

McAUSLIN, et al v. GRINNELL CORPORATION, et al: BEYLER vs. CUSTER

By Richard Schulte

"In a time of universal deceit, telling the truth is a revolutionary act."

George Orwell

Background

The 2010 edition of NFPA 13 now contains provisions which address the use of roof vents in buildings which are protected by a sprinkler system. The roof vent provision and the documentation for inclusion of this provision in NFPA 13 are as follows:

"13-325 Log #CP43 AUT-SSD **Final Action: Accept**
(12.1.1)

Submitter: *Technical Committee on Sprinkler System Discharge Criteria,*

Recommendation: *Revise Section 12.1.1 as follows:*

12.1.1 Roof Vents and Draft Curtains.

12.1.1.1 *Manually operated roof vents or automatic roof vents with operating elements that have a higher temperature classification than the automatic sprinklers shall be permitted.*

Substantiation: *The intent of the [NFPA 13] standard is that roof vents and draft curtains should not be used in conjunction with storage protection. Previous language was unenforceable.*

Explanation of Negative:

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

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

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

“Substantiation: *The intent of the standard [NFPA 13] is that roof vents and draft curtains should not be used in conjunction with storage protection.”*

The Pic ‘N’ Save Warehouse was designed by design-build contractors, Broadmoor Corporation, in 1988/1989. The warehouse portion of the building had dimensions of approximately 1,000 feet by 1,000 feet. The ceiling height of the center one-third of the warehouse was roughly 70 feet, while the ceiling height in other portions of the warehouse was roughly 40 feet.

The building, also known as McFrugal’s Warehouse and the New Orleans Distribution Center (NODC), was designed for rack storage with a storage height of 65 feet in the high bay portion of the building. Portions of the building with lower ceiling heights were intended to be used to facilitate the flow of goods through the warehouse.

Initially, the storage capacity of the entire high bay section of the warehouse was not required so storage racks were only provided in the western portion of the high bay section. Prior to installing storage racks in the eastern portion of the high bay section of the warehouse, this portion of the warehouse was also intended to be used for staging of goods in the warehouse.

The double-row racks in high bay section of the warehouse were protected by ceiling sprinklers and in-rack sprinklers designed to protect a Class IV commodity (as defined by the rack storage standard, NFPA 231C). The ceiling sprinklers were high temperature large orifice sprinklers. The overhead system was designed to provide a density of 0.45 gpm/SF applied over 2,500 SF. Given that storage racks were not provided in the eastern portion of the high bay section of the warehouse, this portion of the warehouse was only protected by ceiling sprinklers located at the high bay roof. In other words, the sprinklers protecting the eastern portion of the high bay section of the warehouse were located 70 feet above the floor of the building.

Initially, the storage capacity of the entire high bay section of the warehouse was not required so storage racks were only provided in the western portion of the high bay section.

In order to store goods that would not fit in the storage racks, the building owners installed portable racks in a multi-row rack configuration in the eastern portion of the high bay section of the building. Given that the height of the storage in the multi-row racks was 21 feet, in-rack sprinkler protection was required. The building owners contacted the sprinkler contractor who had designed and installed the sprinkler system for the building, Grinnell Corporation, to get a quote for the in-rack system installation, but elected not to provide the required in-rack sprinkler protection in the multi-row racks.

In order to store goods that would not fit in the storage racks, the building owners installed portable racks in a multi-row rack configuration in the eastern portion of the high bay section of the building. Given that the height of the storage in the multi-row racks was 21 feet, in-rack sprinkler protection was required. The building owners contacted the sprinkler contractor who had designed and installed the sprinkler system for the building, Grinnell Corporation, to get a quote for the in-rack system installation, but elected not to provide the required in-rack sprinkler protection in the multi-row racks.

About 5:30 on the morning of March 21, 1996, a fire occurred in the multi-row racks located in the high bay section. Given that the only protection provided for the multi-row racks was the overhead system located roughly 50 feet above the top of the storage, the sprinkler system failed to control the fire. Despite the fact that the sprinkler protection was inadequate, the New Orleans Fire Department (NOFD) was able to bring the fire under control at about 10:30 and by noon the fire was extinguished.

About 5:30 on the morning of March 21, 1996, a fire occurred in the multi-row racks. Given that the only protection provided for the multi-row racks was the overhead system located roughly 50 feet above the top of the storage, the sprinkler system failed to control the fire.

In order to facilitate the clean-up operation at the building, the building operator requested permission from the NOFD to turn the electrical power for the building back on even though sprinkler system control valves throughout the building remained closed. At about 3 PM that same afternoon, a second fire occurred and since the sprinkler protection provided for the building was not in service, fire spread throughout the entire building.

After the fire, the only portions of the structure which remained were the concrete floor and concrete exterior walls of the warehouse and a two story office building separated from the warehouse by a 4 hour fire wall.

One of the insurers for the property was Lloyd's of London. Lloyd's retained legal counsel within days of the fire. Given the facts surrounding the fire, the plaintiffs attorneys had difficulty finding expert witnesses, however, eventually Dr. Craig Beyler and Richard Custer were retained as experts.

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The Experts' Reports and Testimony

In Dr. Craig Beyler's expert report and depositions in this litigation, Beyler maintained that Grinnell Corporation and others were responsible for the loss due to the fact that the defendants never informed the building owner on the limitations of the protection for the east portion of the high bay section of the warehouse. Beyler further asserted that the protection provided for the eastern portion of the high bay section was inadequate for any type of storage due to the clearance between the sprinklers and the floor, that the installations of in-rack sprinkler protection in the multi-row racks as required by NFPA 231C would not have made any difference in the outcome of the fire and that the building should have been provided with draft curtains and roof vents, although these two features were not required by the building code.

Beyler further asserted that the protection provided for the eastern portion of the high bay section was inadequate for any type of storage due to the clearance between the sprinklers and the floor, that the installations of in-rack sprinkler protection in the multi-row racks as required by NFPA 231C would not have made any difference in the outcome of the fire and that the building should have been provided with draft curtains and roof vents, although these two features were not required by the building code.

The following are excerpts from Dr. Beyler's expert report and depositions in the litigation:

“However, he [Schulte] failed to examine the role of smoke and heat venting beyond its role in egress. He never acknowledged any other role of venting though the 1988 edition [of the Standard Fire Prevention Code] has requirements for venting in Chapter 36 without reference to egress issues. By failing to examine the role of venting in a more general manner, he provided a faulty recommendation that vents were not required. The value of smoke and heat vents with draft curtains in sprinklered buildings in cases where sprinkler[s] do not operate or are otherwise ineffective is widely acknowledged, and there is definite evidence that smoke and heat vents are value when sprinklers do perform as intended. At the time NODC was designed, the Standard Fire Prevention Code required smoke and heat vents with draft curtains in sprinklered storage facilities and insurance companies like IRI similarly required their use. **Had a properly designed smoke and heat vent system with draft curtains been designed for this building, the activation of sprinklers throughout the building could have been avoided, and the distribution of burning**

brands throughout the facility would have been controlled. As this is not a standard building, the design of this system would have required an engineering approach. This is clearly anticipated in the note to Table 3607 in the 1988 edition.

“Smoke and heat vents with draft curtains should have been included in the NODC and should have been designed by a qualified Fire Protection Engineer. Their inclusion in the NODC would have prevented the activation of sprinklers throughout the facility and would have controlled the distribution of burning brands. As such, the damage resulting from the rekindle would have been eliminated.”

“The value of smoke and heat vents with draft curtains in sprinklered buildings in cases where sprinkler[s] do not operate or are otherwise ineffective is widely acknowledged, and there is definite evidence that smoke and heat vents are value when sprinklers do perform as intended.”

“Had a properly designed smoke and heat vent system with draft curtains been designed for this building, the activation of sprinklers throughout the building could have been avoided, and the distribution of burning brands throughout the facility would have been controlled.”

Editor's Note: “*A qualified Fire Protection Engineer*” would have known that there were concerns that the automatic opening of smoke/heat vents could adversely affect the operation of the sprinkler system and the capability of the sprinkler system to control the fire. These concerns had been expressed since the 1970's. These concerns have now been explicitly addressed in the roof vent provisions contained in the 2010 edition of NFPA 13. Hence, “*a qualified Fire Protection Engineer*” would not have recommended the installation of automatic smoke/heat vents and draft curtains in 1988 (or in 2010).

“In the east and west high bay areas, the [sprinkler] design as implemented did not protect against fires in those areas at all. The protection provided was simply based on extending the rack ceiling [sprinkler] protection and in anticipation of potential future expansion.”

Page 85, Line 25

Q. . . . but is it fair to say that there is significant disagreement in the literature with respect to the efficacy of smoke and heat vents?

A. There's disagreement - - I mean the principal people who think that smoke and heat vents needn't be used is Factory Mutual. I mean they are - - they are the principal organization who advocates against their use. So Factory Mutual has, you know, for decades said they aren't - - the basis for not, quote, liking them or not wanting them to be used is they don't regard them as cost effective. They don't make an argument on the - - primarily on the basis of efficacy. They do it on the basis it's just not worthwhile. There have been claims made, you know, casually, as if it were, that, you know, they don't work sufficiently well to be worthwhile. But that's the nature of the discussion, whether they're - - really whether they're cost effective.

“In the east and west high bay areas, the [sprinkler] design as implemented did not protect against fires in those areas at all.”

[Break in transcript]

Q. Just so that the record is clear, is it your testimony that it's only FM that opines against or does not advocate the installation of draft vents and smoke removal systems?

A. No, they're the one who advocate against it.

Q. Let me rephrase the question. Other than FM, to your knowledge does anyone take a similar stance that FM takes with regard to heat vents and smoke removal systems?

A. There certainly are people who do.

Q. Professionals in the field?

A. Sure.

Q. Professionals in the field who have published outside of Factory Mutual?

A. Yes, sir. In that box is a review paper that goes through this.

Q. We will get to that.

A. We could refer to that. As I sit here, and obviously the review paper I prepared was for the purpose of reviewing this, it's probably better than my memory, but I can't think of anybody outside of FM who's published a research paper to that effect.

Q. . . . Other than FM, to your knowledge does anyone take a similar stance that FM takes with regard to heat vents and smoke removal systems?

A. . . . As I sit here, and obviously the review paper I prepared was for the purpose of reviewing this, it's probably better than my memory, but I can't think of anybody outside of FM who's published a research paper to that effect.

Page 465, Line 14

Q. When you were retained, what was your understanding of the services that you were to provide?

A. My understanding of what I was being asked to do was to develop an understanding, do technical work required to develop an understanding of what a, generically, cause - - a cause of a loss, that is why was the loss as big as it was and what factors played a role in the loss becoming what it was.

[Break in transcript]

Q. Did you come up with a singular cause of the loss or were there multiple causes of the loss?

A. And the answer to that question is the substance of the entire report.

Q. With respect to the factors that led to the magnitude of the loss, I would like you to identify those.

A. Given the ignition, the fire grew in the fashion it did, was not controlled by the sprinkler system, which was inadequate to the hazard present, and caused fire not to be controlled by the sprinkler system, leading to excessive numbers of heads to be activated throughout the building, effectively leaving the building unprotected from a sprinkler [protection] point of view.

