FIRE SAFETY IN HIGHRISE BUILDINGS FOR THE ELDERLY

HEARINGS

BEFORE THE

SUBCOMMITTEE ON HOUSING FOR THE ELDERLY

OF THE

SPECIAL COMMITTEE ON AGING

UNITED STATES SENATE

NINETY-THIRD CONGRESS

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WEDNESDAY, FEBRUARY 28, 1973

U.S. SENATE,
SUBCOMMITTEE ON HOUSING FOR THE ELDERLY
OF THE SPECIAL COMMITTEE ON AGING,
Washington, D.C.

The committee met, pursuant to recess, at 9:45 a.m., in room 6232, Dirksen Senate Office Building, Hon. Harrison A. Williams, Jr., chairman, presiding.

Present: Senators Williams and Chiles.

Also present: John Edie, professional staff member; John Guy Miller, minority staff director; Robert M.M. Seto, minority counsel; Gerald D. Strickler, printing assistant; and Phyllis Balan, clerk.

Senator WILLIAMS. We will come to order. The first statement this morning will be made by A. Elwood Willey.

Mr. Willey, you are a fire record department specialist?

Mr. WILLEY. Yes, sir.

Senator WILLIAMS. And you are associated with the National Fire Protection Association?

Mr. WILLEY. That is right?

Senator WILLIAMS. Where is your headquarters?

Mr. WILLEY. Boston.

Senator WILLIAMS. Boston?

Mr. WILLEY. Boston, Mass.

Senator WILLIAMS. Well, we certainly appreciate your coming to our committee this morning, and we are going to be greatly helped, I know, by your statement.

Mr. WILLEY. I am pleased to be here. I might add that the role of the NFPA in this particular loss is to document the facts, and also to publish and make available our findings to others so that we may solve the problems which have come up.

Senator WILLIAMS. I wonder if before you start your statement, could you describe your association and membership?

NATIONAL FIRE PROTECTION ASSOCIATION

Mr. WILLEY. Yes; the National Fire Protection Association is a nonprofit organization composed of approximately 27,000 members throughout the United States, Canada, and also members from some foreign countries.

Our function, in the main, is to promulgate consensus of standards for fire protection. We have approximately 140 committees. These standards are brought before our annual meeting through a legislative process, if you will. Prior to adoption of amendments or new

standards, the public has an opportunity to review the contents, and these standards are only promulgated, or put into effect and approved, after a two-thirds vote of the committee, and also after a majority vote of the association members on the floor of our annual meeting each year. I might add that the standards are not law until some enforcing agency, such as a State fire marshall's office, a city fire department, a building department, or some model-code agency adopts one of our standards by reference, or, perhaps, a Federal agency such as the Social Security Administration would adopt one of our standards.

Senator WILLIAMS. Have you been called on by the Occupation, Health and Safety Administration?

Mr. WILLEY. Personally?

Senator WILLIAMS. Your organization.

Mr. WILLEY. Our organization, yes, and many of our documents are included, of course, in that law. Another chief function of the association, other than public education aspects, is to investigate significant fire losses, and, as I mentioned before, report the findings and make them available, not only to our own code committees, as feedback, to improve our standards, but also to others who are concerned with fire safety and life safety, particularly.

Senator WILLIAMS. Thank you, Mr. Willey.

STATEMENT OF A. ELWOOD WILLEY, FIRE RECORD DEPARTMENT SPECIALIST, NATIONAL FIRE PROTECTION ASSOCIATION

The fire at the Baptist Towers Home for Senior Citizens, Atlanta, Ga., November 30, 1972, is one of the most significant fires to occur in a residential occupancy in recent times. That this fire occurred in a modern fire-resistive structure, which was essentially designed in accordance with present state of the art, makes this a more relevant example of a fatal fire in a residential occupancy.

In examining the fire problem at the Baptist Towers, I will limit my remarks to multiple-residence occupanies such as apartment buildings, dormitories, hotels, or apartment facilities housing the elderly. The NFPA Fire Record Department, in cooperation with the National Bureau of Standards, conducted an investigation to document pertinent facts responsible for this loss. The essential lesson exemplified by this fire is that an improved life safety environment must be created for all residential occupancies, whether they house the elderly, or whether they are in high-rise structures.

FIRE PROBLEM AT THE BAPTIST TOWERS

The fire problem at the Baptist Towers involves the ignition of combustible contents in the room of origin and the resulting exposure to the adjacent corridor. In this case, occupants in 29 other apartment units on the fire floor were exposed to smoke, toxic gases, and heat.

This exposure resulted in the deaths of eight occupants and a guard on the seventh floor. A combination of factors were responsible for this exposure, and they are: A delayed alarm; that the door to the apartment of origin was left open; the design of the ventilation system: the use of corridor carpeting with fire hazard characteristics beyond what is considered acceptable for that location; and the fact that the apartment of origin was on the windward side of the building.

No Positive Action Taken

In the early stages of the fire, although discovered by an elderly occupant, no positive action was taken to sound the internal fire evacuation alarm, or to notify the fire department, and I might add here that in looking at the sequence of events, the fire was discovered, and discovered for some time, by the occupant of the room of origin, who was well aware of the fire and was in trouble. Again, no positive action was taken to give the internal alarm or notify the fire department from the floor of origin. This allowed the fire to grow and reach the flashover stage, consuming combustible contents of her living room. As the occupant vacated the apartment, the entry door was left open. Builtin compartmentation features provided by the 1-hour fire-rated partitions and the solid-core composite door were nullified. At the Baptist Towers the fact that the apartment of origin was on the windward side of the building was additive to the fire problem. The direction and velocity of the wind drove the fire toward the corridor. The fire was now a serious threat to other occupants.

Exposure to Other Apartments Intensified

The exposure to the other apartments on the fire floor was intensified by the design of the ventilation system and the use of carpeting with high fire hazard characteristics. These two factors in combination increased heat level intensities as well as smoke and toxic gas generation in the corridor system.

Smoke and toxic products of combustion were drawn into other apartments by exhaust vents in kitchen and toilet areas. Entry doors were undercut and each apartment was supplied with 100 CFM makeup air. This air supply moved through corridors from a vent located in each elevator lobby. With such a high air flow, this design violates the intent of certain codes such as the NFPA air-conditioning systems standard 90A. NFPA 90A does permit the use of an apartment building corridor as a supply of makeup air for appliances in apartments through normal leakage around entry doors. This was not the case at the Baptist Towers due to undercutting of entry doors and the higher air flows permitted.

The degree of damage in the corridor is evidence of the intensity of the exposure from the fire in the room of origin. Heat levels were evident by a characteristic char pattern on gypsum wallboard corridor walls extending from the point of origin. The corridor carpeting, which had an integral foam rubber backing, burned in certain areas. Where the fire exposure to the corridor was greatest—between the room of origin and the elevator lobby—both the carpet and the foam rubber backing were consumed. As expected, heat levels were near floor level in these areas. The exposure at some points was severe enough for fire to penetrate solid-core composite apartment entry doors. Flame penetration was generally at the top of the door, either through the door between the core and top rail, this is within the door construction, or between the top of the door and the jamb. Damage to apartments where doors were penetrated was limited mainly to charring near the door and other heat and smoke damage. Smoke and toxic gases penetrated all apartments on the fire floor.

Fire Tests of Corridor Carpet

Subsequent fire tests of corridor carpet material were performed by the Underwriters' Laboratories for the NFPA. It is evident from test results that the flamespread of the corridor carpet is beyond limits recommended by the NFPA life safety code. Requirements of this code permit the enforcing authority to limit the flame spread characteristics of a floor covering in residential occupancies for the means of egress to class C. A class C interior finish has a relative numerical range of 76 to 200 as established by NFPA No. 255 (ASTM E–84) test method. By this method the flame spread of a corridor carpet sample from the Baptist Towers was 252. The U/L test result indicates that this material falls within the class D flame spread classification—higher than the class C limit of NFPA 101. U/L test results also indicate that other fire hazard characteristics such as fuel contributed and smoke developed values are also excessive.

National Bureau of Standards Tests

By contrast, the National Bureau of Standards subjected corridor carpet samples from the Baptist Towers to the small scale methenamine pill test. This test method essentially consists of exposing a 9-by-9-inch square carpet sample to a burning methenamine pill placed in the center of the sample and observations are made of the maximum char radius. Samples tested did not spread flames beyond the specified char radius and the carpet passed this low ignition energy test. Fire tests conducted by the National Bureau of Standards and the Underwriters' Laboratories demonstrate that the corridor carpet material would not readily propagate fire when exposed to a small ignition source, such as a cigarette. However, the carpet material will propagate flame when it is exposed to an ignition source of greater intensity (such as the exposure to the corridor carpet in the Baptist Towers fire).

We will be receiving further test data and these, data above, are based on our preliminary information received at this time, and the other data will be included in our detailed report.

Five Other Floors Exposed

At the Baptist Towers, the fire developed to such proportions that it was a threat to occupants of five other floors. Considerable smoke and heat was spread by the elevator shaft. The shaft was exposed by an open door on the fire floor and an elevator door was open also on the 10th floor. Smoke was also reported in stairways during the fire. All occupants of these floors had to leave the fire area, many requiring assistance of firefighters. One occupant from the 10th floor later died. The relative position of the floor of origin to the total height of the building exposed more people in this high-rise structure than if the fire had occurred on floors above. However, had the fire occurred on floors above the reach of aerial ladders, more fatalities could have occurred on that floor of origin. In that case, all firefighting and rescue work would have to be accomplished over stairways. The longer access time required might not have been sufficient to save those occupants waiting for rescue.

Dangerous Factors Are All Too Common

An NFPA fire record department study of residential fires indicates that most of the factors significant to the Baptist Towers fire are all too common in other residential losses. The fires studied involved apartment buildings, hotels, dormitories, and housing for the elderly. Some of these fires resulted in fatalities and some did not. Findings pertinent to a discussion of the Baptist Towers fire are:

Most multiple-death fires occurred between the hours of 11 p.m. and 7 a.m., presumably when occupants were asleep.

Most fires either involved a delay in discovery of the fire, or a delay in giving the alarm.

In a significant number of cases the door to the compartment of fire origin was left open.

In two fires involving fatalities, the corridor was used as a supply plenum for makeup air to the apartment unit.

Another recent housing for the elderly fire exhibits striking similarities to the Baptist Towers fire and underscores what I believe to be the basic fire problem. This fire occurred at the 10-story Allen Hall in Madison, Wis., on January 1, 1973.[1] In this case a delayed alarm resulted when a 61-year-old occupant and a 22-year-old employee attempted to fight a mattress fire with a portable fire extinguisher. As heat and smoke began to build, they had to vacate the apartment and left the entry door open. Heat, smoke, and toxic products of combustion spread into the corridor. The employee and the occupant sought refuge in a laundry room, closing the door behind them. Firefighters later found their bodies in that room. Another occupant, a 65-year-old man, perished in his room, also on the fire floor, and his door was closed. Also of interest in this case is the fact that smoke spread to upper floors through the elevator shaft. As in the Baptist Towers case, an elevator was stopped on the fire floor with the doors open. Had the fire been confined and controlled in the room of origin, the threat to other areas would have been reduced.

Fire experience in residential occupancies, along with the pertinent facts of the Baptist Towers fire indicates that we must address the more significant fire problem. In my opinion, this is the exposure to a corridor from a fire in combustible contents in the room of origin. If we detect, confine, and extinguish this fire, then the life safety threat beyond that point is practically nil.

Significant Factors of the Occupants

In considering the factors at the Baptist Towers, we should also consider some significant factors which concern the actions of the occupants.

The occupant of the room of origin was key to discovery of the fire, whether or not the alarm was given, and nullifying the compartmentation feature in the corridor partition. The reaction time to take positive action is most critical in a fire emergency and in all too many cases in residential fires, positive action is not initiated to provide either for the individual's life safety or the life safety of others. This is particularly true when we rely on manual assistance.

[1] See preliminary report, Appendix 1, p. 92.

Following the Baptist Towers fire, the Atlanta Fire Department and the NFPA conducted a survey of occupants on the sixth floor through the 11th. Interviews were conducted in order to compile data on occupants, such as age, physical impairments, to ask about their reactions to the fire conditions, and to analyze modes of escape. Of the 95 persons interviewed, the average age was 71, and we found that nearly one-fourth of the population had physical impairments which conceivably could affect reactions to an emergency condition. It was determined that the fire department had to assist 61 persons from the building, either over ladders or down stairways. On the other hand, 34 persons were able to leave the building by themselves.

Even on the fire floor where conditions posed the greatest threat to life safety, nine persons were able to enter the corridor and reach the exit stairs. It is interesting to note that the need of occupants for assistance in evacuation seemed to be relatively independent of handicaps based on the data provided. There were many cases on various floors where occupants did take positive action and exhibited considerable leadership and sound thinking under stress conditions. It follows that any life safety system in housing for the elderly should include fire safety education. Such education should reinforce the capability of occupants to take positive action during the emergency conditions.

Special Problems of Occupants

The occupant study also indicated that our current fire evacuation alarm criteria may not be adequate for the hearing needs associated with an elderly person. At the Baptist Towers a significant number of occupants either did not hear or did not recognize the fire evacuation signal. This indicates that the signal was either not loud enough or not familiar to the occupant, or both. This is an area requiring further study by the NFPA and others interested in this area.

Special hearing needs or hearing impairments are not restricted to just occupants in housing for the elderly. Persons with special problems may be found in any residential occupancy. In the Hilton Hotel fire which occurred in Chicago on January 2, 1970, a number of deaf-mutes were involved. Two deaf-mutes died and of the 36 persons injured, most were deaf-mutes.

It is not practical to expect a fire department to provide total life safety by evacuating occupants in housing for the elderly, particularly in high-rise buildings. The findings of the occupant study at the Baptist Towers show that many fire departments could not supply sufficient manpower to have evacuated the top six floors of the Baptist Towers in a reasonable time. Fifteen minutes was arbitrarily taken as a reasonable time in this study (assuming that one firefighter was required for each person requiring assistance). Ninety men would have been required to evacuate the 61 persons in that amount of time.

The Atlanta Fire Department performed an excellent job of rescue and firefighting, and I am certain that the initiative and skill of those firefighters was responsible for preventing further casualties. Even with the manpower provided by several engine and ladder companies, the actual evacuation time took much longer than 15 minutes, it was closer to, as I understand, 50 minutes. Because of these limitations, many communities with much smaller on-duty forces could not have

done the job as efficiently, and, again, this is a serious question we are looking at, manual systems in the building.

