warehouse, the building owner decided to install multi-row racks in a portion of the high bay section of the building. The multi-row racks were three tiers high with the top of storage roughly 21 feet above the floor, which meant that the sprinklers protecting the multi-row racks would be roughly 50 feet above the top of storage.

The building owner was aware that in-rack sprinklers would be required in the multi-row racks and requested a quote from Grinnell for the installation of in-rack sprinklers. After receiving Grinnell's quote for the installation of in-rack sprinklers, the building owner made the decision not to install the two levels of in-rack sprinklers required in the multi-row racks.

Shortly before the fire which destroyed the entire building, loss prevention inspections conducted by property insurers noted that in-rack sprinklers were required in the multi-row racks. The insurance inspection reports also noted that the hazard of some of the goods stored in the building exceeded that of a Class IV commodity as defined by NFPA 231C. The insurance inspection reports also noted that containers of flammable/combustible liquids and aerosol containers were stored in the warehouse.

The travel distance increase variance negotiated with the City of New Orleans and the Louisiana State Fire Marshal's Office contained several stipulations on the goods stored in the warehouse. These stipulations specifically indicated that the hazard classification of the contents was to be limited to a Class IV commodity and that aerosol containers and flammable/combustible liquids were not permitted to be stored in the warehouse.

These stipulations specifically indicated that the hazard classification of the contents was to be limited to a Class IV commodity and that aerosol containers and flammable/combustible liquids were not permitted to be stored in the warehouse.

At roughly 5:30 AM in the morning on March 21, 1996, a fire was ignited in the multi-row racks apparently by a disgruntled employee. Employees attempted to control the fire with hose lines provided, but were unsuccessful. The New Orleans Fire Department (NOFD) battled the fire for roughly 5 hours prior to bringing the fire under control at about 10:30 AM and the fire was extinguished around noon.

At about 3 PM, a second fire erupted and with all of the sprinkler systems in the building shut down, the New Orleans Fire Department was unable to bring the afternoon fire under control. Eventually, the fire burned itself out and only the concrete exterior walls and floor of the warehouse survived. The four hour fire wall separating warehouse from the office building prevented fire spread to the office building, although the office building sustained heavy smoke damage.

It was never determined whether the afternoon fire was a re-ignite or whether the afternoon fire was caused by damaged electrical equipment which was re-energized to facilitate the clean up of the building in the early afternoon.

After the fire, it was noted that the remains of aerosol containers littered the floor of the warehouse.

With this background on the fire, a discussion of the deposition transcripts can commence.

Previous articles on this fire have discussed the sprinkler protection provided for the high bay portion of the building where the multi-row racks were provided. Would the installation of in-rack sprinkler protection within the multi-row racks affected the outcome of the morning fire?

It is my opinion that most in the fire protection field would agree that there is no doubt about it. The installation of in-rack sprinklers in the multi-row racks would have been of great assistance to the manual fire fighting efforts of the NOFD. It is not unreasonable to say that it is probable that the fire could have been controlled by the operation of 1 or 2 in-rack sprinklers prior to the arrival of the NOFD.

Even if the operation of in-rack sprinklers did not control the fire, certainly the activation of in-rack sprinklers would have made the discharge of the ceiling sprinklers more effective and would have limited the number of ceiling sprinklers which operated prior to the arrival of the NOFD. Given that the NOFD was able to control the fire without the assistance of in-rack sprinklers in 5 hours, there is no doubt that the NOFD would have gained control of the fire much sooner with help from the activation of in-rack sprinklers.

How much sooner, no one can really say, but it is my opinion that most fire protection professionals would bet that the in-rack sprinklers would have gotten the job done relatively quickly. It would not be unreasonable to guess that within 30 minutes of the arrival of the NOFD, the fire would have been under control if in-rack sprinklers had been installed as required by NFPA 231C/NFPA 13.

With that background above in mind, how is it that UL 199 and FM approval standards for sprinklers should be considered to be defective and, hence, both UL and FM should be liable for the fire at the McFrugal's Warehouse on March 21, 1996?

Further, with the background above in mind, how can the National Fire Protection Association and Factory Mutual sprinkler installation standards be considered to be defective and, hence, how can NFPA and FM be considered to be liable of the destruction of the McFrugal's Warehouse?

Dr. Beyler was never able to answer those questions.

With all due respect to Dr. Beyler, considering UL, FM and NFPA to be partly or wholly responsible for the destruction of the McFrugal's Warehouse is silly and I'm being extremely polite in my characterization of Dr. Beyler's assertions. There are far more eloquent technical terms than the term "silly" that would describe Dr. Beyler's assertions about the liability of UL, FM and NFPA in this incident, e.g., b.s., but it is probably best to refrain from the use of those technical terms.

"Science is nothing without truth-telling and honesty, and you're no scientist."

James Lewis

Perhaps one of the attorneys questioning Dr. Beyler characterized Beyler's assertions regarding the liability of UL, FM and NFPA in the McFrugal's Warehouse fire best with the following quote:

"And I wish we could say, but I guess we can't, that the answer is not an answer."

From the excerpts of Dr. Beyler's testimony above, it appears apparent that Dr. Beyler never was able to make a case against UL, FM and NFPA, but, for sure, it cost UL, [FM] NFPA and NFPA hundreds of thousands of dollars (combined) to defend themselves against Beyler's finger-pointing.

Hundreds of thousands of dollars would pay for a whole lot of sprinkler protection in single-family homes in the United States.

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