[Break in transcript]

Q. What are the other factors that led to the magnitude of the loss?

A. The, what I will call, mismatch or inadequacy of the sprinkler protection vis-a-vis the hazard presented; also my opinion that the absence of smoke vents and draft curtains was an important factor in the activation of sprinklers throughout the facility.

Q. What are the other factors that led to the magnitude of the loss?

A. . . . also my opinion that the absence of smoke vents and draft curtains was an important factor in the activation of sprinklers throughout the facility.

Q. With respect to the factors that led to the magnitude of the loss, I would like you to identify those.

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Q. Could you be more specific than that? When you say “was an important factor,” what do you mean by that.

A. Basically that the - - that by including smoke vents and draft curtains provides a mechanism by which heat can be vented from the building in the proximity to or that area of the building where the fire is and avoiding the movement of hot gases from the area of the fire to the building in general. By venting it near the fire, in essence the extent of sprinkler activations would have been quite substantially reduced.

[Break in transcript]

Q. Isn't it true that there is a significant disagreement within the fire protection community with respect to the efficacy of roof vents and draft curtains?

A. I think any disagreement that exists would best be cast around the term “cost effective” rather than whether they're effective.

Q. Their presence can also increase sprinkler water demand. Isn't that so?

Q. Isn't it true that there is a significant disagreement within the fire protection community with respect to the efficacy of roof vents and draft curtains?

A. I think any disagreement that exists would best be cast around the term “cost effective” rather than whether they're effective.

“There's evidence for cases where smoke and heat vents with draft curtains reduces the sprinkler demand. There are cases where it increases sprinkler demand. The one geometry that most notably has seemed to increase water demand sometimes is with the fire directly under the draft curtain. That had not been identified at the time of this design, but it is now - - has now been identified.”

- A.** The evidence for increasing - - There's evidence for cases where smoke and heat vents with draft curtains reduces the sprinkler demand. There are cases where it increases sprinkler demand. The one geometry that most notably has seemed to increase water demand sometimes is with the fire directly under the draft curtain. That had not been identified at the time of this design, but it is now - - has now been identified.

Page 690, Line 8

- Q.** . . . As I appreciate your testimony, the presence of in-rack sprinklers in your view would have been irrelevant to the extent of the damage caused by the first fire. Correct?
- A.** If by that you mean if we had the 21 foot racks with two tiered in-rack sprinklers at two heights, that is, at the top of the first and second tier, with the third tier unprotected, that is, relying on the ceiling sprinklers as would normally occur, yes, I did opine that the sprinkler would not have controlled the fire either.

Page 694, Line 12

- Q.** All right. Would you agree with the proposition that the primary hazard here was the clearance, the excess clearance, in the hierarchy of hazards?

- A.** In the hierarchies of deficiencies, I would put the clearance at the highest. But in terms of hazards, the clearance isn't as much a hazard as a deficiency. The type of commodity and form of storage is normally what's regarded as the hazard.

[Break in transcript]

- Q.** All right. I'll use your terminology and refer to it as a deficiency. In the hierarchy of deficiencies, it's the excessive clearance that was the primary problem here, correct?

- A.** It's primary because there was no system with the clearance that was present that could have worked.

Q. . . . As I appreciate your testimony, the presence of in-rack sprinklers in your view would have been irrelevant to the extent of the damage caused by the first fire. Correct?

A. . . .yes, I did opine that the [in-rack] sprinkler[s] would not have controlled the fire either.

Q. Earlier in your testimony, if I am not mistaken, I think you suggested, and correct me if I am wrong, that you didn't think that in-rack sprinklers would have been of any use in preventing or putting this fire out. Is that correct? And if I misstate what you said, please state if the way you said it before.

A. Yes. And the -- let me try and complete the picture so that we're both clear. This was with regard to the three tier portable racks in the east end of the building as it existed at the time of the --

Q. Correct.

A. Right. And if -- what I had said was normal in-rack sprinklers would include up to -- you know, within the tiers, not above the tiers, and that the fire would spread vertically to the top tier. That tier would burn and spread and would not be controlled by that system.

Q. Okay. So what you're saying is that even if there had been in-rack sprinklers in existence at, say, a 7 foot and a 14 foot level, that this fire would have gone ahead, would have gone ahead, would have happened even if they had had the in-rack sprinklers?

A. Yes, I have given that opinion.

Q. And what do you base that --

Q. . . . I think you suggested, and correct me if I am wrong, that you didn't think that in-rack sprinklers would have been of any use in preventing or putting this fire out. Is that correct? . . .

A. Yes. And the -- let me try and complete the picture so that we're both clear. This was with regard to the three tier portable racks in the east end of the building as it existed at the time of the --

A. Right. And if -- what I had said was normal in-rack sprinklers would include up to -- you know, within the tiers, not above the tiers, and that the fire would spread vertically to the top tier. That tier would burn and spread and would not be controlled by that system.

A. I base that on the modeling work that I did and the experiments that are cited in the appendix to 231C. One that I called out in the report in particular where a 30 foot rack with two [levels of] in-rack sprinklers, I think it was two, that's my recollection, with a ceiling clearance of 30 foot, Class II commodity, two rack configuration, was not controlled.

Q. In your modeling where did you assume the fire started, at what level?

A. The modeling is consistent with being ignited at the base of the commodity.

[Break in transcript]

Q. I don't - - am I understanding you to say that you believe if there were in-rack sprinklers at a 7 foot level and a 14 foot level, that they would not have put a fire out that started at the base; that it would have gone up to 21 feet and, therefore, the only possible way to put the fire out above the 14 foot level would be the ceiling sprinklers? Is that what you're saying?

A. Yes, I have said - - you know, I have said this before today, that - - and in particular, that was a question of this very question, where I had related that the in-racks are activated by fire plumes, as opposed to ceiling sprinklers which are activated by the ceiling jet, and that there is a possibility that the fire might have initiated fortuitously in a position whether rack sprinkler would be just directly above it so that it would

Q. So you're saying that flame would have spread past the in-rack sprinklers, igniting the level above before the in-rack sprinklers could have put it out?

A. In many instances. In most instances.

be activated before the flame passed by; but that most of the time, or in most - - you know, assuming random locations of ignitions relative to where the in-racks are, you wouldn't be able to count on that. That most of the time you would not be close enough to an in-rack to allow that plume to hit it before it spread past it.

Q. So you're saying that flame would have spread past the in-rack sprinklers, igniting the level above before the in-rack sprinklers could have put it out?

A. In many instances. In most instances.

Q. And how is that reflected in your modeling?

[Break in transcript]

A. The height of the top tier in the portable rack is seven feet tall. So what I have modeled is a fuel array eight feet tall, very similar to, slightly greater than the seven feet tall storage that existed in the top tier of the portable racks. So if we make the assumption that the in-rack sprinklers are very effective with regard to fires in the first and second tiers, what do we have left? We have 7 foot high storage that can burn. The performance of that top tier of the portable racks would be very similar to an eight foot high storage array that doesn't have material below it. Because effectively when we look at and assume that the in-racks would be very effective, just by thinking about that in the context of just removing those two tiers, they won't play a role, they will be controlled easily, just assume they're not there and just think about the top tier by itself and how it would burn versus the palletized storage which is one foot taller than that. So that's - - that's how I used that result - -

Q. Okay.

A. - - to come to that conclusion. Similarly, the test that we refer to in the appendix, my recollection is that was a - - that there were it was ten feet above the in-racks, and the description of the test indicates that, as I assumed in the others in my modeling, or my use - - my ability to use the modeling to come to the conclusion, was that the - - that the materials protected by the first and second tier in that test were well-controlled and that the area above the second tier sprinklers is what burned, spread and was not able to be controlled. And I would observe also, in connection to, too, help with the earlier answer, all the tests, that test and all the other tests done within that test series that are referenced in the appendix are ignited at the base of the storage. So they would have done exactly what I was talking about, bypassed the first and second tiers, igniting the third tier. First and second tier are subsequently controlled, third tier is not.

Page 932, Line 25

Q. Now, would you agree with me, Mr. Beyler, that the fire dynamics of a fire that starts in portable racks that are stacked three high, eight deep, some 50 long, with sprinklers in the racks, is going to be different from one that doesn't have sprinklers in the racks?

A. I mean we both understand that's an incomplete hypothetical, but as a general principle, I would say yes.

[Break in transcript]

- Q.** Right. Would you agree with me under that same scenario, with all other things being equal, that the amount of heat and smoke generated by one fire in the racks that were sprinklered would be less than that which was generated by the racks that were not sprinklered. Would be less than the racks that were not sprinklered? Do you understand my question?
- A.** Yes. It's possible that they could be similar. It's possible. But it's also possible that the in-racks would reduce the damage.

[Break in transcript]

- Q.** - - if you have two like situations and the only difference in the sprinklers in the racks versus not sprinklered in the racks?

- A.** The addition of in-racks, which is basically what we're talking about, may have no effect on the damage or - - or may reduce the damage. If I didn't say that, and from your reaction I may not have. That's my intention. It makes no difference or may make it better. That is, less damage.

“The addition of in-racks, which is basically what we're talking about, may have no effect on the damage or - - or may reduce the damage. If I didn't say that, and from your reaction I may not have. That's my intention. It makes no difference or may make it better. That is, less damage.”

[Break in transcript]

- Q.** Right. Let's take the question and place it within the context of what we had out at the facility here in New Orleans. Would your answer be any different.

The configuration as you know it to have existed at the time of the fire with the system, sprinkler systems in place, the only difference between the two factual scenarios is one has in-rack sprinklers, and I'll qualify that it in accordance with [NFPA] 231C, and one does not; would you expect to have an instance where a fire that occurred within the rack system would generate the same amount of smoke and heat, one having sprinklers, one not having sprinklers?

- A.** No, it wouldn't.

[Break in transcript]

Q. My specific question is, would not the generation of heat and smoke be significantly less?

A. Oh. I thought I was saying yes a minute ago.

Q. Well, I would like to see. If you can say, yes, say yes, please. Is it yes? It's significantly less with the sprinklers in the racks? Is that correct?

A. It is correct that it would be significantly less.

Q. Is it possible to measure that effect, that significant effect?

A. Are you asking whether - - it's certainly possible to measure, and measure usually mean experimental, and I also think it's possible to estimate the effect.

Q. Okay. Did you make any attempt to do so?

A. Quantitatively, no.

Page 944, Line19

Q. A fire that occurred in sprinklered racks in the configuration that existed at the NODC at the time of this fire would be a fire that would be much more easily controlled by either personnel with the facility or the fire department, is that not correct, than what we had out there at the time of March 21st, 1996?

A. I don't give much hope to the personnel in the building in either case. So I'll focus on the fire services if that's okay.