Additional Life Safety Needs Recognized

In conclusion, we have established the factors responsible for the disastrous fire at the Baptist Towers. We have indicated that the same factors are common in fires involving other residential occupancies. This fire could have occurred in any multiresidence situation, even on a lower floor, and possibly causing as many casualties. To provide sufficient life safety in all residential occupancies, we must attack the most significant problem which is the control of a fire in the compartment of origin.

The NFPA Safety to Life Committee has taken steps to improve life safety protection for residential occupancies in the proposed amendments to the 1970 edition of the code. These changes are based on unacceptable fire experience associated with keeping a fire within the compartment of origin. Door closers on apartment entry doors are proposed along with improved standards on apartment entry doors. I might add that this particular requirement will be added to hotel occupancies at this time.

The Safety to Life Committee has also voted to propose a tentative interim amendment to the 1973 edition of the code dealing with early warning detection in all residential occupancies.

Based on the more recent experience presented by the Baptist Towers fire, additional life-safety needs are recognized. In residential occupancies we must eliminate the use of corridors as supply plenums to reduce the smoke and toxic gases exposure to other apartments. Smoke stop partitions should be included in building designs, benefiting two fire problem areas, this would be a partition subdividing the corridor.

First, by subdividing the corridor floor area, the number of people exposed to a fire is reduced. Isolation of the elevator lobby also eliminates smoke spread through the elevator shaft, and this would also be accomplished.

Because of the certain operational characteristics in residential occupancies such as housing for the elderly, some of the above hardware applications which are based on the compartmentation principle may not be totally effective. I would stress this point because the foregoing items assume that we build in compartmentation, and if we do have a single failure point in any one of these devices, then we possibly have allowed our fire, again, to expose an area adjacent to the area of origin.

Automatic Sprinkler Performance

Automatic sprinklers which will both detect and extinguish incipient fires as well as transmit the alarm signal to the fire department must also be considered. The record of automatic sprinkler performance is good. We have yet to record a multiple loss of life in a building protected by automatic sprinklers.

As I understand from my exposure to the environment at the Baptist Towers, which I am sure Mr. Snow touched on yesterday, this environment has a family atmosphere, a sort of open-door policy. Apartment entry doors are generally kept open in some areas at

certain times of the day. This particular environment aspect would tend to nullify, possibly, the compartmentation hardware applications.

If sprinklers are installed, the cost of the total life safety system package could be reduced by waiving of other requirements usually called for by building codes. For example, at the Baptist Towers, if sprinkler protection were included in the original design, the cost of providing 1-hour fire rated partitions could have been reduced by the installation of noncombustible partitions using less expensive materials. Small hose cabinets and associated hardware could have been eliminated. Would we really expect an elderly person to use those small hose systems, or portable fire extinguishers for that matter, on incipient fires? Other engineering alternatives could be considered in new designs in a systems approach to provide adequate features of life safety.

If we address ourselves to the real fire problem at hand in residential occupancies—the need to detect, confine, and extinguish a fire within the compartment of origin before it becomes a threat—then we will have advanced the state of the art and solved many problems in housing for the elderly.

Senator WILLIAMS. An excellent statement, Mr. Willey. We appreciate it very much.

PRESENT FIRE AND BUILIDING CODES

Now, a few questions. I gather that you are not satisfied with present fire codes and building codes.

Mr. WILLEY. In addressing that question I would say this, that the state of the art must be improved in recogniton of the problems that we have discussed today. Some changes are being made as I pointed out. Speaking for the NFPA, some changes are being made this year, or are proposed this year, for our 1973 Life Safety Code, and the changes would take care of some of the problems we talked about this morning, but there is need of further emphasis, particularly in residential occupancies.

As far as applying the systems approach that we spoke of, in whatever our codes say and in whatever criteria that is proposed, we should provide design alternatives so that a designer can maximize the protection and at the same time optimize the cost involved, making it economically feasible and still attain our life-safety goal.

As an example, if at the Baptist Towers today, if we were going to do the design today, start a new project—I think it has been pointed out by the builder, on the cost of the sprinkler system—he would have to duplicate portions of the system because of codes and the way the codes are written, and this has been true, I might add, in NFPA 13, the automatic sprinkler standard, and NFPA 14, the standpipe standard. NFPA 13 was changed in 1972 and NFPA 14 will be changed this year to allow the use of the same supply for sprinkler and standpipe systems. At the Baptist Towers this would have eliminated approximately $40,000 in cost based on the builders' estimates.

Senator CHILES. I missed that.

Senator WILLIAMS. I missed that, too.

Senator CHILES. What would be the cost difference?

Mr. WILLEY. He already had installed, incorporated into the design, a standpipe system. This included a fire pump and risers. To put in a sprinkler system, and in their local interpretation of the code, he would have to put in a duplicate fire pump and a duplicate set of risers to supply these systems with water.

INDEPENDENT WATER SUPPLY FOR SPRINKLER SYSTEM

Senator WILLIAMS. In other words, the present code says if you have a sprinkler system, you have to have an independent supply of water.

Mr. WILLEY. Yes, sir.

Senator WILLIAMS. An independent system?

Mr. WILLEY. Yes, sir; at least portions in the system supply.

Senator WILLIAMS. And do you suggest that that is not necessary?

Mr. WILLEY. That it is not. Again, I would mention that NFPA 13, our sprinkler standard, has been changed to reflect this, and we now allow what we call combined systems using the same water supply components within the system for both standpipes and sprinkler systems.

Senator WILLIAMS. Were the standpipes used in the Atlanta fire by the department?

Mr. WILLEY. The fire department connections in the stairwells were used by the fire department.

Senator WILLIAMS. At the seventh floor?

Mr. WILLEY. Yes, right. They made the fire attack on the seventh floor utilizing standpipe outlets for their hose which they bring with them, and they made the connections in the stairwell and advanced on the fire.

HUD REGULATIONS FOR FIRE SAFETY

Senator WILLIAMS. You have been asked to review and comment, I believe, on HUD's proposals for new legislation for fire safety, am I right on that?

Mr. WILLEY. I received a personal request to review the criteria.

Senator WILLIAMS. From the Department?

Mr. WILLEY. Yes.

Senator WILLIAMS. Does that give it a higher dignity, that it was personal? Seriously, were you officially—what does this mean, a personal request? Were you asked to contribute to HUD's considerations of their proposed new fire safety regulations?

Mr. WILLEY. I would just stress, this was not an official transmittal which reached me; it was by personal contact through engineers at HUD, FHA, whom we work closely with and in view of the experiences that we have seen at the Baptist Towers and other residential experiences, it would be safe to say that the trend in both the changes, at NFPA and changes at HUD, are in the same vein; recognizing the need for detection-automatic systems to automatically detect and transmit the alarm signal to somebody who can give some help.

Senator WILLIAMS. Generally, you feel this is a significant advance.

Mr. WILLEY. Yes.

Senator WILLIAMS. Proposals of this type.

Mr. WILLEY. Yes, this is important.

Senator WILLIAMS. I have just looked at them very briefly here this morning. They certainly seem, to me, to meet so many of the problems we heard yesterday. This fire, this Atlanta fire, could happen in many areas in new buildings with the same——

Senator CHILES. Let me ask you—excuse me—just along the lines of that cost. You were saying that if you had the sprinkler system, you would be able to cut down these other costs. Is that envisioned in HUD's regulation?

You know, one of the things you run into now is that all of these things, all of these duplication things cause the builder to find anything he can get out of.

USE OF SPRINKLER SYSTEMS: TRADE OFFS

It seems like your proposal would make so much sense if you would use the sprinkler systems, you wouldn't have the kind of fire-resistant walls, and, therefore, your cost would come out.

Mr. WILLEY. As far as the sprinklers, I would not be in a position to interpret their policy; but it would appear to me, that as far as the duplication of the devices, which we are addressing ourselves to, and the duplication of the water supply, that would be eliminated in their philosophy.

I would believe in that; and it is, certainly, in NFPA's, and so that part of the cost would be eliminated.

Senator CHILES. Do you have any rule of thumb as to how you could come out costwise putting the sprinkler system in, let us say, corridors and public access proportions? Then, you could eliminate some of these more expensive building materials, and the smaller hoses; that kind of thing you could eliminate.

Mr. WILLEY. I think the important thing is to develop a systems concept in which you would provide the alternatives that we have mentioned previously.

Senator CHILES. Right, you could one way or the other.

Mr. WILLEY. One of the alternatives would be complete sprinkler protection, not just in corridors or stairways.

Senator CHILES. I see.

Mr. WILLEY. And with complete sprinkler protection, I think we can consider the trade offs.

COMPARTMENTATION

The other side of that, we go to the compartmentation, HUD philosophy, which includes the entry doors, the closers, the smoke detection, and the early-warning detection which is part of it. We must be very stringent on all those requirements; and they can be restrictive.

I think the important thing in the goal of NFPA, and I would suspect, the goal of other agencies, would be to provide alternatives, either complete sprinklers or compartmentation. And this is the direction I would like to see NFPA go; and I believe we will go that way.

Senator CHILES. OK.

Senator WILLIAMS. I have one specific question.

I understand the proposals of HUD under automatic sprinkler systems. My summary statement says that they are required in all corridors, public spaces, service areas, and utility areas.

Now, it impresses me, that if you have your fire protection standards, emphasize this containment within compartments.

Was 710 an apartment unit?

Mr. WILLEY. Yes, sir.

Senator WILLIAMS. If the integrity of that compartment were according to the best hopes of construction, what is it all about in fire safety?

That fire would not have gotten out of there until it had become a real roarer, if Mrs. Ross had not opened the door; the sprinkler would never have gone off in the hall because, under the proposal, the sprinklers are only out in the hall.

Mr. WILLEY. That is correct.

Senator WILLIAMS. It seems to me, that this does not mean getting to the fire as rapidly as you can, and that is what everybody was talking about here yesterday.

First, the most important thing, is to reach that fire as quickly as you can with what it takes to put it out.

Fire sprinklers are great, but, if you have a roaring fire in an apartment with an automatic sprinkler that is out there, not in here, you will never reach the fire.

Mr. WILLEY. And this is exactly why with the extinguishment philosophy we would stress complete sprinklers.

On the other hand, it would be true, that with detection, this means that somebody who was capable, and very definitely would be depending on the fire department in this type of philosophy, and they will respond automatically as part of the concept and they would have to extinguish that fire.

Senator WILLIAMS. Yes, I think we get a feeling of false security with automatic sprinklers that are only in these defined public areas, corridors, utility rooms, when the fire, obviously, most likely, will start in an area where there are no sprinklers.

In the corridors and service areas it would be rather difficult to apply the trade-off concept because you still have to retain the compartmentation feature.

Mr. WILLEY. This is why, with a systems approach, we could possibly find that particular point where we could, with the trade offs with sprinklers, find it economically feasible.

Senator WILLIAMS. Your profession doesn't deal with the economic factors, such as the pure application of safety principles.

Mr. Fullerton, who is our next witness, will, I hope, combine some of these elements with the economics of making this housing available to elderly people on reduced income.

Thank you very much, Mr. Willey. I appreciate, greatly, your help on this.

Mr. WILLEY. Thank you.

Senator WILLIAMS. Now, about Mr. Fullerton.

We are grateful to you for again responding to our need.

Mr. FULLERTON. Thank you, sir.

Senator WILLIAMS. For those of you who don't know it, Mr. Fullerton has been with us on many occasions, both formally and informally, and he has responded to personal calls on occasion.

We are glad to have Mr. Richard L. Fullerton, of Richard L. Fullerton & Associates. You are located where these days?

STATEMENT OF RICHARD L. FULLERTON OF RICHARD L. FULLERTON & ASSOCIATES

Mr. FULLERTON. Smyrna, Ga., just outside of Atlanta.

May I, Senator, respond to the last exchange with the previous witness before I get into my prepared statement?

LIMITED-SPRINKLER CONCEPT

I sensed your apprehension that a single family, or a particular person, in a particular apartment, would suffer extreme danger if the sprinkler were only in the halls.

The limited-sprinkler concept is predicated on the presence of a highly sophisticated products of combustion detector in a strategic location.

Let us visualize ourselves in one apartment, at night, asleep. If the fire started in that apartment, the products of combustion would asphyxiate the tenant before the sprinkler head would be activated; so, we lose that tenant with the sprinkler head in there now.

If I were a tenant, and had to choose one or the other, I would choose the products of combustion detector so it would awaken me, and in the process alert everyone concerned. Then, by-and-by, the sprinklers would do their work in the halls or wherever they are; but I want to be out of there before the flames are hot enough to activate the sprinkler heads in the ceiling of my apartment. So that, if the fire is in my apartment, I want automatic protection; if it is elsewhere in the building, then the sprinkler concept.

Senator WILLIAMS. Well, in talking about this trade off business, I, certainly, would never trade off the automatic detection in an alarm system.

Mr. FULLERTON. This was the stopper I wanted to put into that discussion, so that we don't lose the early-warning detectors; indeed, that is the beginning key to success.

Senator WILLIAMS. Absolutely right, I am sure. I agree.

Mr. FULLERTON. Senator Williams and honored members of the committee, it does not sully the true heroism of the firemen at Atlanta's tenfold disaster for the elderly to report that the building lacked automatic early-warning protection.

It does not gainsay the Churches' dedication to the third dimension of the Gospel to assert that those who were paid to make the building safe left out this basic safety device.

It does not reflect on proper high-rise housing for the elderly to insist that this unguarded building could have been made much safer with little sacrifice of profit.

It is no condemnation of governmental involvement in social betterment, even housing, to say that the authorized agency of Government was not only negligent, but by omission and commission, participated in the fabrication of the pre-conditioned disaster.

Ten graduate Americans died in vain. Theirs was an innocent trust in the untrustworthy conspiracy—breathing together—of big business and big governmental bureaucracy.

Nearly a hundred of Atlanta's bravest men were belatedly summoned to help. They were there barely 5 minutes after their phone

rang, but the flames were already leaping skyward out of the seventh story windows. The men were on time and they worked manfully at tremendous personal risk. The alarm was too late.

What happened is an outrage of the advertised intent of the Congress and the will of this committee. It is an affront to the conscience of America that her Government would be party to such an event—even a prior causal element.

The fire was not an accident, except in the general definition. It came as the end result of events and circumstances which were known and commented upon. Charity certainly absolves whichever tenant could have prevented or limited the earliest manifestations of trouble. Whether that tenant failed by reason of age, infirmity, or nighttime confusion makes no difference. That much was an accident.

Fire Was Almost Predictable

In August 1971, this committee conducted indepth hearings on the "Adequacy of Federal Response to Housing Needs of Older Americans." Several of us then almost predicted this fire. Many experts and experienced participants spoke of the FHA's penchant toward shoddy construction and expedient money manipulation. Especially was this discussed and made matters of record in the section 236 program.