Q. Whatever way you want to answer the question, go ahead.

“ . . . The fire service would be faced with a different fire certainly, something that, you know, might be something on the order of half the size of the fire that they saw. . . So in terms of control, in terms of the area that would burn, you might do a little better, but I'm not envisioning you do a lot better. . . ”

A. Well, I guess I'll answer in two parts. The two parts as you dealt with, I don't think that the in-racks would have helped the building personnel put the fire out. The fire service would be faced with a different fire certainly, something that, you know, might be something on the order of half the size of the fire that they saw. Because of the multiple row nature of the commodity, they're largely restricted to obviously working from the periphery, which in some measure means you have to wait for the fire to come to where you are because you don't have access to the fire very well within the core of the multiple row racks. So in terms of control, in terms of the area that would burn, you might do a little better, but I'm not envisioning you do a lot better. You would certainly have a harder time - - you would have a less hard time of it, would be less challenging to you physically, but I'm not sure the actual lateral extent of spread would be much different.

[Break in transcript]

Q. Mr. Beyler, if we had this fire in the exact location and there had been in-rack sprinklers in those racks, would we have had a fire where flames burned a hole through the ceiling of the facility 70 feet up in the air?

A. Yeah, I can't say whether the - - the fire with the in-racks would have caused venting or not. Obviously it's not going to get any worse. It can only get better. This is less likely that it will vent. I can't say specifically that I - - that I know that if in-racks had been provided we wouldn't have had venting. I don't know one way or the other.

[Break in transcript]

Q. Would you agree with this statement? If early control of the fire by in-rack sprinklers installed in the portable racks was achieved, the area where ceiling sprinklers would have operated would have likely been limited to the vicinity of the fire?

A. If we have in-rack sprinklers that are in fact able to control the fire - - did you say in its early stages? Well, it would be, if it did at all, it would be that.

“Well, any - - any fire that in-rack sprinklers would control would not activate a ceiling sprinkler.”

[Break in transcript]

Q. Right. Would there not be situations where if in fact the fire occurred directly below an in-rack sprinkler that you wouldn't even have ceiling sprinkler activation with the clearances that we're talking about here, 50 feet?

A. Well, any - - any fire that in-rack sprinklers would control would not activate a ceiling sprinkler.

Page 959, Line 3

Q. To what extent, Mr. Beyler, did you evaluate the effect that smoke or heat vents, and/or draft curtains would have had on the loss that was incurred as a result of the first fire?

A. Well, I have considered how a smoke and heat vent system could have benefitted us in this - - in this fire, but absent a specific design, because none was in place, of course, I have not specifically evaluated the role of a smoke and heat vent system in - - hypothetically in an incident like this.

Q. So you have no opinion as to what effect, if any, smoke and heat vents had on the amount of the loss that was suffered as a result of the fire?

A. Smoke and heat vents could have prevented the spread of heat to remote parts of the building by providing venting.

Q. Could have or couldn't? You said could have?

A. Could have. I mean you could design a smoke and heat vent system that would have done that.

[Break in transcript]

Q. Well, I want to ask you this question then. Had there been some type of smoke and heat vents with draft curtains installed in this building, can you tell me with any degree of certainty that would have had any impact, any effect on the amount of the loss resulting from the fire?

Q. So you have no opinion as to what effect, if any, smoke and heat vents had on the amount of the loss that was suffered as a result of the fire?

A. Smoke and heat vents could have prevented the spread of heat to remote parts of the building by providing venting.

A. I could envision a smoke and heat vent system included a draft curtain between the high rack area and the east bay area of substantial depth with smoke and heat vents in the east bay, not that it wouldn't be elsewhere. But I'm interested in focusing on that because of the fire, that would have contained the heat and smoke from that fire to the east bay area such that sprinklers above the high rack - - excuse me, the high bay racks and the in-rack sprinklers in the high bay racks would not have been exposed to heat, and, hence, would not have operated. And I can similarly envision that system not allowing the spread of burning embers from the east high bay area to the high - - the high rack - - high bay rack area as well. Those having been accomplished, the sprinkler operations would have been limited to the east bay area and obviously we have the potential of never having had the second - - the rekindle, because the ember would not have traveled to where it did, and certainly the sprinkler system would not have been activated in those areas, and, hence, we wouldn't have had - - had that second - - the rekindle occur. We would have - - at least have had an operational sprinkler system in that area of the building with presumably very different outcome.

Q. Have you ever designed such a system that you just described?

A. No.

Q. Do you know of anyone in your firm that has designed such a system?

A. Not that I am aware of.

Page 970, Line 1

Q. Do you have an opinion as to whether you believe that an insurance company who underwrites the risk of the contents would have an understanding or should have an understanding as to the effect of draft curtains and roof vents and smoke vents as it relates to the extent of damage that might occur as a result of a fire in that particular facility?

A. So if I understand that correctly, do I have an opinion as to what an insurance company should know?

Q. I'm asking you whether you have an opinion as to whether you believe that an insurance company who underwrites the risk of the contents would have an understanding or should have an understanding as to the effect of draft curtains and roof vents and smoke vents as it relates to the extent of damage that might occur as a result of a fire in a particular facility.

A. I would say that by and large they don't understand that. Whether they should? I'd like them to, but I don't see that as anything other than what I'd like everyone to understand.

Q. A fire protection engineer would understand it, wouldn't he?

A. I would hope so.

Q. Do you know if Lloyds' of London ever inspected this facility?

A. I don't know.

Q. The lack of draft curtains, smoke vents, and roof vents is pretty obvious when you walked into this building; isn't that correct?

A. I would have thought that.

Q. I'm asking you whether you have an opinion as to whether you believe that an insurance company who underwrites the risk of the contents would have an understanding or should have an understanding as to the effect of draft curtains and roof vents and smoke vents as it relates to the extent of damage that might occur as a result of a fire in a particular facility.

A. I would say that by and large they don't understand that. Whether they should? I'd like them to, but I don't see that as anything other than what I'd like everyone to understand.

Page 971, Line 22

Q. You would agree with me, would you not, that there are many, many buildings that have been designed and constructed that do not have smoke vents, roof vents or smoke control systems?

A. Yes.

Q. And there are in fact code organizations that do not require smoke vents, draft curtains, roof vents, is that correct?

A. I mean, for instance, at this particular time, two of the three national codes do require [vents and draft curtains]. The third does not.

Q. Would you agree with me that the fact that draft curtains or roof vents were not designed into a building does not in and of itself constitute some deviation from a standard of care?

A. Could you repeat the question?

Q. Sure. Would you agree with me that the fact that draft curtains or roof vents were not designed into a building does not in and of itself constitute some deviation from a standard of care? And the standard of care I'm talking about is people who design buildings and fire protection systems.

A. It need not in and of itself.

Q. Do you consider the decision to install draft curtains and roof and smoke vents to be an economic decision to be made by the owner?

A. It's - - sometimes.

Q. Okay. In what instances would it be an economic decision.

A. Well, the first thing would be one where it isn't required by law. Obviously if it's required by law, then it's not an economic decision. And then assuming that life safety is not impacted by that, which would include both fire fighters and the building occupants, or obviously impact the community in some fashion.

Q. Is it your opinion that smoke and roof vents and draft curtains were not required by law in this particular instance for this building?

A. My recollection - - my recollection was that smoke removal was required, but not smoke and heat vents in particular.

Q. Is there not a distinction between smoke and heat vents and smoke removal systems?

A. Smoke removal systems is a broader term in my view.

Q. Is the basis of your understanding the 1985 Standard Fire Prevention Code?

A. Yes.

Q. Does the 1985 Standard Fire Prevention Code distinguish between smoke vents and roof vents and smoke removal systems? Do you understand my question?

A. I don't remember what the '85 Fire Prevention Code says about smoke and heat vents, but I would imagine it makes a distinction in the same way that I indicated a smoke removal system is different, a broader term which is inclusive of smoke and heat vent systems and other means of removing smoke.

[Break in transcript]

Q. So in that particular situation, it's your opinion that roof vents and draft curtains were not a legal requirement in connection with the design of this project. Is that correct?

A. Yes, as I have previously indicated that.

Page 1010, Line 9

Q. Now, in your review and investigation, were you able to determine to what extent there were Group A plastics stored in these portable racks at the time of the fire?

A. No, I wasn't able to.

[Break in transcript]

Q. Now, in your review and investigation, were you able to determine to what extent there were Group A plastics stored in these portable racks at the time of the fire?

A. No, I wasn't able to.

Q. From your standpoint it didn't make any difference whether there were Group A plastics or not as you conducted your investigation?

A. My understanding is that the outcome would have been the same without regard to which commodity classification was actually in place, yes.

Q. And what's the basis for that?

A. Well, I modeled Class II commodity and the sprinkler system couldn't control the fire and so clearly anything above a Class II commodity would have shared that same problem. So if it had been III, IV or Group A plastic, the outcome would have been the same. This is, the fire would not have been controlled.

[Break in transcript]

Q. But as with regard to ten foot clearance, it could have made a difference? Yes or no.

A. Three tiered, ten foot clearance, multi-row racks, the presence or absence of encapsulation and the commodity classification, be it IV or V, under those hypotheticals could well have made a difference in the control of the fire.

Q. From your standpoint it didn't make any difference whether there were Group A plastics or not as you conducted your investigation?

A. My understanding is that the outcome would have been the same without regard to which commodity classification was actually in place, yes.

Page 1100, Line 7

Q. Now, is it your understanding that the fire protection systems for this facility were designed based upon a Class IV commodity?

A. In the high rack areas.

Q. Do you know of any other area where the building was designed to meet a different commodity classification?

A. I don't know of a different commodity classification.

Q. So it's your understanding it's Class IV commodity. So if we did have a circumstance where we exceed this 15 percent, you would agree with me that that would be a change in commodity classification which would require a review of the existing fire protection systems - -

A. Yes.

Q. - - in the facility? Okay. And based upon your knowledge of FM and 231C and all the other NFPA requirements, you would agree with me that there would have to be some change or modification to those systems as they were in place at the time of this fire if in fact we had at least 15 percent Group A plastics?

A. Yes.

Q. Now, with regard to storage of aerosols and flammable liquids, to the extent that those aerosols are flammable, are those permitted to be stored under commodity class IV?

A. Don't recall.

Q. Are you aware of any FM requirements regarding storage of aerosols and flammable liquids?

A. I know there are some. I couldn't quote you any requirements from it.

Q. Do you know whether or not there are requirements that include isolating those aerosols and flammable liquids from other inventory by means of either a separate area specially protected for storing them outside the facility?

A. Or in some cases caging them, yeah.

Q. Yes. Do you recall that there are such recommendations or requirements of FM in that regard?

A. Yeah. That's their recommendation about how to protect them, yes.

Q. To the extent that the owner in this particular facility was storing flammable aerosols and flammable liquids with the warehouse under the existing protection, not any special protection, do you believe that that should have required an evaluation of the existing systems to determine whether those systems were adequate to protect that facility?

A. To the extent that it's known or not known that the aerosols in question can be protected by Class IV, you know, - - are protectable by systems designed for Class IV, yes. That is, if you don't already know better.

Q. Do you have any opinion, Mr. Beyler, whether the storage of plastics in the facility at the time of the fire had any effect on the extent of the loss of the merchandise as a result of the first fire?

A. I guess it would be my - - my opinion based on my calculations involving Class II commodities that the outcome isn't sensitive to commodity classification in the area.

Q. Well, I realize what you did by way of calculations and modeling, but my question relates specifically to what was out there versus what you modeled, which we have already established was not what was out there.

A. Right.

Q. Now, from the standpoint, do you have an opinion as to whether the storage of plastics of any type in the facility, and specifically in these portable racks, had any effect on the extent of the loss that's claimed here by Lloyd's in this litigation?

A. Well, we knew Group B and Group C would not affect it.

Q. Do you have any opinion, Mr. Beyler, whether the storage of plastics in the facility at the time of the fire had any effect on the extent of the loss of the merchandise as a result of the first fire?

A. . . . my opinion based on my calculations involving Class II commodities that the outcome isn't sensitive to commodity classification in the area.

Q. Okay.

A. NFPA [231C] says Group [Class] IV protection is perfectly fine for those commodities. They are lumped into Group [Class] IV. So having those plastics there versus just having, you know, other, you know, Class IV commodities,

we know from that is not material. Obviously Class IV commodities do have plastics in them, so it's not - - not an either/or proposition. It would be my opinion that if there were no Group A plastics in the portable racks at all, that all the sprinkler heads at the ceiling, throughout the facility would have fused just like they were in the incident as they occurred. That would be my way of saying that no, I don't think the damage would be different.

Q. To the extent that there were Group A plastics, would the result have been different?

A. It wouldn't have been.

Q. To the extent that there were Group A plastics, would the result have been different?

A. It wouldn't have been.

Page 1195, Line 6

Q. You want to look at the rest of the report? I am really only focusing on a couple of opinions. I would like you to look at the page (ii) of this executive summary and the bullet, what I call bullet points that are listed there. Based upon your own research, the simulations that you did in conjunction with your recent report, do you agree or disagree with the statement that Mr. McGrattan - et al, make, which states, for the record "The tests and model simulations showed that when draft curtains were installed, up to twice as many sprinklers activated compared to tests performed without curtains."

A. Well, the tests certainly didn't do that. So I'm going to have to look for that. But his modeling, I would have to look.

Q. Might I interject, Mr. Beyler, that I believe that your paper written by you and Mr. Cooper analyzes these tests? Do you recall that?

A. Yes.

Q. Okay. And I believe your report indicates as a conclusion that under the first heptane test, draft curtains increase the total number of sprinkler activations from four through six sprinklers to eight through 13 sprinklers, but had no effect on first sprinkler activation. I'm simply stating that –

A. Yes.

Q. - - because apparently you have already gone through those test results and reached that observation.

A. Observed that.

Q. Right.

A. Yes.

Q. And I thought that might shortcut the process of having to go through that report. But if you would like to go through the entirety of the report to verify that, go right ahead.

A. Right.

Q. Do you have any reason to doubt that that is fact is a true statement? Which is the tests and model simulation showed that when draft curtains were installed that twice as many sprinklers activated as compared to tests performed without curtains.

A. I find it a very misleading statement.

Q. Okay.

A. Which I think I indicated in my report.

Q. . . .Based upon your own research, the simulations that you did in conjunction with your recent report, do you agree or disagree with the statement that Mr. McGrattan - - et al, make, which states, for the record "The tests and model simulations showed that when draft curtains were installed, up to twice as many sprinklers activated compared to tests performed without curtains."

A. Well, the tests certainly didn't do that. So I'm going to have to look for that. But his modeling, I would have to look.

Q. Tell me what is misleading from your standpoint.

A. Well, I mean you are correct in observing the difference in number of sprinklers operated in the heptane spray fire without having looked at them in detail, it's not unlikely that there's a factor of two in the difference within the ranges that - - that you noted to me. However, we understand those tests to be not the most relevant one. That is, they aren't real commodities. You don't have real exting - - there is no extinguishment, there's no suppression. Now, the fire is what the fire is. The more important test with regard to interaction of - - of the totality of the interaction of smoke, smoke and heat vents with draft curtains - - smoke and heat vents with draft curtains and sprinklers are the commodity tests. They're more realistic as you quickly understand. In those tests, there wasn't any - - there wasn't any - -In those tests, if there was an increase, it was minute. Let me find it so I don't - -

“However, we understand those tests to be not the most relevant one. That is, they aren't real commodities. You don't have real exting - - there is no extinguishment, there's no suppression. Now, the fire is what the fire is. The more important test with regard to interaction of - - of the totality of the interaction of smoke, smoke and heat vents with draft curtains - - smoke and heat vents with draft curtains and sprinklers are the commodity tests. They're more realistic as you quickly understand. In those tests, there wasn't any - - there wasn't any - -In those tests, if there was an increase, it was minute.”

Q. Those tests were done as a result of commodities stored in racks?

A. Yes. I mean they were the centerpiece of the investigation. I mean they were spray fires which were done to help Kevin calibrate his model and to learn things about parts of the process. The centerpiece of this investigation are the plastic commodity tests that UL - - for the purpose of evaluating the interactions.

[Break in transcript]

Q. Would it not be a fair conclusion from that report that in fact there is a possibility that with draft curtains and roof vents that you could have more damage than if you had no draft curtains with roof vents?

A. For the scenario of interest here, which is commodities stored directly under the draft curtain, which, as you previously pointed out in my report, you know, which I indicated that they shouldn't be placed. That's why they shouldn't be so placed.

[Break in transcript]

Q. . . . Would it be fair to say that you have not been asked to render an opinion as to the number of sprinklers which would have activated in connection with this fire of March 21st, 1996, the first fire, if smoke or roof vents with draft curtains had been installed?

A. Have I been asked specifically to do that?

Q. Yes.

A. Not specifically.

Q. And I take it that you have made no quantitative analysis as to the number of sprinklers which would have been activated if smoke or roof vents with draft curtains had been installed and in place at the time of this fire on March 21st, 1996?

Q. Tell me what is misleading from your standpoint.

A. . . . However, we understand those tests to be not the most relevant one. That is, they aren't real commodities. You don't have real exting - - there is no extinguishment, there's no suppression. . . The more important test with regard to interaction of - - of the totality of the interaction of smoke, smoke and heat vents with draft curtains - - smoke and heat vents with draft curtains and sprinklers are the commodity tests.

A. Right. I think that goes back to questions I have already answered, that we don't have a design and didn't do the calculations.

[Break in transcript]

Q. And you would agree with me that no such results or no such opinions are included in your report of February, 1999. Is that correct?

A. I mean it is my opinion that smoke and heat vents with draft curtains would have limited the number of heads operating, but I don't know it's my report.

Q. If that is in fact in your report, what is the basis of that opinion? Obviously not a quantitative analysis, correct?

A. Correct. Correct.

Q. So what is it based on?

A. Based on the fact that the role of smoke and heat vents and draft curtains is to limit the lateral spread of heat and smoke. Which is, of course - - well, the heat at least is what activates the sprinklers.

Q. Okay. What I am going to ask you is do you have any opinion, and I assume you don't, as to the number of sprinklers that would not have been activated as a result of this fire had smoke vents, roof vents, and draft curtains been installed in this building at the time of the fire?

Q. When I say would not have been activated, I'm referring to versus those that were activated. Do you understand my question?

A. Yes.

Q. And the answer to my question is what? You have no opinion, correct?

A. I don't have a quantities estimate of how it would be reduced.

[Break in transcript]

A. The last paragraph is "smoke and heat vents with draft curtains should have been included in the NODC and should have been designed by a qualified fire protection engineer. Their inclusion in the NODC would have prevented the activation of sprinklers throughout the facility and would have controlled the distribution of burning brands."

Q. You don't know whether it would have reduce sprinkler activation by one sprinkler, by ten, by a hundred, by two hundred, by a thousand, do you?

A. If by that you mean do I have quantitative estimate of the reduction, I don't.

Page 1211, Line 4

A. There are negative claims that indicate smoke and heat vents would delay sprinkler activations and increase the number of activated sprinklers. And I -

[Break in transcript]

Q. Well, do you believe, based upon your review of this particular report, which you have summarized in part in your report, Exhibit 16, that if fact these tests and simulations do in fact establish or support the negative claims that smoke and heat vents increase the number of activated sprinklers?

A. The results in this report and in the literature as a whole are quite mixed on this front. There are - -You can point to individual tests where the number of sprinklers activated go up, you can point to specific test where the numbers go down. And overall, without rereading my report, my recollection - - my recollection of what I wrote was that some were worse, some are better. Overall, I can't, you know - -you can't really see an overall difference.

Q. Okay.

A. That you can't support the positive - - I mean you can't say that it makes it more or makes it less. They're mixed results.

Q. Mixed results. That was your conclusion and your assessment after you did your review and prepared this paper, Exhibit 16; is that correct? Is that correct?

A. I'm looking. I'm looking for the place in the report where I do that.

Q. You don't know whether it would have reduce sprinkler activation by one sprinkler, by ten, by a hundred, by two hundred, by a thousand, do you?

A. If by that you mean do I have quantitative estimate of the reduction, I don't.

Q. Well, I'm not asking you - -I'm asking your opinion or conclusions.

A. Yes.

Q. In your assessment after you did your review and prepared this paper, - -

A. Right. On page 20 of the report, and page 22 of the report, I indicate that there are mixed results, and I can't support the number either goes up or goes down as a general proposition.

Q. Would you agree with me, Mr. Beyler, that reasonable men, persons in the fire protection engineering community, could disagree on the inclusion or lack of inclusion of smoke and roof vents with draft curtains in connection with a building such as we have here at MacFrugal's/Pic-N-Save/WCL? Would you agree with that?

A. Yes.

Q. Okay. Would you agree with me that in fact persons in the fire protection engineering community in fact disagree as to the need of smoke and roof vents with draft curtains in connection with the design of fire protection systems for a building such as this particular building, MacFrugal's?

A. I think my paper reflects that - - that there are people and organizations and particularly Factory Mutual who does not regard them as cost effective and, hence, as a result, do in fact disagree about the - - whether they should be included or not.

Q. Would you agree with me, Mr. Beyler, that reasonable men, persons in the fire protection engineering community, could disagree on the inclusion or lack of inclusion of smoke and roof vents with draft curtains in connection with a building such as we have here at MacFrugal's/Pic-N-Save/WCL? Would you agree with that?

A. Yes.

Q. All right. And would it be fair to say, based upon your experience and knowledge, that that type of disagreement has been existing for at least back to 1988, 1989 when this project was designed?

A. That had been Factory Mutual's position at that time, yes.

Q. And others in the fire protection community, including fire protection engineers?

A. Well, Factory Mutual certainly does include fire protection engineers.

Q. I understand.

A. Yes.

Q. Is it still Factory Mutual's position today that roof vents and draft curtains and smoke vents should not be installed or not mandated to be installed by FM?