In this day of splendid technology, when the least potential fire in the Library of Congress, for example, sets off automatic alarms inside the Library and at the District of Columbia fire stations, these elderly Americans in Atlanta need not have died. About $50 per apartment unit would have provided early warning smoke detection equipment sufficient to have saved these old peoples' lives.

Certainly, America should preserve her old books. America should care for her old folks, too. I have come one more time to beg in their behalf that this committee and the whole Congress shall mandate proper use of public funds.

Just one leased telephone line tied to the nearby fire station could have, automatically, brought the firefighters in full array before anyone in the building was hardly awake. The night watchman who perished in faithful duty could have been saved. He deserved to live.

Too late for those 10 aged victims. Only tears avail for them now. Baptist Towers in Atlanta had its first fire drill on Wednesday, February 7, 1973. Prayers for the living can now be implemented only by proper legislative and administrative action both inside and outside of Government.

Too late also to do anything but thank and honor the men of the 18 firefighting companies who, most deservedly, received unit citations. These men knew, even as they gave their masks to tenants being rescued, that a little commonsense, a little careful dedication, a little less greed earlier on could have saved it all.

What a travesty for a housing expert to say, afterward, "The building performed beautifully."

The FHA Assistant Director for Technical Services told me 3 weeks ago, "We have no quarrel with the construction (of Baptist Towers). It met the requirements. It has everything any similar project has under any program."

This, of course, is just not true. Baptist Towers does not even have proper hardware on the doors. Not even on the new, replacement, doors.

Lack of Money

Architect, builder, consultant, even manager, all complain that there was not enough money to supply this building with automatic warning devices. That complaint has been made right here in this hearing.

Anybody in the business knows full well that $4,708,000 is adequate to develop and build 300 small apartments. Any widow or elderly couple in America can be housed in optimum safety and comfort for $15,695 per dwelling unit. The issue is not the fact of the money. It was there and it was taken. In this mortgage, over $624,657 was spent for the very wrong things.

I offer these documents for printing in the record of these hearings:[2]

(1) Description of the system and actual paid subcontract price for fire warning system in Baptist Terrace in Orlando, Fla.

(2) Photocopy of FHA Form 2264 for project No. 006-44103 NP, Baptist Towers in Atlanta, Ga.

(3) Photocopy of HUD Form 4105 for SH-G-11, St. Paul Apartments in Macon, Ga., completed since Baptist Towers.

(4) Development costs comparisons for the Atlanta and Macon projects with figures extended for factual collation.

Atlanta's building that burned does have manual fire alarm stations with all the bells and wiring needed. Orlando's Baptist Terrace has the added feature of ionization smoke detectors tied to the same system. The Orlando Baptist project has had fire alarms also but those fires alarmed themselves and were controlled without harm to tenants or building.

May I say that the Baptist project in Orlando, is also fully sprinkled. The only time a sprinkler head has gone off anywhere in the building, was in the trash collection area. This is equivalent to a partial sprinkling concept. But that project is guarded with both early warning detection and sprinkling system. The difference is not in a sprinkler system, it is in ionization products of combustion detection which automatically alerts even the man on watch at the firehouse.

Ionization Smoke Detection Demonstration

These detectors—I show you a working device—sell for about $100 each, plus installation. The 11 floors of Atlanta's Baptist Towers could have been covered by four detectors each—$4,400 plus the control panels and transformer. These are some of the sort of detection devices we are talking about. I am not talking about a product, I am talking about a concept. This is the same sort of detection device that we walked under, Senator, when we walked over in the Capitol Building to view the film yesterday. The Senators are protected by these devices, the Library of Congress, the Pentagon, and other Federal buildings are protected by these devices that we have in a great many section 202 projects all over the country.

Senator Williams. Is that the ionization smoke detection?

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[2] See Appendix 1, pp. 95-99.

Mr. FULLERTON. Yes, this is an ionization smoke detection head. Now, of course, in a multifamily housing unit, any multi-installation, this is attached by wires in conduits to a central panel, a board, an annunciator, and it goes through a transformer producing 200 volts of direct current in this sort of installation.

Senator WILLIAMS. How does it work?

Mr. FULLERTON. How does it work?

Senator WILLIAMS. What about the heat, what happens, what is this ionization business all about?

Mr. FULLERTON. Since we are both laymen in this context, let me make bold to describe how it works.

There is a man in the room who could describe it exactly, but he sells them for a living, and he might have a commercial interest where I don't have.

There are two compartments in this device. This one opens to the——

Senator WILLIAMS. The record will show that Reverend Fullerton is now taking apart a mechanism described as a one-unit ionization detection system.

Mr. FULLERTON. This is one detector. This is one head for this is the outer chamber. Obviously, the air in the room or in the hallway passes through this with the addition to that ambient air, of the products of combustion. This is not necessarily visible smoke. This is whatever comes off a smoldering fire or combustion at any stage.

Senator WILLIAMS. In other words, even if it is just an increase of heat——

PRODUCTS OF COMBUSTION DETECTION

Mr. FULLERTON. No, not the heat. It is not the temperature of what is passing through, it is the content of what passes through. This is not a heat-rise device. We can get into that, but they are a great deal less sensitive. They operate much like the sprinkler head; it depends upon the melting or flexing temperature of a given piece of metal. This is not the temperature of what is passing through, it is the content; so that when those particles of combustion are there the conductivity is changed in this area and also in this chamber, and it triggers and sounds the alarm.

Let me demonstrate it. "One noise is worth ten thousands words," I think the Chinese said. This is a self-contained unit of the exact same design, and so that we will not be confused as to whether or not it is the heat or a product of combustion that is doing it, let the match finish its smoking. You don't see what is going up there, and it is not the heat or I would be feeling it. I hope it is plugged in.

Senator WILLIAMS. Was that supposed to set it off?

Mr. FULLERTON. It will set it off. It is bound to be this way when you are—my dad used to strike those matches with his thumb, but I don't smoke so I never learned.

Senator WILLIAMS. We used to do it in our teeth.

[During this portion of the colloquy the alarm sounded in the hearing room.]

Mr. FULLERTON. Of course, Senator, the sound that it would make is a very limited sound. This is an installation——

Senator WILLIAMS. That was a common stove match held lit about 8 inches below the detector.

Mr. FULLERTON. Yes, with my hand between the match and the detector; that is why it did not set it off too quickly, because I had my fingers blocking it.

Senator WILLIAMS. It was not the heat, it was the——

Mr. FULLERTON. The products of combustion, nicknamed "smoke." Smoke is what you say when you see it, but there is a great deal that goes on that you don't see. What you see is not necessarily what you get.

MODELS FOR HOME USE

And, again, this is a home model. This is a self-contained unit that you would put in the hallway of your home.

Senator WILLIAMS. But now in this home model there is a battery.

Mr. FULLERTON. No; we plugged it into the a.c. There is a transformer that transfers into d.c. current, but it is the exact same technique. These wires on the top are so they can be wired in a series if you have more than one in your home; the activation of one will sound them all. I recommend them for your home by the way.

Senator WILLIAMS. I have one, but it has a battery and it went off, I mentioned here yesterday—you were here—burning toast, at a distance of 30 feet set that thing off.

Mr. FULLERTON. Well, this is what is needed in housing for the elderly.

Senator WILLIAMS. You are absolutely right.

Now, the only thing with the battery, the only way you can turn it off is to pull the battery. How do you test that unit without pulling out the battery, you only pulled the plug.

Mr. FULLERTON. If you just go out of the house and wait a little while, this will clear itself. It just takes a little hanging on, but it will quiet itself down after a while.

These, of course, when they are in commercial buildings, they stay on until somebody with authority goes to the panel and shuts them off. The tenants cannot just go and quiet this down; that is something for the firemen or manager to do. These detectors sell for about a hundred apiece plus installation.

The question is singular. Is FHA so tightfisted that a few thousand dollars could not be spent for life safety?

FHA FEES

No, the FHA is anything but tightfisted. FHA cheerfully confiscated $47,087 for themselves in the original "mortgage insurance premium," and steadily charges the tenants an additional one-half of 1 percent per year ($23,540 or about $3.30 per month additional rent) just to insure the lender against any possible loss. This $47,087 is in the principal of the mortgage for 40 years, as are all of the $625,000 we will talk about now.

Let me insert here, Senator, I talked to the FHA people about that and they said, "Oh, no, the Government pays the mortgage insurance premium." That is a childish reasoning for there is an 8½-percent interest factor on this mortgage premium. How is it possible to say that the tenant pays $1 and the Government pays another? If it were not in there, we know the tenant's rent would be that much less.

The widow pays it all, plus 1 percent per year in FHA penalty on this purloined purse.

FHA also charged $14,126 to "examine" this mortgage. FHA also charged $23,544 to "inspect" either the mortgage or the building. FHA also gave the mortgage broker $94,174 from the widow's mortgage proceeds because he made the arrangements for a Florida savings and loan association to lend this amount at 8½-percent interest. FHA insures this whole amount for repayment and actually pays—no, FHA doesn't pay anything—you and I pay 7½ percent to that outfit in Florida.

Treasury payments to this lender come to $294,784 per year or a total of $11,791,360 during the term of the mortgage. This Federal investment alone is enough to build the whole thing three times (with fire protection built in) and give it to the tenants. Talk about a condominium.

FHA also made the tenants' rents high enough to provide an AMPO (amount to make the project operational) fund of $94,174. Someone has that money now. The tenants have the debt.

In addition to the 8½ percent interest he is drawing (with absolutely no risk) the lender was awarded the $82,402 originally set up in the loan for the GNMA/FNMA fee. The bond premium of $22,650 suffered a similar fate.

All of this unbecoming action in the federally subsidized mortgage covering this project mushroomed from the 1968 Housing Act. Equally evil has been the administration of the act.

Minimum Property Standards

"FHA Mimimum Property Standards for Multi-Family Housing" (FHA No. 2600, issued February 1971) in paragraph M508–1.3, states—and the last time we showed you this book, Senator, was at this same table in 1971. You will remember we had the discussions about the voluminous FHA requirements as compared with the hard-nosed, straightforward section 202 requirements:

> Buildings of noncombustible construction of eight or more stories in height having more than 15 living units per floor shall be equipped with an automatic fire detection system. Fire Alarm system shall be installed in accordance with the appropriate NFPA Standard Nos. 70, 71, or 72c.

The description fits Atlanta's Baptist Towers, except that the regulation was conveniently sidestepped by FHA itself. "We didn't have enough money to do everything," is the gist of the explanation given me.

Of course they didn't have enough money after they passed out $625,000 in unnecessary fees, discounts, and gimmicks. The FHA procedure deliberately reserves all the benefit in all of its programs for its profiteering cronies. Financial greed is served first, housing need gets only what is left over.

In the case that brings us here, there was not quite enough left over. I am sorry. Sorry enough to come and beseech you that the awful wrong of 1968 shall be redeemed in 1973.

Do not raise cost allowances. This would only make more funny money available for those who are in favored positions to lift it from the subsidized mortgage proceeds.

Do not merely stiffen the regulations regarding construction. The state of the art is better known out where we work than in here where you all work. My present fear is that Congress and the administration will both create such extreme requirements as to obviate any future cost-conscious housing for senior citizens.

The cost allowances are high enough. The problem is that the insatiable Housing Act of 1968 takes the cash benefit away from the old folks themselves (though they and their sons are indeed the taxpayers) and gives it to the lender/promoters who piously build the trash and pocket the cash.

Please, sirs, give us an elderly housing program like we had after the 1959 act and before the 1968 act.

We remain at your service in service to America's elderly.

202 vs. 236

Senator WILLIAMS. You mentioned—you said all that without saying that there is available an alternative to 236.

Mr. FULLERTON. I know you knew it; and I knew you know it.

Senator WILLIAMS. Well, you are talking here to 202.

Mr. FULLERTON. I am talking here, sir, to a program that leaves the parents of a given project in control from the start to finish and makes the commercial sector come in competitively.

Senator WILLIAMS. Well, I, of course, share your view on the relative merits of 202 and 236, as you well know.

Something was added to the relative merits of another program yesterday by Mr. Butler when he described the desirable features of 236 in terms of negotiating for greater efficiency, the subcontracts, as compared to 202, where it has to go out formally and be given to the lowest bidder inflexibly; and getting as a fallout people who are not qualified and deficient as the subcontractors.

You were here, of course, and I was looking forward to today when I knew you would be asked to comment, if you did not volunteer a comment.

Mr. FULLERTON. May I remind the record, Senator, that you quoted what he said as him having said it, not as facts that were to be obtained. I want to be sure that we understand that is what he said, not——

Senator WILLIAMS. Well, isn't that what I said he said?

Mr. FULLERTON. Yes. I think you left out one "he said."

He said some things yesterday that just do not——

Senator WILLIAMS. Let me see, is Mr. Butler here, no. I did not expect that he would be because he was not expected. He came to testify yesterday and returned home.

Mr. FULLERTON. Had I said what he said yesterday, I would be here today with a little trepidation because it involves one consultant and one builder.

Before I go into this, let me speak of the whole context, the whole technique, not necessarily with regard to Mr. Butler and Abco Builders, though I will answer specific allegations.

Senator WILLIAMS. You want to generalize rather than deal with Mr. Butler and Baptist Towers?

Subcontracts for Baptist Towers

Mr. Fullerton. No. I want to deal with Baptist Towers, but I don't want to infer, in the least, that this is an isolated wrong. This is a technique that is well blessed by the FHA, and promoted, and carried out in 50 States. This goes on steadily. In the Calvin Court project that he cited as being his 202, this is a direct quote from a Government official, "We did not require that he go with any subcontracts. The competition is with the general contractor. He could use any subcontractor he desired."

Now, if you want the real facts as to the techniques that were involved there, I suggest you ask the architect. Mr. Butler complained about the requirements of 202; the quality requirements in 202 are higher, there is no equivocation that we have asserted that. We have demonstrated that, it shows in the existing projects around the country. In fact, the architect who did both the Calvin Court and the Baptist Towers has said that there is very little comparison between the two projects with regard to quality; this is from the architect himself. His statement says that the 202 project is vastly superior in physical quality, the actual existing structure, even as to the size of the apartments, the actual living area available.

This is again a quote from the Government official who processed the paper, for the section 202 loan for Calvin Court. "His problems, that is Mr. Butler's problems, in Calvin Court were with the architect. He and the architect were going round and round."

The problem that Mr. Butler had in Calvin Court in the section 202 project was in building the thing up to the architectural standards that had been written into the loan application and loan approval. The builder insisted on cutting and splashing and getting his costs down. The architect, in the 202 program, was required and paid to hold the standard up, and the standard was held up. Because of that tug and draw, that argument which raged for 21 months, it took that poor builder 21 months to build it.

Time for Construction

The time in 202 for construction was usually put in at 15 months, sometimes a little less, it usually took 16 months to build a section 202 project. That is kind of a national average.