A. They still regard them as not cost effective, yes.

Q. And that position was also their position in the late '80s?

A. Yes.

Page 1214, Line 22

Q. Okay. Let me go back to the McGrattan report. . .“In one rack storage test where the ignition of the fire took place near a draft curtain and the fuel array extended underneath the curtain, disruption of the sprinkler spray and delay in sprinkler operation caused by the draft curtain led to a fire that consumed more commodity compared to other tests where the fires were ignited away from the draft curtains. This result was demonstrated by the model simulation as well.”

You have already indicated, I believe, that in fact, based on your review of those test results and simulations, that did in fact occur. Is that correct?

A. I certainly remember that the tests, that the observations on the tests are exactly what happened. The model simulation, I don't remember, but I don't have a reason to disagree with that.

Q. And I believe it was your statement that that is one of the reasons why you don't want to put draft curtains directly above commodities or stored materials. Is that correct?

A. Yes.

Q. Because of this possible result? Is that correct?

A. Yes.

Q. Okay. The next bullet point, “The significant cooling effect of sprinkler sprays on the near-ceiling gas flow often prevented the automatic operation of vents.” Do you agree or disagree with that statement?

A. Well, there’s no doubt that with the fire - - fires that they were using - - well, not all the fires, but at least some of the fires they were using, in the absence of sprinklers at all, four vents would have opened, and the reality is that fewer than that opened in the case of sprinklers. So yes.

Q. Well, I don’t understand your answer.

A. These are fires you would expect all the - - all the smoke and heat vents within the curtained area, four of them, in the absence of sprinklers to operate.

Q. Right.

A. And in the sprinkler tests not all four operated.

Q. Is it not correct that most roof vents are activated by a heat-sensitive device?

A. Yes.

Q. And is it not also customary that that heat-sensitive device is activated at a temperature which is higher than the temperature which activates the sprinkler?

A. Often done, yes.

Q. You, in fact, wouldn’t want it to be the other way, would you?

A. My review says that I would be happy if the links on the smoke and heat vents were the same as the sprinklers. I think that’s a good idea.

Q. Well, isn’t there a possibility that by having vents activate earlier than sprinklers, that you then in effect trigger activation of more sprinklers than is necessary?

A. My review indicates that there’s no evidence of that.

Q. I take it that there are studies done by others which indicate other wise. Is that correct?

A. No.

Q. None that you know of?

A. I would refer you to page 22 of the Beyler and Cooper report where we review the claim that smoke and heat vents will delay sprinkler activations, and, you know, go through the research that's been done, including many tests or several tests that have been done where the smoke and heat vents were open, you know, when the tests start, that is, they're open the whole time, and didn't find any evidence that those early operations had any effect on the number of sprinklers that operated.

Q. Okay.

A. The most salient example of that in recent history is the McGrattan's report where test number 5, they opened all four smoke and heat vents at the time - - at the time of the first sprinkler operation and it was one of the best results that they had. It was the lowest amount of damage they had ever had and the second lowest in terms of the number of sprinkler activated, and that's not inconsistent with tests that had been done previously by other people, including ones where they weren't thermally activated at all, but they were simply opened at the beginning of the test. And, in fact, - -

Q. So in answer to my - - Go a-head.

A. And, in fact, you know, it is European practice to open the smoke and heat vents much earlier than we do in the U.S. Not uncommon in Europe to find them operated on smoke detectors, with the intention of being very early operation.

“And, in fact, you know, it is European practice to open the smoke and heat vents much earlier than we do in the U.S. Not uncommon in Europe to find them operated on smoke detectors, with the intention of being very early operation.”

Q. So in answer to my question, you're not aware of any studies or research which indicate, or tests which indicate that by having roof vents activate prior to sprinkler activation that you have an effect of additional activations when that occurs.

A. That's correct. That was one of the goals of this report that Len Cooper and I wrote. And as I sit here and read it today, it reads the way I remember that.

Q. I'm not asking specifically about your report. I'm asking about any studies that you're aware of.

A. Well, obviously, I mean, my goal in writing this report was to reflect everything that's been done. If you were unclear about that, I certainly want to make that clear.

Q. All right.

A. And so to the best of my knowledge, the testing that has been done relative to this issue is included in this review. It's my intention that it be included in the review. And there isn't anything in the review, and that means that there isn't anything that I know of, that indicates that early operation could lead to additional sprinkler operation.

Q. Well, let's ask the question then in reverse. Are there studies, research and tests which indicate that roof vents, in conjunction with draft curtains, in effect have the effect of delaying the activation of sprinklers?

A. I'm not aware of any.

[Break in transcript]

Q. Well, let me then ask a different question. Do not these tests and model simulations performed by McGrattan and others indicate that you can have a decrease as much as 50 percent in sprinkler activation if roof vents activate before or approximately the same time as the first sprinkler activation?

A. That's consistent with my understanding.

Q. And cannot that be or have a deleterious effect on the ability of the sprinkler system to control a fire?

A. No.

Q. Well, let's ask the question then in reverse. Are there studies, research and tests which indicate that roof vents, in conjunction with draft curtains, in effect have the effect of delaying the activation of sprinklers?

A. I'm not aware of any.

Q. And why not?

A. Because it's reducing the number, but never reducing the number in a way that the sprinklers that aren't activating are actually above a place where there's fire. That is, the operating areas may have been reduced, but the operation areas were always larger than the area that was burning. If in fact smoke and heat vents did reduce them enough that the sprinklers above the fire itself, which are the ones that can do any good, of course, were also prevented from operating that would be a negative effect. That's not what's observed.

Q. Well, isn't it true that to the extent that you have a reduction in sprinkler activation, thereby, I would assume, meaning a delay in sprinkler activation, - -

A. (Witness shakes head negatively.)

Q. That's not true?

A. That's not true.

Q. Why not? Why can't that fact be true?

A. Having fewer of them activated doesn't inherently mean that the one that are activated are activated later. It simply means that few - - Fewer doesn't mean later necessarily.

Q. But it can?

A. I can't systematically a priori say that's possible.

“Because it's reducing the number, but never reducing the number in a way that the sprinklers that aren't activating are actually above a place where there's fire. That is, the operating areas may have been reduced, but the operation areas were always larger than the area that was burning. If in fact smoke and heat vents did reduce them enough that the sprinklers above the fire itself, which are the ones that can do any good, of course, were also prevented from operating that would be a negative effect. That's not what's observed.”

Q. Well, isn't it true that the adequacy of the sprinkler design depend upon the sprinklers activating at an appropriate time in order to control the fire? Is that correct?

A. Which - - Which, if that happened, would be reflected not in a reduction in the number of heads operating, but an increase in the number of heads operating. So that normally when you have delays you have increases, not delays that cause decreases. Small numbers of heads operating is a good thing. It's a good thing.

“Which - - Which, if that happened, would be reflected not in a reduction in the number of heads operating, but an increase in the number of heads operating. So that normally when you have delays you have increases, not delays that cause decreases. Small numbers of heads operating is a good thing. It's a good thing.”

Q. Are you telling me that the delay that McGrattan is identifying here does not have a deleterious effect on the operation and effectiveness of the sprinkler system? Is that your opinion?

A. Well, I mean his comment reflects my confusion. I thought we were talking about bullet point 3 that says nothing about time. Just says about how many. It doesn't say anything about delay. So if you would like to direct me to where McGrattan is talking about delays, we'll talk about it. But where you have directed me, that's not what he is saying. So just so - - let's make sure we're on the same page, the same bullet point.

Q. Well, did my question refer to McGrattan?

A. Yes.

Q. All right. Let me rephrase the question. The reduction in the number of sprinkler activations that McGrattan identifies in bullet point 3 on page (ii) of the executive summary would not have a deleterious effect on the operation and effectiveness of the sprinkler system. Is that correct?

A. It does not have a deleterious effect.

- Q.** Do you know of any studies which indicate otherwise?
- A.** No. The reduction in the number of heads operating is a good, favorable figure of merit. It is one of the ways that we judge a good sprinkler system. If you put it out with one head, that's terrific.
- Q.** That assumes that that head put it out.
- A.** Listen to what I am saying. If one head can put it out, that's good. If it takes 50, that's bad. Having a reduced number of heads operate is a figure of merit. That is, the smaller the number, the better the system has operated, the better performance you have achieved.

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- Q.** Okay. The second sentence in that paragraph refers to a tour of the storage facility at Rancho Cucamonga by representatives of Broadmoor and Grinnell. What forms the basis of your statement that "The purpose of this tour was to allow the design team to develop an understanding of the intended use of the facility? Is that what you understood it to be?

"No. The reduction in the number of heads operating is a good, favorable figure of merit. It is one of the ways that we judge a good sprinkler system. If you put it out with one head, that's terrific."

- A.** It is.

[Break in transcript]

- Q.** Do you know that Rancho Cucamonga has areas within their facility where there are clearances from stored inventory to ceiling sprinklers that exceed ten feet?
- A.** That was my understanding, yes.
- Q.** And would you agree with me that there in fact are instances, based upon your knowledge and information, where the distance between inventory and ceiling sprinklers is approximately 40 feet?
- A.** That's consistent with my understanding.

Q. And based upon your investigation of the NODC, would it be fair to conclude that those spaces at RCDC would also, in your opinion, represent excessive clearances where the sprinkler system would not function in case of a fire in those areas?

A. That's correct.

Q. So it's your opinion that both facilities had areas where there were problems with the design, which means that there could be fires which would not be controlled by the in-place sprinkler systems. Is that correct?

A. That's correct.

Q. So it's your opinion that both facilities had areas where there were problems with the design, which means that there could be fires which would not be controlled by the in-place sprinkler systems. Is that correct?

A. Yes.

Q. And I take it from that, that it would be your opinion that whoever designed the Rancho Cucamonga facility did so improperly as it relates to the sprinkler system?

A. In the particular of excessive clearance, yes. Not having seen detailed designs, I certainly wouldn't be in a position to make any more specific commentary.

Q. And I take it from that, that it would be your opinion that whoever designed the Rancho Cucamonga facility did so improperly as it relates to the sprinkler system?

A. In the particular of excessive clearance, yes. . .

Q. Right. And it would be your opinion that to the extent that the Rancho Cucamonga facility was using portable racks stacked three high, a total of 21 feet, that without [in-rack] sprinklers that that would have violated [NFPA] 231C?

- A.** If we're talking about the same three tier - -
- Q.** Multiple row racks.
- A.** Right. We're talking the same configuration.
- Q.** Class IV commodity, greater than 16 feet between aisles.
- A.** Yes.

Page 1275, Line 8

- Q.** Is it your opinion that Mr. Martin [Grinnell] did not determine that the east end of the building would not be used for storage?
- A.** My recollection of this deposition, he didn't know how it was going to be used.

[Break in transcript]

- Q.** Is it your opinion that by meeting the insurance and legal requirements that you will not get a design which will control fires which start in the facility? Let's leave it at that.

- A.** Satisfying the legal and insurance requirements may - - will not necessarily lead to a suppression system that can control fires. It might, but it might not also.