Now, an interesting thing happened with Baptist Towers in Atlanta. It was about the first of the 236 projects for the elderly. There was a concerted effort made by Mr. Gary S. Hooks, who was the Insuring Office Director for FHA. You will recall that the FHA—I don't want to seem put upon here but the FHA tried consistently here to make section 202 housing look bad in its processing and so forth. This came on in the third dimension then, because 236 was extant, and was allowed to develop projects of its own. This particular project was processed in the shortest time the FHA ever took to process any project of this size in the history of the FHA. I think that record still stands. That was the advance paper work. It was approved while the fund freeze was on. You remember that fund freeze. Back in those days they did it in record time and got it approved.

Consider the matter of Mr. Butler here saying that while they were allowed 21 months to build it, he built it in 14 months. That 21 months

figured out to $350,210 in interest during construction. You know the taxpayers pay for that long time allowed, and that comes into the loan and stays in the loan, and is paid back out of the tenants' rent. They set up an extra long time, built it in average time, and took credit for the difference.

My question is, what happened to the one-third of the $350,000 that wasn't needed for interest during construction?

I secured the answer to that question this morning; FHA has what it calls the incentive plan, it says that the builder and the owner can divide whatever money is saved by reason of accelerated construction, and you know, haste makes waste. In this case, perhaps, it was a waste of human lives.

You remember what Mr. Fay said when he was here in 1971, Monsignor Michelin, Mr. Fernandez, The Reverend Shirk, and the others; this is a situation after the fact, we talked then as before the fact, but the fact remains.

Senator WILLIAMS. I wonder if you would analyze this sprinkler question with us, Reverend Fullerton. Certainly, you have described the compelling need, to my satisfaction at least, of these detection devices.

MANUAL VERSUS AUTOMATIC SPRINKLER SYSTEMS

Now, where, in your judgment, should we be moving in terms of the agency that puts the fire out, the sprinkler, the manual as against the automatic, the two standpipes as against the one? You have analyzed all of this, I am sure.

Mr. FULLERTON. All right.

In section 202 housing, with exception of course—we can't operate with total awareness in all of these projects around the country—the norm is that there are pressure standpipes in the end of the halls, in the stairwells, as there is in Baptist Towers, and an automatic sprinkling device in the high-danger areas, that is, in the trash chute, in the room where the trash is collected, in the elevator, penthouse, the head of the elevator, the place where fires, nonresident fires, ordinarily begin. Those are automatically sprinkled, wet down, alarmed, and that is the existing condition. We don't have to correct that. It is already corrected.

Now, it is not, in my opinion, the killing factor in terms of cost or actual presence to tap into the standpipe that already exists, and run sprinklers down the hall, with quite close head settings; at least one in front of every apartment door, so that that door will be wet, remembering then that heat rises, and a severe fire in that unit would heat that ceiling of that hall reasonably soon, and would sprinkle that hall and in effect, contain that fire, remembering also that this is all predicated on the smoke detection device already having sounded which indeed it would have. So that in projects where we have sprinklers already and smoke detection, the sprinklers are never used. The smoke detection brings the situation under control well in advance of any heat rise sufficient to activate the sprinkler system.

Senator WILLIAMS. Now, how does the smoke get out of the apartment unit when the compartment is as tight as it has been described, as it should be from the descriptions of prior witnesses?

Mr. FULLERTON. It is not visible smoke we are talking about; it is the products of combustion, and no door seals so tightly so that these

particles would get through. And, again, I apologize for calling this the "Baptist fire," this is a highrise fire and it ought not carry that particular onus, it happened.

The wood door frames and all that is characteristic of that project and most section 236 high rises are just not that tight, these doors are naturally warped. The frames and doors are prehung. It is the very least expensive installation that can be made. They are not made to be tight, and besides that, they are precut to clear the carpet; there is no notion of it being a refrigerator door.

Detectors in the Hall

The detector in the hall, to my way of thinking, is the minimum sufficiency; to put the detector in the room and the sprinkler in the hall would, in my opinion, provide the optimum situation.

I rather resist the notion of sprinklers in all of the rooms. It would be a cost redundancy and a managerial problem that would get out of hand because of bumping, not the actual use of the sprinklers, but the accidental turn-on. There is an insurance problem there and all the rest, but that is for the experts to decide. I just hope that we will not, in panic, go clear over to the other extreme.

Senator Williams. It seems to me, the best in detection and the automatic doors would guide us to the conclusion that the sprinklers in the units might not be necessary.

Mr. Fullerton. This would be my conclusion. Now, those door closures are going to have to be carefully maintained. There is no worse nuisance than a door closure that is too loose or too tight. A door closure will hold a door open if it is malfunctioning.

Unfortunately, the door-closure technology isn't up to the detector technology, and also you have infirm people who have a legitimate right to live there not being able to——

Senator Williams. We will stay on the record even though we are going off fire safety and protection against a fire; where do we stand these days on housing in the area we are addressing ourselves to, for elderly people on reduced incomes?

We have two programs, three programs, Public Housing 202, and 236. What is the situation now?

Housing Freeze

Mr. Fullerton. We are at a standstill, of course, because of the—an ostensible standstill—the freeze, the moratorium is in effect. This does not obviate paper being processed in the FHA, and I am sure that there is a good bit of that going on, though it is quasi-official. So, if the moratorium is lifted for section 236, there would be a great many projects quickly approved by the reason of prior processing, but 202, of course, is in complete disrepute in the administration. There is no notion of them accepting a section 202 application, though, I know of many applications that would come in quickly, if they would be received. Public Housing is out of my bailiwick, although we all know that is in the moratorium.

Senator Williams. So these two programs, they are both in moratorium. Is there construction going on of prior approvals?

Mr. Fullerton. Oh, yes; there is a great deal of 236 going on.

Senator WILLIAMS. There have been no approvals since the moratorium.

Mr. FULLERTON. Well, again, those that were up to a certain stage, and the FHA is very fluid, very flexible with certain people and very inflexible with others as to where that stage is. There is a great deal of action yet in 236.

Senator WILLIAMS. I get the impression that there is no enthusiasm in this whole area in this administration.

Mr. FULLERTON. No, of course not.

Senator WILLIAMS. Now, we have 202 and 236 and lack of enthusiasm. To use a Mort Saulism; of the two, the 202 is the evil of the two lessers.

Mr. FULLERTON. I understand. The reason being, of course, the budget's impact, that is the old harangue; and in section 236, the interest subsidy concept was so thoroughly sold to the administration that, though Mr. Romney, Mr. Gulledge, and these others that we have had opportunity to argue with before are gone, the memory lingers on, and the concept is still the same.

Senator WILLIAMS. Thank you, very much.

Mr. FULLERTON. Thank you, sir.

Senator WILLIAMS. Mr. Quinton Wells, Director of the Office of Technical and Credit Standards, Department of Housing and Urban Development.

Do I have that position correct, Mr. Wells?

STATEMENT OF QUINTON R. WELLS, DIRECTOR, OFFICE OF TECHNICAL AND CREDIT STANDARDS, DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT; ACCOMPANIED BY DR. CALVIN HIIBNER AND DUANE KEPLINGER

Mr. WELLS. Yes, sir.

Senator WILLIAMS. The Office of Technical and Credit Standards.

Mr. WELLS. It is a long title.

Senator WILLIAMS. Yes; but do these two fit into the same mix? Is this money credit?

Mr. WELLS. Yes, sir.

It is really an underwriting arm we have in the Office of Technical and Credit Standards; cost estimating, mortgage credit, evaluation, appraisal, market analysis, everything to do with the construction of projects, the architecture, the minimum property standards, and land development.

Senator WILLIAMS. Have you been through the rise and fall of 202, and the rise and fall of 236?

Mr. WELLS. No, sir. I came aboard 3 years ago this May; and at the time I came in, 202 was being phased out because administratively they decided the budget impact was excessive.

Senator WILLIAMS. When you say budget impact, you are talking about the first-year budget impact?

Mr. WELLS. Yes, sir.

Senator WILLIAMS. Not the long-term budget impact?

Mr. WELLS. First-year impact, right.

Senator WILLIAMS. OK. I appreciate your being here, and look forward to your statement.

Mr. WELLS. Mr. Chairman, and members of the committee. It is a privilege to appear before you to report our latest efforts in the field of fire protection and to relate them to the Atlanta Baptist Towers tragedy. A tragedy that occurred despite the fact that this was a fire-resistive building meeting all applicable codes.

PROPOSED REVISIONS TO HUD STANDARDS

At the present time, proposed revisions to our pending standards are in the process of circulation for comment. On January 23, Assistant Secretary Gulledge authorized a press release concerning these proposed revisions. A package containing present wording of our standards and the intended revision was then sent to all HUD field offices and to 162 professional societies, consumer groups, materials associations, Federal agencies, and individuals knowledgeable in the field of fire protection. A notice of availability of these proposals will also appear in the Federal Register this week. To date, we have received approximately 40 replies.

We have been working on these problems for many months in close cooperation with the National Commission on Fire Prevention and Control, and with the National Bureau of Standards. Our first concern was for the occupants of nursing homes and elderly housing. However, after delineating those items we felt necessary for elderly housing, we then proposed that these items be made mandatory for all elevator housing. It is our feeling that the protective measures described should not be limited to housing designed specifically for the elderly and handicapped since many of our regular apartments are occupied by elderly persons. Also those measures which may prove appropriate for elderly housing are equally applicable to family housing. Since your request for testimony referred specifically to the Atlanta elderly housing fire, I will attempt to illustrate the reasoning behind some of our proposed standards by reference to Baptist Towers' events.

BAPTIST TOWERS FIRE

Shortly after 2 o'clock on the morning of November 30, 1972, the emergency call system annunciator board in Baptist Towers indicated a call from the seventh floor. The resident-security guard, on duty at the time, rode the elevator to the seventh floor, opened the door, and perished from smoke, fire, or intense heat. The death of the guard undoubtedly delayed the sounding of a general alarm at this critical time. In addition, the elevator door remained open, providing a passageway for smoke to the upper floors. This caused some confusion among the occupants as to the actual floor upon which the fire was located.

Our standards propose the installation of a smoke detector in each elevator lobby, on each floor except the main floor, which will program the elevator to bypass a floor upon which the detector is activated. The "American National Standards Safety Code for Elevators," ANSI A 17.1, is also being revised at this time. This revision reportedly will contain more detailed provision for control of elevators during a fire, permitting use by firemen to attack the fire. This standard

will be thoroughly reviewed when completed and adoption by HUD is anticipated.

The occupant of room 710, where the Baptist Towers fire originated, left her room without closing the door. This action permitted the fire to spread into the corridor. Several other tenants opened their doors and either evacuated the floor of were driven back into their rooms by the smoke and intense heat. The doors remained open allowing the fire to penetrate and reach the furnishings in the room, thus contributing to the fire fuel load.

Door Closers Proposed

We propose the installation of automatic door closers on all apartment entrance doors. This would, hopefully, confine a fire originating in a living unit to that unit, or prevent a fire in a corridor from easy access to living units and their combustible furnishings.

As previously mentioned, the fire in Baptist Towers spread through the corridors and did not penetrate the walls separating units. In the event that the doors do not confine the fire to the living unit, we propose that all elevator buildings, regardless of construction type, be provided with an automatic sprinkler protection system in service areas, utility areas, public spaces, and all corridors throughout the buildings. The sprinkler system is to be connected to an automatic alarm system.

We have no way of knowing the extent to which the fire in room 710 had progressed before the occupant was alarmed and left the room, since she was one of those who died in the fire.

Smoke Detectors

To gain the earliest possible notice of fire, we propose that in buildings with elevators an automatic smoke detector and alarm system be provided, with a detector located within each living unit. For elderly housing, elevators are required in all buildings containing three or more stories, and in two-story buildings which contain congregate living facilities on a floor other than that containing living units. In nonelevator buildings, a smoke detector, which may be a single-station alarm device, is to be provided within each living unit and, unless each living unit has a direct access to the exterior a grade level, a manual fire alarm system is required.

The number of smoke detectors required within each living unit will vary depending upon the size and configuration of the units. Installation and location of detectors is to be in conformance with the applicable standards of the National Fire Protection Association. Cost of the single-station smoke detectors in nonelevator buildings is estimated to be $50 to $75 each. Costs for elevator buildings will be discussed later.

We are aware of the controversy existing in the industry concerning the degree of safety or hazard related to the use of so-called combustible and noncombustible materials; and combinations of both. There is also the question; in the event of fire, should housing occupants of high-rise buildings attempt to flee to the ground, go to an area of refuge, or remain in their own apartments? Our standards and most

building codes contain limitations relating the allowable height and floor areas of buildings to certain construction types. In the case of type 1, or fire-resistive building, there is no limitation. Baptist Towers was of such a construction type.

In order to provide a place of refuge, other than the apartment, we are proposing that in all elevator buildings, which contain more than eight living units per floor, each floor be divided into not less than two fire divisions. Separation shall be by 1-hour firewall, and a fire door with a closer activated by a smoke detector and electromagnetic doorholder. Each of these divisions is to contain one elevator. As an alternative, when elevators are grouped together off a common lobby, the entire lobby may be separated from each of the fire divisions as described above.

Cost Estimate of Proposed Revisions

An estimate of the additional costs attributed to our proposed revisions cannot be exact due to the widely varying figures received from different parts of the country. For example, a survey of our 10 regional offices produced prices for sprinkler systems ranging from $65 to $150 per sprinkler head.

Costs will vary also based upon building size and shape. I will attempt to illustrate the figures for each of the protective measures as they would relate to a building similar to Baptist Towers: Elevators controlled by smoke detectors, $1,500; door closers to 300 apartments, $9,000; automatic sprinklers in corridors, service areas, and public places, $17,900; smoke detectors in 300 apartments, $40,000; an automatic fire alarm system activated by smoke detectors and sprinklers, including manual pull stations, code transmitters, control panels and annunciator, $12,200; horizontal separation, since the elevators at Baptist Towers are grouped at a central lobby, it is more practical to separate each wing from the lobby, providing three fire divisions per floor, $7,800.

The total estimate for these protective measures is approximately $88,400, or $295 per apartment. This figure, spread over the life of the mortgage would require an increase in rent of $2.40 per month for each apartment.

Additional Protection for Nursing Homes and Care Facilities

I have stated earlier that we would apply our fire protection requirements for elderly housing to all multifamily housing. However, we do propose several additional protective measures for nursing homes and care facilities. Occupants of nursing homes are usually not as ambulatory or self-sufficient as residents of elderly housing. The requirements proposed in addition to those for multifamily are as follows: Door controls; doors to patient rooms for nursing homes usually remain open. We propose automatic door closers to these rooms. Doors are to close automatically when activated by a smoke detector and electromagnetic doorholder. The detectors activating these doors are to be located within the patient's room and are also to activate the automatic alarm system.

Alarm Systems

The automatic alarm system, activated by smoke detectors and fire extinguishers is to automatically transmit an alarm to the fire department committed to serve the area. The cost of the simple transmittal system which we will require is estimated at $200 per building. The system will simply notify the fire department that a fire is occurring in a specific building.

Fire Extinguishing Systems

The Life Safety Code, NFPA 101, 1967, requires automatic sprinkler systems throughout all nursing homes, other than those of fire-resistive or noncombustible construction. In our multifamily and elderly housing programs we have expanded this coverage to corridors, service spaces and public areas in all elevator buildings, regardless of construction type. For nursing homes we propose this same protection of corridors, service areas and public spaces in all buildings exceeding one-story in height, regardless of construction type. The proposals for elevator controls, and horizontal separation of fire areas, set forth previously for multifamily housing, are also applicable to nursing homes.

Evacuation Procedures

This Department does not itself have the expertise to establish fire evacuation procedures for the various types of residential occupancy. The residents of Baptist Towers were not instructed in fire exit drill procedures. Events there, clearly illustrate the need for recognized standards of this type, prepared by fire authorities. Several persons left their apartments on the seventh floor and escaped safely; five people remained in their apartments and died; three other occupants perished in the corridor attempting to escape. We are actively seeking information and methods of implementation from the experts in this field.

Furnishings

We have attempted to strengthen the life safety provisions of our design and construction standards. However, we are concerned about the materials moved into a residence by occupants. Much of the furniture and household equipment manufactured today, is of a material that can literally explode, spreading fire throughout the living unit. Other materials that may smolder, or burn slowly, can generate excessive smoke and toxic gases which are even more deadly than fire. Most of these materials are beyond appropriate code or standard provisions and control.

Personal Safety Devices

I understand that the committee has expressed an interest in a portable emergency signaling alarm system which is operating in the elderly housing highrise on the operation breakthrough site in Sacramento, Calif. This personal alarm system, developed initially with NASA support, has been used in high schools for security purposes.

This pencil-like device, which can be kept in a pocket or on a necklace, is intended to help elderly occupants in case of accidents, sudden

illness, threats to safety, or other emergencies anywhere in the building. When the user presses a button, the transmitter flashes an alert to a control panel, pinpointing the location where help is needed.

HUD awarded a $98,000 14-month contract on November 10, 1972, to assess the applications and transferability of the emergency alarm system, installed in this experimental facility, to similar facilities for the aged.

The contractor will train the residents to use the system, and operators to monitor and evaluate it. The contractor will further evaluate all emergency response systems in the high rise to determine if they meet the emergency needs of the elderly. The history of emergency system operations, the perceptions and attitudes of the users, and all implementation and operational costs will be documented by the contractor.

Dr. Calvin Hiibner of Utah State University, a consultant to our Office of Research and Technology has accompanied me today, and would be pleased to answer any questions you may have concerning the personal warning system.

This concludes my prepared statement and I thank you for the opportunity to present it.

Senator WILLIAMS. Thank you, very much.

Why don't we start right now with a little demonstration of this device.

Dr. Hiibner, are you the contractor?

STATEMENT OF DR. CALVIN HIIBNER

Dr. HIIBNER. No; I am not the contractor. I was partly responsible for starting this contract. I left HUD last September to join the University.

Senator WILLIAMS. Who is the contractor?

Dr. HIIBNER. The contractor is from Mentoris Co. in Sacramento. It is a small business.

Senator WILLIAMS. Would you come up and show that to us please? Is it operational right now?

WARNING TRANSMITTER

Dr. HIIBNER. No; I am sorry. I don't have the sound effects that you had before. I will just hand it to you.

This, I might say, is a very early model of the transmitter that was loaned to us about a year ago by NASA, who developed it, and at the present time, it is essentially the same thing, although it is much easier to use, particularly if one is not as agile with their hands as they would like to be.

This device is simply a tune bar in the end of it. You press the button and it activates the tuning fork; the sound, which we cannot hear, is picked up by a receiver in the room, transmitted to a control panel that lights a light, and a noise similar to what you heard before will respond.

It was not designed particularly as a fire protective measure, but it could conceivably be used for that.

Senator WILLIAMS. This activates with just a very slight pressure.

Dr. HUBNER. Yes.

Senator WILLIAMS. With your thumb, this looks like a penholder you would buy for your pocket.

Dr. HUBNER. Yes.

Senator WILLIAMS. I wonder where the NASA people used this, in what part of their activities.

Dr. HUBNER. They didn't. Their technology applications office, they had been experimenting with this type of signaling device, and it came to their attention that it might possibly be used in their civilian sector. They did not use it at NASA, to our knowledge. It turned out in their investigation of the civilian sector.

They initially were using it on experiments in high schools, where high school students were threatening to beat up teachers; and the teachers in this case, in a Sacramento high school, the teachers were given one of these and the students no longer beat up the teachers; nothing happened.

We didn't try it in the housing for the elderly because of particular problems; we wanted emergency systems, and we are only evaluating in this case.

RESPONSE TO PROPOSED REGULATIONS

Senator WILLIAMS. Now, a few questions, Mr. Wells.

Would you indicate how the responses are coming in to your request that went out to so many areas, institutions, and individuals on the new regulations?

Mr. WELLS. Mr. Duane Keplinger, he has read these; I have not.

STATEMENT OF DUANE KEPLINGER

Mr. KEPLINGER. We received 40 replies, so far.

Generally, they are favorable; some wish us to go a little further on a technical basis. There are some arguments on the exact figures we used in certain cases. Some are favorable and support us.

Mr. Willey this morning did receive a request from us to comment; also, two other requests went to NFPA. They, generally, supported us, and the big question is of two figures that we will check out.

Senator WILLIAMS. What did they question?

Mr. KEPLINGER. Two figures on the distances from the stairway to the entrance door.

Senator WILLIAMS. On the figures, in this statement you have priced out the various elements of your proposal, is that right?

Mr. KEPLINGER. Yes, sir.

Senator WILLIAMS. You are using here a Baptist Towers status.

Mr. WELLS. We are using that building.

Senator WILLIAMS. Now, you have a total cost here translated into a monthly rental increase. Did you, in any way, I don't believe you did, build in any tradeoffs here of things now required that might not be required if the new rates were in?

COST TRADEOFFS NOT INCLUDED

Mr. WELLS. No, sir, we did not. The meaningful tradeoffs come with the installation of a sprinkler within the unit, and then you eliminate the need for fire-rated walls; in other words, 1-hour walls between

all of the units. It was our feeling that, at this time, we decided to go with maintaining those fire-rated walls, and have the sprinklers only in the corridors.

Senator WILLIAMS. Well, how about that whole unit of fire hoses on every floor, was that present at Baptist Towers?

Mr. WELLS. Yes, sir. Mr. Keplinger also went down there to Baptist Towers immediately after.

Senator WILLIAMS. As I recall the testimony, there was a firehose unit on each floor, four on each floor.

Now, there has been a great deal of uniformity in the testimony that it is not realistic to expect tenants to operate that particular fire-fighting apparatus.

If the fire department gets there, they don't—probably won't—use it because they have standpipes pressurized, and they have their units that they will carry up with them, hook in, and go to work.

Now, isn't this a possible tradeoff area?

Mr. WELLS. Yes, sir. We intended that, but we didn't put the figures in.

Senator WILLIAMS. This is just for your information without getting into the next step. So, we could expect, though, a tradeoff that would reduce this figure?

Mr. WELLS. I am not sure how substantial it would be, however.

Mr. KEPLINGER. We are checking into a complete system proposed by NBS that promises some tradeoffs, but we have not yet studied their costs.

Senator WILLIAMS. Well, just from the little I know, from what we have heard on this particular issue, it would seem that those units on each floor must represent an expense that would reduce this quite a bit. Of course, you can reduce, if you want a real tradeoff, go back to 202.

Let's see, we have just a couple of other things here I think we should clear up.

There seems to be some degree of conflict, Mr. Wells, between your position, the Department's position, and Mr. Bland's position, he is Chairman of the President's Commission.

Now, he has been part of your development of these proposed regulations, I believe, and the Commission has.

Mr. WELLS. The Commission; yes, sir.

HUD vs. PRESIDENT'S COMMISSION

Senator WILLIAMS. He testified that a complete sprinkler system was a necessary part of the answer here, and yours is a partial.

Mr. WELLS. Yes, sir; we feel that the reason that we did not put sprinklers in the units are coupled:

One, much more money, and we think that we are adding quite a bit already; and secondly, we have found that in residential units the women, the occupants, simply don't want them. They don't like sprinklers in their ceilings; they are unsightly, and, often, they go about doing things which make them inoperable, covering them and things of this sort.

We didn't feel that by putting them in the unit we really gained very much, or we don't feel that we gained anything in life safety.

We have a smoke detector, an early-warning device, as has been said here this morning, the sprinkler in the unit is not an early warning element. Before the sprinkler goes off, the occupant will perish from smoke. So the sprinkler in the unit is not a life safety control measure; we are counting on the smoke detector to alert the occupant and get the occupant out of the unit.

We then are looking to contain the fire within that one unit. We have fire-rated walls around the unit and we have the fire door and the door closer, but in the event that does not contain it, then we have the sprinklers in the hall, so that even if the door is left open, or anything else happens, the sprinklers in the hall will prevent the fire from expanding to any other unit, and will contain it to that one unit.

We feel that this is a very workable package, and one that brings about the ultimate in life safety; and that sprinklers in the unit itself do not add to the life safety.

Senator WILLIAMS. I appreciate that from the way you have described it for the layman's understanding. I noticed, and I think it is fair to say, that you are talking to this audience of knowledgeable people, and looking out on these people, I can see heads moving in assent.

Another point of some apparent conflict that I see in the regulations and their application, as I understand it, HUD has two sets of regulations that affect buildings such as Baptist Towers, this is FHA regulation 2600, and minimum property standards for multifamily housing and for the elderly, that is HUD PG 46.

Now, I am getting to the conflict. Our analysis shows that if a building, the size of Baptist Towers, had not been built for the elderly, an automatic alarm would have been required. And experts testified yesterday that housing for the elderly should have more fire safety requirements, and PG 46 does not require an automatic system.

Mr. WELLS. Sir, the difference between PG 46 and 2600 is just a plain error that was never brought to our attention.

Now, the applicability of the two standards, we in the central office certainly anticipate that all high-rise construction, eight floors or more, is to have smoke detectors or rather, an automatic alarm system if it has eight floors or more. That is what we are getting all over the country.

Now, in this case, since we did not specifically state in PG 46 that it was mandatory, the office made the judgment tha it was not; and proceeded without the automatic alarm system. I think it was a regrettable judgment.

Senator WILLIAMS. Still in effect today, PG 46.

Mr. WELLS. It has gone to the printer to be changed. Yes, PG 46 will be amended.

Senator WILLIAMS. That is not going to await the new rates?

Mr. WELLS. No, sir, this is a changing of that particular document, then both of these documents will be altered——

NEW REGULATIONS FOR NEW CONSTRUCTION

Senator WILLIAMS. How about your new regulations and their application, is this only for new construction?

Mr. WELLS. Yes, sir.

Senator WILLIAMS. Is there any way to reach back to existing housing units.

Mr. WELLS. Not really. You see, we merely insure the property owned by an individual, and we have no way of going back, it is just as if we were insuring a single home. We have no way of going to them and saying that they have to spend a thousand dollars to do something to their house. We have no real mechanism to go backwards on production that has taken place in the past.

Now, we will give them the encouragement to do so, to get a supplementary loan, if the economics would support it, a supplementary loan to add these things.

Senator WILLIAMS. It would seem to me that exploration should proceed along this line.

Mr. WELLS. Yes, sir, I agree with you

Senator WILLIAMS. You do?

Mr. WELLS. Yes, sir.

Senator WILLIAMS. Fine. I am very much impressed with your work.

Mr. WELLS. Thank you.

DIRECT LINE TO FIRE STATION

Senator WILLIAMS. Oh, yes, this running a wire direct to the firestation, it is a $200 cost, this is going to be your proposal as a requirement only for nursing homes and not for the elderly high-rise buildings.

It would seem that at that cost, if there aren't any overwhelming technical problems, and I don't see why there should be any, this could also be applied to elderly housing as well as nursing homes.

Mr. WELLS. As I was reading the testimony this morning, that struck me too, Senator, and I think it is something we should definitely consider. We do not claim the ultimate expertise in any of these fields; and this is one reason we are looking forward to the comments that we are going to be getting from experts. After we receive them we do hope that we will have a package that we will all be proud of.

Senator WILLIAMS. I do not know much about the state of the art in this communication from a unit to the official station, but I do know burglar alarms. For example, in single family residences they hook right into the police station. So there isn't evidently any major technical communication problem.

Excellent. Thank you, very much. This concludes the hearing and my editorial judgment is that it has been a most worthwhile 2 days of hearing.

My congratulations to all who made it possible.

[Whereupon at 12 noon, the subcommittee hearing was adjourned.]

APPENDIXES

Appendix 1

ADDITIONAL MATERIAL FROM WITNESSES

ITEM 1.—LETTER FROM A. ELWOOD WILLEY, FIRE RECORD SPECIALIST, NFPA FIRE RECORD DEPARTMENT, NATIONAL FIRE PROTECTION ASSOCIATION, TO SENATOR WILLIAMS, DATED MARCH 14, 1973

NATIONAL FIRE PROTECTION ASSOCIATION,
March 14, 1973.

DEAR SENATOR WILLIAMS: Since giving testimony before your Sub-Committee on Fire Safety in High-Rise Buildings for the Elderly, I have had the opportunity to review testimony of other witnesses and wish to respond to certain statements made regarding automatic sprinkler protection and life safety in housing for the elderly. Testimony presented by Messrs. Fullerton and Wells left a distinct impression that automatic sprinklers installed in elderly housing living units would not ensure the life safety of occupants within the unit of fire origin. Records collected by the NFPA Fire Record Department show that this is not the case, as occupants may survive in rooms where fires have occurred and sprinklers have operated to extinguish fires. In the cases of single fatalities that have occurred in the room of fire origin in institutional occupancies protected by automatic sprinklers, these fatalities are due mainly to factors beyond the control of either automatic sprinklers or smoke detection systems. No multiple loss of life in sprinklered residential or institutional occupancies has ever been reported to the NFPA.