[Break in transcript]

- Q.** Has your review and investigation indicated to you whether the sprinkler system in place at those two ends of the building could in fact control certain fires that started in those areas?

- A.** Obviously I haven't made a study of what fires I think it could have controlled. They would be typified by certainly very isolated fuel packages. Small, isolated fuel packages I would expect to be controlled.

Q. Is it your opinion that by meeting the insurance and legal requirements that you will not get a design which will control fires which start in the facility? Let's leave it at that.

A. Satisfying the legal and insurance requirements may - - will not necessarily lead to a suppression system that can control fires. It might, but it might not also.

Q. Did, in your review and investigation, you determine whether a single pallet high of stored inventory in the east end of the building would be in fact controlled by the sprinkler system?

A. You mean in these general arrangements that we had there at the time?

Q. Yes.

A. I don't know.

Q. Did you at all examine the sprinkler system in the low bay sections?

A. I mean, I know I looked at the drawings, but that was not a focus of my attention certainly.

Q. Well, we have, do we not, clearances over ten feet between - -

A. I'm sure we do.

Q. Is it your opinion that those areas are not designed properly? Or do you have an opinion?

A. I pause because you used the ten foot one. I believe that it would be most consistent with [NFPA] 231C to use ten feet for these simply because they have used it for other - - together situation with more advanced technologies; at the same time, acknowledging that the FM data sheets would allow you to go to 20 [feet], for which I think there is - - there is basis. So if you had said more that 20 [feet], I would have agreed with you. With the ten foot number, there's reason to - - to say there are other standards of care, other design documents that reflect a basis for something greater than ten feet.

"I believe that it would be most consistent with [NFPA] 231C to use ten feet for these simply because they have used it for other - - together situation with more advanced technologies; at the same time, acknowledging that the FM data sheets would allow you to go to 20 [feet], for which I think there is - - there is basis. So if you had said more that 20 [feet], I would have agreed with you. With the ten foot number, there's reason to - - to say there are other standards of care, other design documents that reflect a basis for something greater than ten feet."

Q. Well, I assume you know that in those low bay areas we have roof heights, ceiling heights of 35 [feet] to a little over 40 feet. Correct?

A. Yes.

Q. And to the extent that you have inventory stored on the floor one pallet high, you would have clearances in excess of 20 feet.

A. Yes, you would.

Q. And if that is fact the case, is it your opinion that there is something wrong with the sprinkler design in those areas?

A. They have excessive clearances, yes.

[Break in transcript]

Q. You wouldn't be able to tell me whether a fire that could start in the low bay area in single pallet high storage could be controlled by the sprinkler system that was installed?

A. I simply hadn't looked at it.

Q. Do you have any idea of what the owner intended for the use of these low bay areas with regard to storage?

A. I expected there to be staging there.

Q. Is it your opinion that if there's staging in those areas, that they are treated as if it's stored materials?

A. I do.

Q. You wouldn't be able to tell me whether a fire that could start in the low bay area in single pallet high storage could be controlled by the sprinkler system that was installed?

A. I simply hadn't looked at it.

Q. Did you, in your review of the inventory, and by you, I am referring to the imperial you, determine whether or not any aerosols or flammable liquids were present in the warehouse?

A. Don't know.

Q. Do you recall whether anyone else that was part of the Lloyd's team made that determination or came to that conclusion or did that identification?

A. Don't know.

Q. Did you receive any documents from Mr. Mazarat that would indicate whether or not there were aerosols present in the warehouse?

A. Don't remember. I mean we have reviewed the materials I got from him. I don't remember what those are. We could review any of those that were made exhibits, but I don't remember as I sit here.

Q. Your understanding is, to the extent that there were aerosols present within the warehouse, that was contrary to the variance? Is that correct?

A. Yes.

Q. Did you, in your review of the inventory, and by you, I am referring to the imperial you, determine whether or not any aerosols or flammable liquids were present in the warehouse?

A. Don't know.

Q. Your understanding is, to the extent that there were aerosols present within the warehouse, that was contrary to the variance? Is that correct?

A. Yes.

Another of the plaintiff's expert's in McAuslin, et al v. Grinnell Corporation, et al litigation was Richard Custer. The following are excerpts from Custer's deposition:

Q. . . .But maybe you could tell me, Mr. Custer, without having the benefit of these code provisions as it relates to 231, what the clearance requirement is as it relates to these area that you identified as staging areas or temporary storage areas in the facility.

[Break in transcript]

A. [NFPA] 231 talks about general clearances of between the sprinkler deflector and the materials as being around three - - three to four and a half feet I think is the number that they use in the tables that deal with ceiling clearance. When you go below that- - Well, first of all, the closer the sprinklers are to the fire, the more effective they are. So [NFPA] 231 allows a reduction in the amount of water requirement for sprinklers below that three to four and a half feet level. Above that , as the clearance goes up, they reference to a graph that requires an increase in the water supply as the clearance between the sprinkler and the materials that could be burning up. And that goes up to about ten feet on the graphs and - - of clearance. There's a footnote in that area that - - of the document that indicates that there is insufficient evidence to provide any guidance for what to do if the clearances are greater than ten feet. And the clearance here are substantially greater than ten feet.

Q. If I understand your answer correctly, the code specifically does not state that there is a maximum clearance. Is that correct?

A. It says that there is no way to determine what sprinkler design area requirements are if you go above ten feet.

Q. Right. But it doesn't say clearance shall not exceed ten feet. Is that correct?

A. I don't know that it states that explicitly.

Q. Well, it is then your interpretation that because the graph doesn't go beyond ten feet of clearance, that in order to meet the requirement of [NFPA] 231 that you have just mention you have to have a clearance of ten feet or less. Is that correct?

A. That would be my interpretation.

[Break in transcript]

Q. And is there a requirement as to the level of fire protection necessary when a certain quantity of group A plastics is present in a warehouse like this?

A. Well, if they're storing group A plastics, then there are different requirements relative to the in-rack and ceiling sprinkler specifications in terms of densities and location of heads and so on.

[Break in transcript]

Q. And isn't a fact that, based upon your review of what was existing at the time of the fire, that you believed that there was a change of use by the owner and that as result of that change in use there should have been additional protection, fire protection for that facility at the time the fire occurred? Do you agree with that?

A. Yes.

Q. And you have already mentioned that based upon your review of what was existing at the time of the fire in the east end of the building that there should have been, to be in compliance with [NFPA] 231C, sprinklers in the racks. Right?

A. Yes.

Q. And isn't a fact that, based upon your review of what existing at the time of the fire, that you believed that there was a change of use by the owner and that as result of that change in use there should have been additional protection, fire protection for that facility at the time the fire occurred? Do you agree with that?

A. Yes.

[Break in transcript]

Q. Now, I don't think you really answered the question, so I am going to ask it again. To the extent that you're advising an owner, would you not indicate to that particular owner that to the extent that you're going to use portable racks and there are no other options available such as lowering the ceiling and that kind of thing, that you would advise them that [NFPA] 231C would in fact require in-rack sprinklers if they were configured the way they were at the time this first fire occurred?

A. Yes, I would.

[Break in transcript]

Q. You would agree with me, Mr. Custer, that based on your experience, regardless of whether you made an in-depth study, you would agree with me that the inclusion of in-rack sprinklers in these racks would have resulted in less of a loss?

A. Less of a loss, yes.

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Q. Did you review the applicable codes, and when I say applicable codes, I mean those codes that were in effect or being enforced by the regulatory authorities having jurisdiction over this project at the time the project was designed, as it relates to draft curtains.

Q. And you have already mentioned that based upon your review of what existing at the time of the fire in the east end of the building that there should have been, to be in compliance with [NFPA] 231C, sprinklers in the racks. Right?

A. Yes.

Q. Is it possible in your opinion that even with draft curtains and roof vents that we would have had sprinklers activating several hundred feet away from the fire?

A. Yes, I think that's - - I think that's possible.

A. Yes.

Q. Based on your review of the codes, was there a requirement for the installation of draft curtains in connection with the design of this project? I'm talking about a code requirement.

A. Yes. Yes, with respect to egress issues greater than 400 foot travel distance.

Q. Okay. Anything else?

A. I believe that the applicable NFPA 101 would have required it relative to, again, egress.

[Break in transcript]

Q. And as you understand what a variance is, it means that the building is in compliance with code. Is that correct?

A. Yes.

Q. So in that regard, the lack of draft curtains is not a code violation as the regulatory authorities who had jurisdiction over the project enforced those codes. Is that correct?

A. Yes, as it relates to the egress issue, yes.

Q. And as you understand what a variance is, it means that the building is in compliance with code. Is that correct?

A. Yes.

[Break in transcript]

Q. Okay. Now, based on your review and your investigation, would you not agree with me that the local building authority and the State Fire marshal reviewed and approved the design of this project as it relates to fire protection and determined that draft curtains were not required for this project?

A. Yes.

Q. Okay. Now, if I substituted "roof vents" for "draft curtains", the answer would be the same, would it not?

A. It would, under the variance.

Q. Not only under the variance, but under this exception under 3603.3.1, right?

A. That they had approved the sprinkler system.

Q. That's correct.

A. Yes.

Q. Would it be fair to say, based upon your review and investigation, that, in fact, the design as reviewed and approved by the regulatory authorities having jurisdiction over this project as it relates to fire protection met the applicable codes in effect at the time the project was designed? I want you to carefully review that question, make sure you understand that question.

A. Based on the fact that an agency approved it, by definition they found it acceptable and it met code.

Q. Is it your opinion that you don't believe that it met the codes?

A. I don't believe that the - - In my opinion, the intent of the sprinkler system to control fire, which is the reason for, at least in my opinion, for not requiring smoke and heat vents was met. It would have been met for that particular design.

Q. Right.

A. The fact that they did approve it mean[s] that legally it met the code.

Q. To the extent that my client, Broadmoor, delegated the design of the sprinkler system to somebody else, in this case Grinnell, wouldn't it be fair for my client to rely upon and presume that the sprinkler system was in fact capable of controlling a fire in this facility?

A. I think that - - that could be considered a fair assumption.

Q. To the extent that my client, Broadmoor, delegated the design of the sprinkler system to somebody else, in this case Grinnell, wouldn't it be fair for my client to rely upon and presume that the sprinkler system was in fact capable of controlling a fire in this facility?