Five case histories from our files are enclosed[1] which illustrate typical loss experience in residential and institutional occupancies where fires have occurred within living units or patient rooms, exposing occupants. In the first three cases, all occupants in the rooms of origin survived. In case No. 1, the occupant was not injured, and in the next two cases the occupants were injured but survived. The last two cases are typical examples of those incidents where single fatalities have occurred within rooms of five origin protected by sprinklers. Both fatalities involve the ignition of the victims clothing, and in each case other occupants of the room survived because the fire was detected and controlled by automatic sprinklers. Recorded incidents of single fatality fires show that in institutional occupancies, elderly occupants many times ignite their clothing with smoking materials. In some cases the fire was discovered by others within seconds of ignition, yet the occupants were beyond help and died. It is not reasonable to expect total life safety with either automatic sprinklers or early warning smoke detection devices in situations where the victim's clothing or bedding becomes involved.

It must be remembered that with the provision of smoke detection systems the fire, once detected, must be extinguished manually. In housing for the elderly we should not expect this to be accomplished by the occupant, and staff personnel, particularly at night, may not be adequate to handle the fire situation. This means that the fire department must respond to accomplish extinguishment utilizing their hose lines supplied by a standpipe system. During the time required for fire department response, the fire will continue to burn, fed by combustible contents and continue to pose a threat to the occupants. This response would be particularly critical if the facility is located in an area that does not have a fully-paid, on-duty fire department. The reaction of the elderly occupant

[1] See attachment, p. 91.

is extremely important in this situation without automatic extinguishment. Will the occupant hear the evacuation alarm once the detector has activated, and leave the unit of fire origin? At the Baptist Towers there is reason to believe that the alarm system could not be heard or was not recognized by many occupants within apartment units. If the alarm is heard, what will be the occupant's reaction? At the Baptist Towers, the occupant of the room of fire origin discovered the fire in sufficient time to escape, but she apparently returned to the unit for her medicine and perished. Can the occupant escape from the apartment? With the room configuration of the larger apartment units in the Baptist Towers design the living room and kitchen are located between the bedroom and the apartment exit door. Conceivably, a rapidly developing fire could occur either in the living room or kitchen and without automatic extinguishment the means of escape from the bedroom could be blocked. These are risks that must be evaluated in providing life safety protection for housing of the elderly occupants.

The testimony presented by Messrs. Butler (ABCO Builders), and Wells (HUD) regarding the economics of providing fire protection in housing for the elderly does not take full advantage of systems engineering techniques available today for providing life safety in these occupancies. Accurate cost comparisons cannot be made between the sprinkler alternative presented by Mr. Butler and the detection system alternative presented by Mr. Wells, as each is based on different installation criteria ; for example, the ABCO sprinkler estimate includes the cost of existing water supplies (fire pumps, standpipe risers, etc.) at the Baptist Towers and the HUD springler estimate does not include this $40,000 cost. The statements do not take into consideration all major costs required to provide life safety protection or many cost benefits that may be derived from trade offs when evaluated using current systems engineering techniques.

In considering the HUD fire protection cost estimates, with a systems approach and in view of multi-residence loss experience, additional items must be included to ensure life safety with the compartmentation method. First, the cost of the connection to the local fire department communication center or central station alarm service must be included as the transmission of the automatic signal to the fire department is of extreme importance. Also, compartmentation for housing for the elderly must necessarily include labeled apartment entry door and frame assemblies to ensure the integrity of the one hour fire rated corridor partitions. These fire rated assemblies are not included in the proposed HUD criteria. In evaluating the design of ventilation systems in relation to the fire problem in housing for the elderly, corridors must not be used as a source of make-up air for apartment units. This consideration is not presently reflected in the proposed HUD criteria, and will require changes in these ventilation systems, if similar to the design at the Baptist Towers, and increase equipment cost.

The sprinkler system cost estimates presented by the ABCO representative do not necessarily take into consideration all fire protection requirement trade offs available through use of systems engineering techniques. In discussing sprinkler systems we are addressing a building completely sprinklered with appropriate connections to the evacuation alarm system and a connection to the fire department as well as complete supervision of the water supply to the system. First, the $200,000 estimate represents the installation of up to 9 sprinklers in the larger apartment units at the Baptist Towers. A preliminary engineering analysis indicates that six sprinklers will provide adequate coverage and reduce total cost. In current engineering practice, a number of trade offs from other restrictive compartmentation requirements (as proposed by HUD) are possible.

Additional cost benefits can be realized by also deleting fire rated apartment entry door and frame assemblies in the corridor partitions. As noted above, with the compartmentation method in housing for the elderly, these assemblies are essential and are not considered in the present HUD criteria.

The reduction of fire resistance requirements for the vertical shaft enclosures may be reduced by one hour, and thereby provide an additional cost benefit.

The reduction of fire resistance requirements for floor and ceiling assemblies by one hour will provide an additional cost benefit.

The deletion of small hose systems and associated hardware can be considered (note that 2½-inch standpipe hose outlets in the automatic sprinkler supply risers would still be required for fire department use).

The deletion of the elevator automatic control requirement would be acceptable with the degree of fire control provided with sprinklers and compartmentation afforded by smoke-stop partitions separating the elevator lobbies from the corridors.

As previously mentioned, with the compartmentation method, corridors should not be used as a supply of make-up air to apartments. With the provision of complete automatic sprinkler protection, this prohibition could be deleted with considerable cost benefits realized. The ventilation system could then be designed using the corridor system as a source of make-up air through normal leakage around doors for kitchens, appliances, and bathrooms as permitted for apartments by NFPA 90A.

Statements were made indicating that the appearance of automatic sprinklers in apartments is unsightly, and that occupants would tamper wih the hardware to make the sprinklers inoperative. Low profile or flush mounted sprinklers are available with today's technology eliminating this problem area. Occupants of buildings have also been known to tamper with any type of fixed protection devices or installations, however, I doubt that this would be a problem in housing for the elderly.

The above discussion represents an overview of the application of systems engineering in relation to fire problems in multi-residence housing such as the Baptist Towers facility. A more detailed discussion with cost estmates for the Baptist Towers facility will be presented in a final detailed investigation report to be prepared by the NFPA. Design decisions could not be made based on the analysis and cost estimates presented by the ABCO building representative and the HUD representative. In solving the fire problem in housing for the elderly, standards and criteria developed must allow designers more alternatives in providing an acceptable level of life safety protection. The application of early warning smoke detection along with compartmentation requirements may be acceptable, or the application of a complete automatic sprinkler system may be acceptable to provide the desired life safety in a given facility. The decision, to use either concept or a combination of the two for a given facility should only be made after an analysis of all the applicable fire risk, facility design requirement, and economic considerations. This must be accomplished by the application of systems engineering techniques currently avaliable.

Respectfully yours,

A. ELWOOD WILLEY,
Fire Record Specialist, NFPA Fire Record Department.

[Attachments]

NFPA FIRE RECORD DEPARTMENT

CASE HISTORIES IN RESIDENTIAL AND INSTITUTIONAL OCCUPANCIES PROTECTED BY AUTOMATIC SPRINKLERS

1. *Hotel, Amsterdam, New York, December 14, 1961.*—At 4:00 A.M. a fire originated in the bed clothes of a sleeping guest. One sprinkler automatically extinguished the fire. No injuries were reported.

2. *Hotel, Greenfield, Massachusetts, October 8, 1960.*—At 3:55 A.M. while the hotel guest was asleep, a fire caused by a cigarette occurred in an upholstered chair. The guests trousers and the chair upholstery was burned. He was awakened by the discharge of water from sprinklers. He suffered only minor burns on his legs.

3. *Nursing Home, Boston, Massachusetts.*—During the night a patient in a second story room set his bed on fire while taking a forbidden cigarette smoke. The fire was extinguished by a sprinkler. The occupant of the room where the fire occurred was taken to a hospital for treatment of burns, and another patient who suffered from asthma was hospitalized to spare him the discomfort of smoke. None of the other 21 patients was removed. The contents loss was $200.

4. *Home for the Aged, Coeur D'Alene, Iowa, November 25, 1966.*—Although smoking was not permitted in this institution except under the direct supervision of a nurse or in designated smoking lobby areas, the victim in this case had been known to sneak a smoke in previous instances. A nurse noted a smoke odor, and investigating found the 77-year-old female burned to death, her clothing having ignited. Two other patients in the same ward were senile and did not make any outcry or other indication that there was trouble. A single sprinkler had operated and completely extinguished the fire which did not extend beyond the victims clothing and the chair in which she was sitting.

5. *Home for the Aged, Portsmouth, Virginia, June 21, 1970.*—A 63-year-old patient, physically restrained in a chair, started a fire in his clothing which spread to the padding of the chair. This patient was not allowed to smoke except

under the closest of supervision, but on this morning he had obtained a book of matches which had been left within his reach by a visitor. A single sprinkler located over the fire extinguished the fire. The patient, however, received burns over 75 to 80 percent of his body and died as a result of these burns. Two other patients in the same room were taken to the hospital but suffered no apparent injuries from the fire.

ITEM 2.—PRELIMINARY REPORT, HOUSING FOR THE ELDERLY FIRE, MADISON, WIS.

JANUARY 1, 1973.

(By NFPA Fire Record Department)

Three persons were killed in this fire which occurred in a facility housing the elderly in Madison, Wisconsin on January 1, 1973. Preliminary information from the Madison Fire Department indicates several factors in this loss which are similar to the Baptist Towers fire in Atlanta. The fire originated in the apartment unit of this high-rise, fire-resistive building. There was a delayed alarm as an employee and an elderly occupant attempted to fight the fire. An elevator was stuck at the fire floor and smoke spread to floors above through the open door and the shaft. Three persons died in other compartments with entry doors closed and the entry door to the room of origin was left in the open position exposing the corridor.

This facility was designed to house the elderly and was classified by the State as a residential care center. The ten-story structure was approximately 10 years old and was of fire-resistive construction. Each apartment unit contained living and sleeping facilities but cooking was done in one central area in the facility. The occupants were elderly, some with various physical handicaps, and based on the information available it is assumed that most could care for themselves. Total occupant population was 203 and approximately 14 apartments were provided on the fourth floor (the floor of origin).

Full construction details are not yet available on the reinforced concrete building. The arrangement of the apartments and the corridor configuration is noted in the attached sketch. Interior partitions were gypsum wallboard on metal studs and both corridor partitions and partitions between apartments are one-hour fire rated. Apartment entry doors were solid-core wood and in some cases apartments were arranged with a common bathroom with hollow-core doors installed in the separating partitions. Carpets were installed in the corridors. Each floor was served by two elevators. Two enclosed stairs provided means of egress from each floor. One stair discharged into a ground floor lobby; the lobby was sprinklered. A manual local-only fire alarm system was installed in the building, however, sprinklers were not installed throughout the facility.

The basic story of the fire indicates that an occupant of Apartment 409 discovered a fire in a mattress and bedding in his apartment. An employee of the

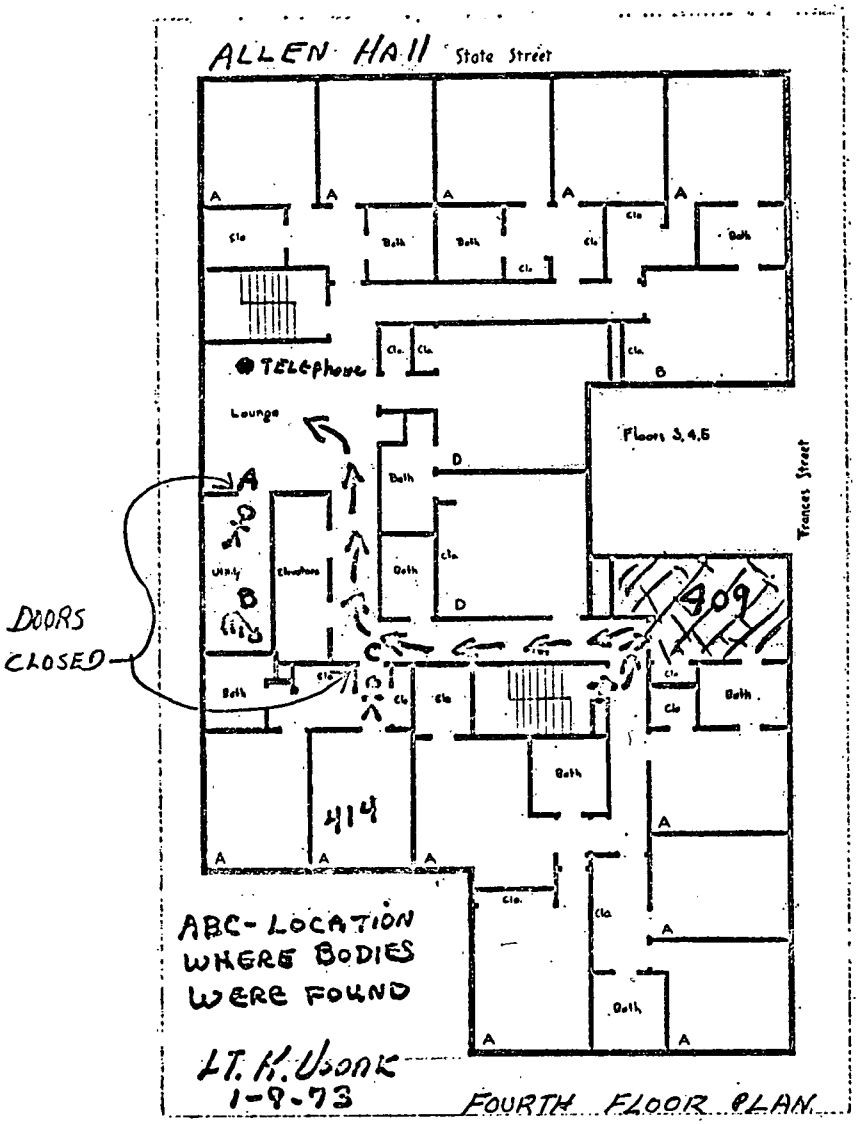
facility went to the fire floor with an extinguisher and (traveling up the stairs) both the occupant and the employee attempted to fight the fire. As smoke and heat began to build up and their extinguishing attempts were not successful, the employee went out into the corridor and used a telephone on the same floor requesting the girl on the desk to notify the Fire Department. The Fire Department received the alarm at 9:58 AM. Sometime after the alarm to the Fire Department, the internal fire alarm was sounded. Meanwhile, the employee and the occupant of the room of origin had to vacate the apartment because of the heavy heat and smoke conditions. They traveled approximately 45 feet down the corridor to a laundry room and sought refuge within that room. They closed the entry door to the laundry room and their bodies were discovered after the arrival of the Fire Department. The entry door to the apartment of origin was left open.

Total Fire Department response included four engine companies, two ladder companies, a snorkle and three rescue units. Fire attack was made on the fire floor using hose lines from the standpipe system and the fire was knocked down within five or six minutes after arrival on the scene. Evacuation was conducted by the Fire Department on the fire floor as well as six floors above the fire. Evacuation routes were established over the internal stairs. During search and rescue operations the body of another occupant of the fire floor was found in Apartment 414. This apartment was located approximately 20 feet from the room of origin and the apartment entry door was in the closed position.

Principal fire damage included the contents of the room of origin with heat and smoke damage at high levels in the corridor. The hollow-core door to the bathroom in the room of origin failed. Smoke spread to floors above the fire was heavy. The elevator shaft was the principal means of smoke spread. Reportedly, one of two elevators in the common shaft was stuck at the fourth floor level. Firefighters indicate that this automatic elevator was stopped at the fire floor for approximately 10 minutes during the fire.

Fire Department investigators indicate that the material first ignited in the fire was bedding and a mattress. The mattress was filled with cotton, and a cigarette is believed to be the ignition source. Full casualty information was not available, however, the following details are known. The occupant of the room of origin was 61 years of age and had no apparent physical handicaps. The employe who died was twenty-two years of age. The occupant of the other apartment unit was 65 years of age and used a cane. Also, his carboxyhemoglobin reading was 0.75. The employee and the occupant of the room of origin apparently sought refuge in the laundry room. The laundry room is located approximately 10 feet from an exit stair and the apartment of origin is located approximately 5 to 6 feet from the exit stair.

Investigators indicate that the carpet in the corridor did not burn in this case. Weather conditions at the time of the fire were clear and cold with the wind blowing from the north 2 to 5 miles per hour. The room of origin was on the west side of the building.


ALLEN HALL
State Street
Trances Street
Floors 3,4,5
Lounge
TELEphone
Bath
Clo.
Utility
Chambers
409
414
DOORS CLOSED
ABC- LOCATION WHERE BODIES WERE FOUND
LT. K. USONK
1-9-73
FOURTH FLOOR PLAN

ITEM 3.—DESCRIPTION OF THE SYSTEM AND ACTUAL PAID SUBCONTRACT PRICE FOR FIRE WARNING SYSTEM IN BAPTIST TERRACE IN ORLANDO, FLA.

(RICHARD L. FULLERTON & ASSOCIATES)

BAPTIST TERRACE, ORLANDO, FLORIDA (197 UNIT APARTMENT HIGHRISE FOR THE ELDERLY

FIRE DETECTION/ALARM SYSTEM

1. Combined system for detection and alarm by automatic or manual means.

(*a*) Operation of any manual station or automatic "products-of-combustion" detector immediately causes,

(1) Alarm horns on affected floor to sound until the system is reset.

(2) A zone indicator lamp on the master annunciator panel, located near the rear entrance to the building where Fire Department personnel will enter, to remain on until the system is reset. This zone lamp indicates the floor on which the alarm was activated.

(3) Alarm signal to be transmitted via leased telephone line directly to the central Fire Station.

(*b*) The basic system consists of manual stations located at each end of the hall on each floor plus ionization type smoke detectors on each floor (two per floor), and two alarm horns per floor. Heat detectors are also provided in mechanical and electrical equipment rooms and in the elevator equipment rooms.

(*c*) The cost of the equipment, installed, not including conduit and wire which were provided as part of the electrical contract was $6,700.00 or about $34.00 per apartment dwelling protected.

2. Apartment Call System.

(*a*) Operation: Any apartment can call the administration area by pushing a red emergency call button located in the living room of each apartment. This action initiates an associated indicating lamp on a master annunciator in the administration area and sounds a buzzer. Administration personnel then call the apartment on a telephone type intercom unit and establish immediate two-way conversation. The light remains on until it is reset in the apartment. It cannot be reset from the administration desk.

(*b*) Basic cost of the system, installed, not including conduit and wire was $7,500.00.

ITEM 4.—FHA FORM 2264 FOR PROJECT NO. 006-44103 NP, BAPTIST TOWERS, ATLANTA, GA.

U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL HOUSING ADMINISTRATION

FHA Form No. 2264
Rev. 3/70

RENTAL HOUSING
PROJECT INCOME ANALYSIS AND APPRAISAL

☐ Preliminary ☐ Conditional ☐ Firm

Project Name: Nineteen Hundred DeLowe

Project No.: 006-44103 NP

A. LOCATION AND DESCRIPTION OF PROPERTY:

1. Street No.	2. Street	3. Municipality	4. County	5. State
1960	DeLowe Drive	Atlanta	Fulton	Georgia

6. Type of Project	7. No. Stories	8. Check Applicable box(es)	9. Est. Avg. Monthly Rental per Unit
☒ 2 Investor ☐ Walkup	11F	☐ Row ☒ Detached ☐ Semi-detached	$ 95.76 Mo.

10.	11. No. Units	12. No. Bldgs.	13. List Accessory Buildings or Spaces
☒ Proposed ☐ Existing	300	1	Laundry Area

SITE INFORMATION		BUILDING INFORMATION	
14. Dimensions	5.67 Acres	16. Structural System	16a. Yr. Built
ft. by ft., or	247,050.3 sq. ft.	Reinforced Concrete Frame	
15. Zoning (If recently changed, submit evidence)		17. Exterior Finish	18. Heating-A/C System
A-2-C		Masonry	FWA-A/C-Elec

B. INFORMATION CONCERNING LAND OR PROPERTY:

19. Date Acquired	20. Purchase Price	21. Additional Cost Paid or Accrued	22. If Leasehold Annual Ground Rent	23. TOTAL COST	24. Relationship-Business, Personal or Other Between Seller & Sponsor
Optioned 4-10-70	$ 300,000	$ 0	$ 0	$ 300,000	none

25. Utilities - Public Community
Water ☒ ☐
Sewers ☒ ☐

26. Unusual Site Features -
☒ Cuts ☐ Fills ☐ Rock Formations ☐ Erosion
☐ Poor Drainage ☐ High Water Table ☐ Retaining Walls
☒ Other (Specify) Branch ☐ None

C. ESTIMATE OF INCOME:

27. No. of Each Family Type Unit	Living Area (Sq. Ft.) Net	Composition of Units	Basic Rent Unit Rent Per Month	Basic Rent Total Monthly Rent For Unit Type	Market Rent
54	404	3,690.36 Subsidy Eff. Type A 68.43	$ 80.02	$ 4,321.08	148.45
18	437	1,239.12 Eff. Type B 68.84	80.50	1,449.00	149.34
18	409	1,246.68 Eff. Type C 69.26	81.00	1,458.00	150.26
168	531	14,706.72 1 Br. Type A 87.54	102.37	17,198.16	189.91
42	542	3,678.36 1 Br. Type B 87.58	102.42	4,301.64	190.00
28.		24,960.24 TOTAL ESTIMATED RENTALS FOR ALL FAMILY UNITS		$ 28,727.88	

29. No. Parking Spaces—
☐ Attended
☒ Self Park

Open Spaces 150 @ $ 0 per month
Covered Spaces 0 @ $ 0 per month

30. Commercial
Area-Ground Level 0 Sq. Ft. @ $ 0 per sq. ft./mo.
Other Levels 0 Sq. Ft. @ $ 0 per sq. ft./mo.

31.	TOTAL ESTIMATED GROSS PROJECT INCOME AT 100% OCCUPANCY	$ 28,727.88
32.	TOTAL ANNUAL RENT (Item 31 x 12 months)	$ 344,734.56

33. Gross Floor Area	34. Net Rentable Residential Area	35. Net Rentable Commercial Area
195,342 Sq. Ft.	149,016 Sq. Ft.	0 Sq. Ft.

36. NON-REVENUE PRODUCING SPACE

E. ESTIMATE OF ANNUAL EXPENSE:

ADMINISTRATIVE

1. Advertising	$
2. Management	
3. Other	
4. TOTAL ADMINISTRATIVE	$

OPERATING

5. Elevator Main. Exp.	$
6. Fuel *(Heating and Domestic Hot Water)*	
7. Lighting & Misc. Power	
8. Water	
9. Gas	
10. Garb. & Trash Removal	
11. Payroll	
12. Other	
13. TOTAL OPERATING	$

MAINTENANCE

14. Decorating	$
15. Repairs	
16. Exterminating	
17. Insurance	
18. Ground Expense	
19. Other	
20. TOTAL MAINTENANCE	$
21. Replacement Reserve (.0060 x total structures Line 41)	$ 18,355
22. TOTAL OPERATING EXPENSE	$

TAXES

23. Real Estate: Est. Assessed Value $ @ $ per $1000	$
24. Personal Prop. Est. Assessed Value $ @ $ per $1000	
25. Empl. Payroll Tax	
26. Other	
27. Other	
28. TOTAL TAXES	$ 52,500
29. TOTAL EXPENSE	$ 175,500

F. INCOME COMPUTATIONS:

30. Estimated Project Gross Income *(Line C 32 Page 1)*	$ 344,734
31. Occupancy *(Entire Project)* Percentage	95 %
32. Effective Gross Income *(Line 30 x Line 31)*	$ 327,497
33. Total Project Expenses *(Line 29)*	$ 175,500
34. Net Income to Project *(Line 32 − Line 33)*	$ 151,996
35. Expense Ratio *(Line 29 ÷ Line 32)*	53.59 %

G. ESTIMATED REPLACEMENT COST:

36a. Unusual Land Improvements	$ 0
36b. Other Land Improvements	57,390
36c. Total Land Improvements	$ 57,390

STRUCTURES

37. Main Buildings	$ 3,059,166
38. Accessory Buildings	
39. Garages	
40. All Other Buildings	
41. TOTAL STRUCTURES	$ 3,059,166
42. General Requirements	$ 112,183

FEES

43. Builder's Gen. Overhead @ 1.952 %	$ 60,835
44. Builder's Profit @ 4.523 %	140,962
45. Arch. Fee-Design @ 3.577 %	111,492
46. Arch. Fee-Supvr. @ 1.10 %	34,305
47. Bond Premium	22,650
48. Other Fees	1,500
49. TOTAL FEES	$ 371,744
50. TOT. For all Imprmts. (Lines 36c, 41, 42 & 49)	$ 3,600,483
51. Cost Per Gross Sq. Ft.	$ 18.432
52. Estimated Construction Time	21 Months

CARRYING CHARGES & FINANCING

53. Int. 21 Mos. @ 8.5 % on $ 4,708,700	$ 350,210
54. Taxes	25,000
55. Insurance	8,500
56. FHA Mtg. Ins. Pre. (0.5%)	47,087
57. FHA Exam. Fee (0.3%)	14,126
58. FHA Inspec. Fee (0.5%)	23,544
59. Financing Fee (2%)	94,174
60. AMPO (.2%)	94.4
61. FNMA/GNMA Fee (.75%)	82,402
62. Title & Recording	31,200
63. TOTAL CARRYING CHGS. & FINANCING	$ 770,717

LEGAL AND ORGANIZATION

64. Legal	$ 10,000
65. Organization	
66. TOTAL LEGAL AND ORGANIZATION	$ 10,000
67. Consultant Fee	27,500
68. Builder and Sponsor Profit & Risk	$
69. TOTAL EST. DEVELOPMENT COST *(Excl. of Land or Off-site Cost)(Line 50+63+66+67+68)*	$ 4,408,700
70. Warranted Price of Land — J-14(3) 247,050 sq. ft. @ $ 1.20 per sq. ft.	$ 300,000
71. TOTAL ESTIMATED REPLACEMENT COST OF PROJECT *(Add 69 + 70)*	$ 4,708,700

H. TOTAL REQUIREMENTS FOR SETTLEMENT:

72. DEVELOPMENT COST *(Section G Line 69)*	$
73. LAND INDEBTEDNESS *(or Cash required for land acquisition)*	$
74. SUBTOTAL *(Line 72 + Line 73)*	$
75. Mortgage Amount	$
76. Fees Paid by Other than Cash	$
77. Line 75 + Line 76	$
78. CASH INVEST. REQUIRED *(Line 74 − Line 77)*	$
79. INITIAL OPERATING DEFICIT	$
80. ANTICIPATED DISCOUNT	$

Source of Cash to Meet Requirements:	Amount
	$
	$
	$
	$

ITEM 5.—HUD FORM 4105 FOR SH-G-11, ST. PAUL APARTMENTS, MACON, GA.

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

REVISED PROJECT SUMMARY

PROJECT NO. [illegible]

TYPE OF FACILITY [illegible]

REV. NO.

NAME, ADDRESS AND ZIP CODE OF APPLICANT

St. Paul Apartments, Inc.
Macon, Georgia

PURPOSE OF REVISION

To increase A/E line item to cover additional engineering cost in heating.

1. METHOD OF FINANCING ☒ No Change	PREVIOUS APPROVAL	THIS CHANGE (+) OR (-)	AS REVISED
Federal Funds:	$	$	$
Applicant Funds			
Total	$	$	$

2. CONSTRUCTION SUMMARY ☐ No Change			
Preliminary Expense	$ 2,000	$	$ 2,000
Land and Rights-of-way	200,000		200,000
Construction	2,900,000		2,900,000
Architect/Engineering Services:			
Borings			
Surveys			
Fees			
Resident Inspection			
Sub-total	120,000	(+) 20,000	140,000
Legal Expenses	7,500		7,500
Administrative Expenses	10,000		10,000
Interest During Construction	80,000		80,000
Interest During Development	60,000		60,000
Miscellaneous Allowable Costs			
Sub-total			
Project Contingency	20,000	(-) 20,000	20,000
Sub-total			
Government field expense			
Title Assurance Fee	22,500		22,500
Total Project Cost	$ 3,300,000	$ -0-	$ 3,300,000
Less Ineligible Costs:			
Adjusted Total Cost	$ 3,300,000	$ -0-	$ 3,300,000

3. FEDERAL FUNDS AMOUNT PER EXECUTED AGREEMENT..... $ 3,300,000
(If there is no executed agreement enter "None." If an offer has been made but not accepted as of the date of the revised project summary, enter amount of offer and "acceptance pending.")

4. COMMENTS/OTHER CHANGES *(Continue on separate blank sheet, if necessary)*

Due to the type of structure and the methods of construction, the cost of engineering (heating) has exceeded the budgeted cost; therefore, necessitating the shifting of funds from Project Contingency to Architect/Engineering.

.115 #'s @ $1.75 = 435.2 S.F
101 1BR @ 103.75 = 590.7 S.F.

ITEM 6.—DEVELOPMENT COST COMPARISONS, SEC. 236 v. SEC. 202

(RICHARD L. FULLERTON & ASSOCIATES)

Both projects built and put to use approximately concurrently.