A. I think that - - that could be considered a fair assumption.

- Q.** Okay. And to the extent that draft curtains and roof vents were not a part of the sprinkler design, would you agree with me that it was fair for my client to assume then that the exception state in Chapter 36 with regard to draft curtains and roof vents did in fact apply? Do you understand the question?
- A.** Let me read it. I guess I am confused by the question. You said that the draft curtains are not part of the sprinkler design. In fact, they are part of the sprinkler design. Something that has to be considered in - - in a situation where you're looking at an unusually high spacing above - - or clearance, large clearance above the fire, that - - that has to be part of the design process.
- Q.** Was it not your understanding that the evaluation of draft curtains and roof vents was made by Broadmoor, not Grinnell?
- A.** For - - For different - - For different purposes. For purposes of eliminating the vents under the extended travel issue.
- Q.** Okay. I understand. You are indicating to me that you believe that Broadmoor only looked at the question of draft curtains and roof vents as it related to egress. Is that correct?
- A.** That's what I understand from the documentation that I have seen.
- Q.** When a regulatory authority has a set of sprinkler drawings in front of them and they are reviewing it, wouldn't it be fair to assume that when they approve those sprinkler drawings that it triggers, in the case of these draft curtains and roof vents, the exception set forth in the '85 edition of the Standard Fire Prevention Code?
- A.** Now, functionally, it does that. But it does not presume that the approving authority has looked at the implication of the actual design. Frequently the approving authority is not a fire protection engineer. They look at, is there a sprinkler system? Yes. Does it need draft curtains? No. They don't determine whether the sprinkler system actually works properly or could work under those situation as part of the design evaluation and analysis.
- Q.** Right.
- A.** In fact, they really can't do that under the law. Cannot do that.

Q. The application of this particular requirement involving the extension of the Chapter 36 of the Standard Fire Prevention Code doesn't anticipate the Fire Marshal or the local regulatory authority to make a determination as to whether the sprinkler system or the fire extinguishing system actually is suitable for its intended purpose, but rather, that the fact that you have one triggers the exception.

A. That's - -

Q. Isn't that correct?

A. I think that's what I just said.

Q. Okay.

A. Again, in far more words than you did. Thank you.

Q. So from your review and investigation, you would agree with me that from the standpoint of the regulatory authorities, they believed in their review and approval of the design of fire protection systems that draft curtains and roof vents were not necessary? Is that correct?

A. Yes.

[Break in transcript]

Q. Is it possible in your opinion that even with draft curtains and roof vents that we would have had sprinklers activating several hundred feet away from the fire?

A. Yes, I think that's - - I think that's possible.

Q. Based upon your knowledge of the fire, based on your investigation, would you agree with me that it's more probable than not that, in fact, sprinklers would have activated several hundred feet away from the first fire even if draft curtains and roof vents were installed in this building?

Q. Is it possible in your opinion that even with draft curtains and roof vents that we would have had sprinklers activating several hundred feet away from the fire?

A. Yes, I think that's - - I think that's possible.

- A.** I can't say how many hundreds of feet, several or not. But it's quite possible that a number of other systems out over the high rack area would have operated during the course of this fire with the presence of roof vents.

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- Q.** Mr. Custer, would you agree with me that those design curves that we looked at in [NFPA] 231C were based on the assumption that roof vents and draft curtains were not being used?

- A.** Yes, that what was stated in the documents.

[Break in transcript]

- Q.** Would it be fair to assume that when designers are applying these design curves, that they have no empirical data available to them when roof vents and draft curtains are utilized in connection with the design of the sprinkler system?

- A.** Yes, I think that that's - - that is a correct statement.

[Break in transcript]

- Q.** All right. Is there not a presumption, though, based upon this particular statement, that when you are venturing into the area of vents and draft curtains that there's not reliable data that's provided in [NFPA] 231C that can be utilized to determine the design curves to be used in designing the sprinkler system.

- A.** I have answered that as yes, I think that's a correct statement.

Q. And there is really no consensus in the design community as to whether the inclusion of draft curtains and roof vents is a good idea or a bad idea; is that correct?

A. My recollection is that there - - there were no - - at that time there were no guidelines for how to design these interacting systems.

Q. Okay. Now, you would agree with me that there is a difference of opinion in the design community as to the effectiveness or, for that matter, the possible detriment of installing draft curtains and roof vents? In connection with sprinkler design?

A. Yes.

Q. And there is really no consensus in the design community as to whether the inclusion of draft curtains and roof vents is a good idea or a bad idea; is that correct?

A. In what time frame are you talking about?

Q. I'm talking about - - Well, let's first talk about the time frame of 1988 and '89 when this building was first designed.

Q. Okay. Now, you would agree with me that there is a difference of opinion in the design community as to the effectiveness or, for that matter, the possible detriment of installing draft curtains and roof vents? In connection with sprinkler design?

A. Yes.

A. My recollection is that there - - there were no - - at that time there were no guidelines for how to design these interacting systems.

[Break in transcript]

A. So if I basically understand that, what you're saying is that if someone did not put vents in, that that would not be considered to be bad practice.

Q. Right. Right.

A. I would say that in general that's correct. I would also point out that in that time frame, although the information is not available necessarily in the fire codes which are put together to apply to broad based applications, that there were tools available to assess the types of effect that vents would have on the flow of hot gases, and at such time it was necessary to put - - put them in by codes. As a matter of fact, I think somewhere in Factory Mutual they say that if they are required by code, and they were required in some places by code, that they have some guidelines on how to deal with that. I just don't recall exactly where - - where that is. But it's in FM data sheets.

Q. Okay. To the extent that roof vents and draft curtains were not required by code when this project was designed, you would agree with me that it was not poor engineering practice to have not required them as part of the design for the fire protection systems including the sprinkler system for this building? Is that correct?

A. I think given the design environment that this particular building represents, that it's something that should have been considered. May have been eliminated during an analysis of the problem.

[Break in transcript]

Q. Let me read the question again. I want you to listen to it carefully.

To the extent that the designer reviewed and considered draft curtains and roof vents and chose not to install them, and those draft curtains and roof vents were not required by code, is it not your opinion that that would not reflect poor engineering practice as it relates to design of fire protection systems in the time period of 1988 and '89?

A. This is a hypothetical, assuming that it was reviewed and a decision was made not to do it.

Q. Right.

A. And that they were not required.

Q. Yes.

A. No, that would not reflect poor engineering practice given that it was reviewed with respect to the objectives of the system decided not to and it wasn't required.

[Break in transcript]

Q. . . .Would you agree with me that NFPA has made the statement that a broadly accepted equivalent design basis for using both sprinklers and vents together for hazard control has not been universally recognized?

A. I have heard that quote verbatim and I can't recall whether - - where it was. Is it - - It may be in an NFPA - -

Q. If I suggest to you it's in NFPA 204?

A. 204, for the design of vents, and is a statement by Gunter [Gunnar] Heskestad, yes, I have seen that.

Q. And are you also aware that that statement is included in the 1998 edition of NFPA 204?

A. I don't know that I - - I don't think I have looked at the '98 version of that recently.

Q. Okay.

A. But I will take your word for it.

Q. Do you think that that is in fact a true statement. In other words, do you agree with that statement?

A. I would say that I would agree that there is not a broadly based, agreed upon design or set of design requirements that could be applied across the board to deal that that - -

Q. Okay.

A. - - vent-sprinkler issue.

Q. . . .Would you agree with me that NFPA has made the statement that a broadly accepted equivalent design basis for using both sprinklers and vents together for hazard control has not been universally recognized?

A. 204, for the design of vents, and is a statement by Gunter [Gunnar] Heskestad, yes, I have seen that.

Q. In other words, there has not been something that the fire protection community has embraced and recognized as it relates to the interaction design-wise between sprinklers and vents? Is that a fair statement?

A. As a generalized design procedure, that is a fair statement, that's correct.

Q. Would you agree with me that there has been in the fire protection community some concern raised about the detrimental effect of roof venting on the performance of sprinkler systems?

A. Yes, some test have shown that more heads open; some tests have shown less heads open Therein lies --

Q. The rub?

A. -- the rub.

Q. And that is a view that is present even today; is that not correct?

A. Yes.

Q. And there are even some fairly recent, within a year's time, studies on the interaction between roof vents and sprinklers, is there not?

A. I think there's some work out of NIST dealing with that.

Q. And the results were inconclusive, where they not?

A. I think there were two -- there may be two studies by the same individual.

Q. Do you think that that is in fact a true statement. In other words, do you agree with that statement?

A. I would say that I would agree that there is not a broadly based, agreed upon design or set of design requirements that could be applied across the board to deal that that - -

A. - - vent-sprinkler issue.

Q. And those results - -

A. Yes.

Q. - - are inconclusive, are they not?

A. I believe they are inconclusive.

[Break in transcript]

Q. Would you agree with me that there is some debate that has gone on even today as to whether the value received from the installation of smoke and heat vents and draft curtains justifies there cost?

A. That's - - That's been one of the points of debate.

Q. Would you agree with me that there is some debate that has gone on even today as to whether the value received from the installation of smoke and heat vents and draft curtains justifies there cost?

A. That's - - That's been one of the points of debate.

Q. Would you agree with me that one of the considerations that goes into the design of fire protection systems is the cost to the owner of those systems to the extent that they are not mandated by code?

A. That's certainly - - certainly one of the considerations in determining what the ultimate design solution will be for a problem, particularly when there are alternatives that exceed the code requirement that may reduce losses but cost money.

Q. Okay.

A. That's one of the basis of performance based design or the whole variance process that we have been using for years.

Q. I take it from that that you don't believe that the inventory, the nature of the inventory was important in connection with your investigation?

Q. This particular report, Mr. Custer, has a recommendation that plastics storage should be confined to specific racks and protected accordingly. Based upon your review and investigation in preparation of your report, would you agree with me that that, in fact, was not the case at the time of the fire? Can you answer my question?

A. With the intervening conversation, I'm not sure that I recall the entire question.

[Break in transcript]

Q. Okay. Would you agree with me, Mr. Custer, that based on your review and investigation that there was expanded plastics contained in these portable racks at the time of the first fire?

A. I have not seen any documentation as to specifically what was in the racks at the time of the fire, so I can't answer that question yes or no.

Q. Have you discussed the commodities that were stored in the warehouse with any other expert hired by Lloyd's?

A. No.

Q. Have you discussed storage of commodities, even in a general sense, with Mr. Beyler?

A. I don't believe so. No.

Q. Hypothetically, to the extent that expanded plastics were in fact stored in the portable racks, that would have violated this recommendation, would it not?

A. It would.

Q. Have you discussed the commodities that were stored in the warehouse with any other expert hired by Lloyd's?

A. No.

Q. Have you discussed storage of commodities, even in a general sense, with Mr. Beyler?

A. I don't believe so. No.

Q. I understand, I believe, from your previous testimony that you were not provided with a copy of the inventory lists?

A. I don't recall seeing a copy of the inventory lists on this - - these inventory documents. There may have been something in the documents originally supplied, but I don't recall seeing it.

[Break in transcript]

Q. I take it from that that you don't believe that the inventory, the nature of the inventory was important in connection with your investigation?

A. It would - - would have some - - could have some effect on it. But primarily I was looking at the issues relating to the performance of the sprinkler system as designed and the kinds of issues that would be - - should be considered in designing the sprinkler systems and the fire protection systems. I was not trying to determine what the inventory was. That's one of the things that should be considered in the design.

[Break in transcript]

Q. What, from your standpoint, would need to be done if you were the consultant looking at the risk from a fire protection standpoint?

A. Find out quantities and distribution and likelihoods of amounts being present close to one another and design the segregation of the product or the protection of the racks accordingly.

[Break in transcript]

Q. So to the extent that the owner at the time of this fire was storing expanded plastics in these portable racks that met your definition of substantial aggregate risk, that the owner or that storage approach would violate [NFPA] 231C? Is that correct?

Q. Are you aware, Mr. Custer, that certain changes were directed to be done at Rancho Cucamonga related to plastics storage after this fire?

A. I know that there were some recommendations. I don't recall what - - what they were as I sit here right now.

- A.** Yes. That would not be consistent with the protection required by [NFPA] 231C.
- Q.** Are you aware, Mr. Custer, that certain changes were directed to be done at Rancho Cucamonga related to plastics storage after this fire?
- A.** I know that there were some recommendations. I don't recall what - - what they were as I sit here right now.
- Q.** Do you recall that one of the recommendation was to segregate the plastics to the lowest level of rack, install a horizontal barrier, and examine the sprinkler density in that area to determine whether it would be adequate protection for those plastics in case of a fire?
- A.** Well, I can't say that those are the exact words, but that would be an appropriate recommendation of handling plastics if they were present in large amounts of storage contiguous to one another.
- Q.** Is that not an indication to you that at least at Rancho Cucamonga the owner of this facility had substantial aggregate risk in storage of expanded plastics that would have mandated such an approach?
- A.** I can't - - I would say it doesn't because I don't know whether those are plastics, unexpanded or expanded. I don't know whether they Class A, B, or C. It just uses the term "plastic".

[Break in transcript]

- Q.** Now, if unexpanded plastics were being stored in appropriate quantity in these portable racks at the time of the first fire, would you agree that this recommendation would be an appropriate recommendation. And that is, a barrier every ten feet vertically, with storage limited to 25 feet?

[Break in transcript]

- A.** That would - - That would certainly be one approach of dealing with that.

[Break in transcript]

- Q.** And you would then also agree with me that to the extent that the owner at the time of this fire was storing an appropriate quantity of unexpanded plastics in the portable racks that that storage would have violated the provisions of [NFPA] 231C. Is that correct?

A. If that were - - If that were in fact the case.

[Break in transcript]

Q. Now, had the portable racks been installed with the protection that's recommended in this report for unexpanded plastics storage, would you not agree with me that a fire that started in those racks would have been controlled?

[Break in transcript]

A. - - clarifying. We've had a number of hypotheses put forward through here. I would say that it would more likely than not be controlled.

[Break in transcript]

Q. I'm going to ask you the same question with regard to expanded plastics. To the extent that expanded plastics were being stored in these portable racks at the time of the fire, in the appropriate quantities, and the owner had followed this recommendation contain in this report, which we have identified as Exhibit 11, as it relates to expanded plastics storage, is it your opinion that the fire that started in those racks or a fire that starts in those racks would more likely that not be controlled?

A. I would agree that it would more likely than not be controlled.

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Q. Now, are you aware of whether aerosols were stored in the warehouse at the time of the fire?

A. I don't know whether they were or were not installed. I have seen references to aerosol, possibly hair spray I think somebody mentioned. I don't know what - - to the extent that they were there or not there.

Q. Now, are you aware of whether aerosols were stored in the warehouse at the time of the fire?

A. I don't know whether they were or were not installed. I have seen references to aerosol, possibly hair spray I think somebody mentioned. I don't know what - - to the extent that they were there or not there.

[Break in transcript]

Q. Do you know whether that area that you have described was in fact being utilized by the owners to store aerosols and flammable liquids at the time of the fire?

A. No, I don't.

Q. Are you familiar with and have you reviewed the variance requests that were made by Broadmoor to the State Fire Marshal - -

A. Yes.

Q. - - and the local building authorities? Yes?

A. Yes.

Q. And did you note when you reviewed those variance requests that one of the stipulations which formed a condition of the granting of the variances was that aerosols and flammables would not be stored in the warehouse, but would be stored outside, either in a separate building or in some container?

A. I have seen that recommendation, yes.

[Break in transcript]

Q. And in your opinion, to the extent that aerosols and flammables were stored in the main warehouse, not in a caged area, that would be a violation of code?

[Break in transcript]

Q. I'm telling you to assume that they were there.

A. Okay.

Q. Are you familiar with and have you reviewed the variance requests that were made by Broadmoor to the State Fire Marshal - -

A. Yes.

Q. - - and the local building authorities? Yes?

A. Yes.

Q. Whether you know or not. If you assume that to be the case.

A. Then the answer is yes.

Q. And what particular code would be violated?

A. Well it would - - it would be operating outside the conditions of the variance, which in itself is not the code. Variances are these things not generally taken to be rewriting the code, but they are specific to a - - one application.

Q. Right. It's your understanding that when the variance is granted that the owner must comply with the variance and any stipulations that are attached to that variance. Is that correct?

A. That's what I have said.

Q. And what particular code would be violated?

A. Well it would - - it would be operating outside the conditions of the variance, which in itself is not the code. Variances are these things not generally taken to be rewriting the code, but they are specific to a - - one application.

Page 299, Line 9

Q. Mr. Custer, we'll come back to that later, dealing with documents and reference materials. I want you to tell me in your own words what your specific assignment was in connection with this litigation.

A. I was - - I was asked to review the - - in general, the fire incident and the systems - - again, in a general sense, the systems and the fire protection involved in the design process and involved to determine what the reasons were for the failure of the system, the protection systems, and the - - what, if any, - - what an appropriate design procedure would have been to deal with a risk such as this warehouse if, in fact, I thought it wasn't - - it wasn't dealt with properly. That's sort of a general statement. I think somewhere in the record there was a correspondence, maybe there's a letter originally sort of spelling out what the framework was.

Q. I want to specifically refer to your report on page 4. There is a sentence in the middle of that, I guess it's the second paragraph, "In the absence of a dropped ceiling, a properly engineered draft curtain and roof venting system would most likely have provided better access for the fire service." You don't know whether that's true or not, do you, as it relates to this particular fire.

A. No, I don't know for sure whether that's true or not with respect - -

Q. To this particular fire?

A. That's correct.

Q. The next sentence, "Draft curtains and vents would also have limited the operation of the sprinkler systems outside the fire area, allowing the fire protection in the unaffected areas of the building to be maintained after the first fire." Likewise, you wouldn't know with any degree of certainty whether that is correct or not, based upon this particular fire. Is that correct?

Q. I want to specifically refer to your report on page 4. . . "In the absence of a dropped ceiling, a properly engineered draft curtain and roof venting system would most likely have provided better access for the fire service." You don't know whether that's true or not, do you, as it relates to this particular fire.

A. No, I don't know for sure whether that's true or not with respect - -

Q. To this particular fire?

A. That's correct.

- A.** No, that's not correct. I think we talked about that in my last deposition when you asked me what the effect would have been in my opinion on the smoke and heat vents and draft curtains with respect to the operations of the system, and I indicated it's my opinion then, and it still is now, that it would have reduced the number of systems, not heads, but the systems that were in the further - - outer - - outer portions of the building that went off and, therefore, some of those systems would have been functional at the time of the second fire. I can't say how many and how far that would extend, but it would - - given that the fire was not being controlled, in my opinion it was enough energy to have substantial ventilation from those vents.

Discussion

Although Dr. Craig Beyler and Richard Custer were both expert witnesses for the plaintiffs, there is clearly a difference of opinions on whether or not the installation of in-rack sprinklers in the multi-row racks would have had a significant impact on the severity of the fire in the warehouse and also on the issue of the use of smoke/heat vents and draft curtains in buildings protected by a sprinkler system.

As has been noted many times before, the use of roof vents in buildings protected by a sprinkler system has been an issue which has been debated in the field of fire protection for well over 30 years. While Custer conceded that this was the case, Beyler continued to make the argument that the installation of automatic-opening roof vents in sprinklered buildings will not have a negative effect on the operation of the sprinkler system.

How is one considered to be an expert when your opinions and a good portion of your testimony are so completely destroyed?

After more than 30 years of debate over roof vent issue, the NFPA 13 committee has finally put an end to the debate. The new roof vent provisions included in the 2010 edition of NFPA 13 specifically require that roof vent installations be designed to prevent the opening of vents in the early stages of a fire.

In effect, the NFPA 13 committee has completely rebutted Dr. Beyler's testimony regarding roof vents in the McAuslin, et al v. Grinnell Corporation, et al litigation. How is one considered to be an expert when your opinions and a good portion of your testimony are so completely destroyed? The fact that members of the NFPA 13 committee have opposed the use of roof vents in storage buildings protected by sprinklers has been common knowledge in the field since the 1970's.

What is also particularly interesting with respect to the testimony of both Beyler and Custer is the apparent lack of interest in the contents of the warehouse. Neither Beyler, nor Custer, seemed overly concerned, over the fact that expanded Group A plastics, aerosol containers or flammable/combustible liquids may have been stored in the warehouse (in violation of the stipulations contained in the equivalency approvals). Of course, if these types of combustibles were stored in the warehouse, the fire which likely would have developed would in all probability have been markedly more severe than anticipated by these two “experts”. This fact would have changed the entire complexion of the fire and the plaintiffs’ experts analysis of the fire.

Editor’s Note: The author walked through the rubble within the exterior walls of the warehouse with a representative of Broadmoor Corporation within days of the fire. The rubble was littered with the remains of aerosol containers.

Conclusion

Previous articles have documented Dr. Craig Beyler’s misuse of the fire modeling in his “expert” analysis of the fire at the McFrugal’s Warehouse.

This article documents Dr. Beyler’s testimony regarding the use of roof vents in buildings protected by sprinklers, the impact of the installation of in-rack sprinklers in the multi-row racks on the severity of the fire and Dr. Beyler’s lack of interest in the fact that the warehouse contained Group A plastics and aerosol containers in violation of the conditions for which equivalencies were granted both by the City of New Orleans and the Louisiana State Fire Marshal’s Office.

Dr. Beyler is a Fellow in the Society of Fire Protection Engineers (SFPE) and was awarded the SFPE’s Guise Medal shortly after the testimony outlined above. Does Dr. Beyler’s conduct as an “expert” in the McAuslin, et al v. Grinnell Corporation, et al litigation in 1999 conform to the ethical standards of the Society of Fire Protection Engineers or does his testimony simply embarrass the profession?

Editor’s Note: The author, Richard Schulte, was the recipient of Engineering News-Record’s “**Top 25 Newsmakers of 2004**” award and the American Institute of Steel Construction’s “**Special Achievement Award**” in 2006 for his commentary on NIST’s investigation into the collapse of the World Trade Center towers. Mr. Schulte acted as an expert for one of the defendants, Broadmoor Corporation, in the McAuslin, et al v. Grinnell Corporation, et al litigation.

With the partial transcripts of Dr. Beyler's testimony in the litigation above, you can be the judge or jury and answer that question for yourself. It's my opinion that Craig Beyler is nothing more than a charlatan with a PhD and opinions for sale. It's time for the SFPE to consider asking Dr. Beyler to return the Guise Medal award, particularly considering the timing of the award with respect to his testimony in the McFrugal's Warehouse fire litigation.

*"In a time of universal deceit,
telling the truth is a revolution-
ary act."*

George Orwell

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