	Baptist Towers, Atlanta, Ga., sec. 236, FHA 016-44103 N.P.	St. Paul apartments, Macon, Ga., sec. 202, SH-Ga-11	40-percent increase to 300 units (projected
Number of units	300	216	300
Rents (basic)	$80–$102	$81.75–$103.75	$80–$100
Area of building, square feet	195,342	142,900	200,060
Average/apartment, overall	651	662	667
Number of elevators	2	2	3
Tenants, total maximum	510	317	510
Tenants per elevator	255	158	170
Land cost	$300,000	$190,000	$290,000
Land cost per unit	$1,000	$880	$967
Parking spaces paved	150	100	150
Construction time allowed, months	21	15	18
Actual development cost items:			
Preliminary expenses	(1)	$2,000.00	$2,000.00
Land cost, raw	$300,000.00	190,000.00	290,000.00
Construction, total	3,439,336.00	2,620,000.00	3,668,000.00
Land improvements	57,390.00		
Total structures	3,059,166.00		
Builders overhead	60,835.00		
Builders profit	140,962.00		
Insurance	8,800.00		
Architecture and supervision	145,797.00	160,000.00	201,500.00
Legal services	10,000.00	7,500.00	7,500.00
Interest during construction	350,210.00	86,000.00	130,000.00
Interest during development	(1)	48,000.00	65,000.00
Sponsor administrative expense	(1)	16,000.00	20,000.00
Consultant (loan adviser)	27,500.00	22,500.00	28,000.00
Project contingency	(1)	38,000.00	50,000.00
Carrying, financing, and other special FHA fees, total	435,857.00	None	None
FHA mortgage insurance premium	47,087.00		
FHA examination fee	14,126.00		
FHA inspection fee	23,544.00		
Financing fee (brokerage)	94,174.00		
AMPO	94,174.00		
FNMA/GNMA fee	82,402.00		
Title and recording	31,200.00		
Bond premium	22,650.00		
Taxes	25,000.00		
"Other fees"	1,500.00		
Total development cost	4,708,700.00	3,190,000.00	4,462,000.00
Per unit development cost	16,615.67	14,768.52	14,873.33

[1] Not available.

ITEM 7.—COST COMPARISONS, BAPTIST TOWERS, INC., ATLANTA, GA.

Subsequent to the hearing, the following cost comparison was received from Richard L. Fullerton & Associates:

These actual cost comparisons are from the official FHA forms for the Baptist Towers projects. The forms are attached.[4] This is the project which was denied early warning fire protection because the promoters "couldn't afford it". Ten innocent old people died last November 30. Had they been awakened by automatic smoke detectors before the fire became raging they could have walked out of the building safely. The equipment would have cost about five or six thousand dollars more than was spent. The point of this comparison is to show how such projects are prearranged to leave large sums of money in special categories so that the opportunists can claim it as their own.

Line item	Previous approved amount	Final amount in mortgage	Profit takeout above prior authorization	Remarks
1. Land cost, raw	$300,000	$300,000		
2. Land improvements	57,390	55,772		$1,618 cut in quality.
3. Construction	3,059,166	3,030,100		$29,066 cut in quality.
4. Requirements	112,183	163,873	$51,690	Hidden builder's bonus.
5. Builder's overhead	60,835	46,805		$14,030 padded time allowance.
6. Builder's profit	140,962	248,733	107,771	Prearranged kickback.
7. Architect's fees	145,797	145,797		Honest workmanship.
8. Bond premium	22,650	21,604		$1,046 padded time allowance.
9. Other fees	1,500	2,415	915	Extra to builder.
10. Construction interest	350,210	244,541		$105,669 padded time allowance.
11. Real estate taxes	25,000	2,369		$22,631 exemption granted.
12. Insurance	8,800	8,541		$259 padded time allowance.
13. FHA mortgage insurance premium	47,087	31,392		$15,695 ½ too much time.
14. FHA examination fee	14,126	14,194	68	
15. FHA inspection fee	23,544	23,544		½ padded.
16. FHA financing fee	94,174	223,663	129,489	Prearranged kickback.
17. FHA AMPO	94,174	94,174		Bribe to nonprofit.
18. FHA GNMA/FNMA fee	82,402	0		$82,402 stolen whole.
19. Intangible tax and title	31,200	31,500	300	
20. Legal fee	10,000	10,000		
21. Consultant's fee	27,500	27,500		
22. Total legal loan	4,708,700	4,726,517		
23. Georgia Power Co		−54,000		$54,000 cash kickback.
24. Loan amount reduced	−37,100			
Subtotal	4,671,600	4,672,517		
Disallowed in audit		−434		
FHA accounting error		−435		
To round off		−48		
Total	4,671,600	4,671,600	290,233	

[4] Retained in committee files.

Appendix 2

LETTERS FROM INDIVIDUALS AND ORGANIZATIONS

ITEM I.—LETTERS FROM RAYMOND J. CASEY, PRESIDENT, NATIONAL AUTOMATIC SPRINKLER AND FIRE CONTROL ASSOCIATION, INC., TO SENATOR WILLIAMS, DATED JANUARY 17, 1973, AND FEBRUARY 6, 1973

NATIONAL AUTOMATIC SPRINKLER & FIRE CONTROL ASSOCIATION, INC.,
White Plains, N.Y., January 17, 1973.

Subject: Fire Safety

DEAR SENATOR WILLIAMS: The fire at the Baptist Towers in Atlanta, which claimed the lives of nine (9) elderly occupants in a high rise apartment house on November 29th was not unlike a remarkably similar fire which occurred ten hours later atop a high rise apartment—office occupancy in New Orleans. Within a span of ten hours fourteen (14) people died under similar circumstances.

An increasing number of apartment houses, condominiums and residential hotels for the elderly are of the high rise variety for reasons that are not germane to the purposes of the inquiry your Committee is making.

Fires aloft create a potential for massive carnage from fire, because the very loftiness creates a unique combination of circumstances which, viewed as a total, conspire to become possibly the most hazardous occupancy in which the elderly will be residing in the decade ahead.

This is not said to discourage the erection of tall buildings to house the elderly. Indeed, the high rise occupancy has become the object of intensive study by many professionals in the fire protection community. The problem has been studied in depth and solutions have been proposed, and the beginnings of the implementation of those solutions have already begun.

In considering the nature of your Committee's inquiry and the kind of information your Committee seeks, as it was conveyed to us by John Edie of your staff, it occurred to us that the principal questions the Committee is posing to the fire protection community, and specifically to the sprinkler industry, are defined, examined and analyzed on pp. 7–18 of the enclosed publication, *High Rise—Tall Dilemma.*

We suggest that pp. 7–18 be included as a part of the sprinkler industry's position paper and be printed in the Committee Record as an expression of the views looking into the problem and proposed solutions to dealing with the perils of the elderly who live aloft.

Here is an outline in index form, based on pp. 7–18, for ready reference for your Committee:

1. High Rise Defined (p. 102).
2. Emergency Evacuation—Not Practical (p. 103).
3. Fires Fought Internally (p. 103).
   (*a*) Reaching Fire;
   (*b*) Communications;
   (*c*) Smoke;
   (*d*) Heat; and
   (*e*) Venting.
4. Inherent Design Problems (p. 104).
   (*a*) Stack Effect Defined;
   (*b*) Communications and Egress;
   (*c*) Active Versus Passive Fire Control, Fire Resistive and Compartmentalized Containment;
   (*d*) Active Fire Control, Automatic Sprinklers; and
   (*e*) Building System Design.

5. The Roll of Sprinklers in the "Systems Approach" (p. 106).

(*a*) How Effective Have Sprinklers Been?

After a long series of fires beginning in the early 1960's, the International Association of Fire Chiefs (IAFC) proposed an amendment to the Uniform Building Code, the nation's most widely adopted model building code. On September 29, 1972, the International Conference of Building Officials (ICBO), at its 50th Annual Meeting in Kansas City, adopted the recommendations of the IAFC after two (2) years of in depth study of the problem by a special sub-committee of the ICBO, involving a wide spectrum of building officials, fire prevention officers, construction industry representatives and trade associations and code consultants.

The new Section 1807, attached hereto, will become a part of the 1973 edition of the Uniform Building Code when it is published early this year. Identical provisions have been placed on the agenda of Building Officials and Code Administrators International (BOCA), a large model code association of building officials which publishes the Basic Building Code. This code will have a sphere of influence ranging from Missouri and Illinois to the eastern seaboard. This proposal is scheduled for public hearings in June 1973 at the Annual Meeting of BOCA in Philadelphia.

The identical proposal will also be introduced by the IAFC at the Southern Building Code Congress in October 1973.

If all three model code organizations (ICBO, BOCA and Southern) adopt the ICBO (Uniform Building Code—1973) code change, then 76% of the jurisdictions (cities and counties) will provide for the protection of occupants of tall buildings.

The optimum time table for concerted action by the three model code groups would be the Fall of 1973, assuming all three model codes concur with ICBO's action.

In such an eventuality, approximately 24% of U.S. jurisdictions (cities and counties) will have taken no action or independently devised alternate, but different, solutions.

In our view, the course taken by ICBO is the soundest one and will result in a permanent solution to the protection of lives of the elderly or other occupants who live or work in tall buildings.

It would be the recommendation of this Association and the sprinkler industry that your Committee urge the adoption of Section 1807 by all code writing organizations, cities, towns and legal jurisdictions in the country.

Attached hereto is an explanation of the meaning of this model code section, along with a verbatim reprint of the text which will appear in the 1973 edition of the Uniform Building Code.

Cordinally yours,

RAYMOND J. CASEY,
President.

[Attachments]

[From High Rise—Tall Dilemma]

HIGH RISE DEFINED

The first order of business was to arrive at a precise definition of the term "high rise building."

The fire services had traditionally conceived of a high rise building as any structure housing people whose height exceeded the reach of *aerial ladders*, snorkels and rescue equipment. At least 80% of the cities in this country have aerial equipment that does not exceed 85 feet. Allowing for the angle of a ladder and possible ground slope most fire chiefs classify buildings as "high rise" if they exceed 75 feet.

Indeed this was the basis for the first mandatory high rise sprinkler code requirement in the United States when Rochester, Minnesota amended its code to mandate sprinklers throughout buildings exceeding 75 feet.

But there were other facets to the project of identifying the nature of this recently recognized hazard. The GSA panels of experts subsequently adopted a functional definition for use by code writers and building designers containing the following essential concepts:

A high rise building is one in which:

1. Emergency evacuation (to the outside of the building) is not practical.
2. Fire must be fought internally because of height.
3. At least part of the building extends beyond the reach of fire department aerial equipment.
4. Poses a potential for significant stack effect.

Having identified the object of their study, five panels were assigned to the task of exploring the problems connected with high rise fire safety and to begin a compilation of recommendations that would result in the solution to the problem of high rise fire safety. The five panels included a study of occupant protection, life support systems, fire propagation and movement, fire control and extinguishment and structural systems.

A further analysis of the ingredients of high rise design and fire protection brought into focus the underlying problems inherent in this occupancy.

EMERGENCY EVACUATION—NOT PRACTICAL

The Division of Building Research of the National Research Council of Canada made a major contribution in the conduct of research with regard to emergency evacuation.

Calculations programmed into a computer enabled the Canadians to establish a formula to measure evacuation time. Assuming 240 persons per floor and a two unit stairway existing system, the data indicated that about 90 people per minute could enter a stairway. Buildup of human traffic is assumed to occur in geometric proportion and stairways of normal exit width are incapable of providing means of egress in high rise buildings. In specific terms, here are the results of the Canadian calculations:

Optimum evacuation time for an 11-story building is 6½ minutes; 7½ minutes for an 18-story building. It would take 1 hour and 18 minutes to evacuate a thirty-story building through a single stairway and 2 hours and 11 minutes for a fifty-story building.

Egress to the outside of the building, considered by most experts to be the foremost method of providing for occupant safety was therefore ruled out as a practical solution.

FIRES FOUGHT INTERNALLY

The great height of these buildings and the limitation of aerial fire fighting equipment necessitates internal fire fighting. The problems created by this necessity have become monumental.

1. *Reaching Fire.*—The first problem to confront the fire fighters is the task of reaching the fire. Firemen were trapped in an elevator in the One New York Plaza fire and had to ax their way to freedom. Modern automatic elevators are summoned by heat sensors and photo electric cells which control doors. Heat sensors can bring elevators at the worst possible location—the fire floor. After the doors open, photo electric cell beams are activated by smoke occlusion and doors remain open. Some elevators can be activated by small amounts of heat generated by the touch of a finger. So elevators, as presently designed and installed in most high rise buildings cannot be regarded as a means of ingress to the fire floor.

2. *Communications.*—The distance between the fire fighter at the end of the hose line and the man who controls the pumper precludes clear communications. The chief, directing the operation experiences frustrating delays in issuing commands. The lives of fire fighters can be placed in jeopardy if a chief officer cannot communicate with his men.

Black acrid smoke frequently obscures even visual communication.

3. *Smoke.*—Dense smoke, containing lethal amounts of carbon monoxide and other noxious gases limits sustained fire fighting operations, because self-contained oxygen tanks are rapidly exhausted.

Carbon monoxide is the most lethal danger facing fire fighters. Even a modest reduction in oxygen supply creates anoxia, a euphoric state, which gives the fire fighter an irrational self confidence and a sufficient reduction in oxygen can cause permanent brain damage or death.

4. *Heat.*—Experience in the One New York Plaza fire indicated that firemen could not remain in super heated air for more than a few minutes. This necessitated a constant exchange of fire fighting manpower. Studies by competent medical authorities indicate that a human being can withstand temperatures above 150° F for only a few minutes; with the length of time depending on

humidity and protective clothing, and limited further by exertion required. Temperatures above 290° F become intolerable in five minutes and at 350° F irreversible injury occurs to the skin in less than sixty seconds. Temperatures of 300° F have been measured ten feet from a place which developed 1,000° F temperature above the fire.

5. *Venting.*—Most high rise buildings constructed during the past fifteen years are centrally air conditioned. Windows are usually sealed tight or may be open only by a special building maintenance tool. Firemen are reluctant to shatter the glass because of the danger of pedestians below.

In the fire at the fifty story New York City Chemical Bank building in 1967, a five block area was cleared by police to protect people at ground level from flying splinters and panels of glass.

With this experience behind them, trained and disciplined fire fighters did not break windows on the thirty-third through thirty-fifth floors of the 1 New York Plaza Building.

Even buildings provided with sliding windows can become a two-edged sword. If a fire is vented on the windward side it can add oxygen and increase combustion. So venting is useful only when used on the leeward side to exhaust smoke and reduce temperatures.

Research conducted by the National Research Council of Canada indicated that when temperatures rise from ambient to 1,000° F in five minutes, the volume of heat gases is increased to *three times* its original volume. In poorly vented rooms, glass could explode outward endangering passersby. Temperatures of 1,000° F in a small area prohibit effective fire fighting.

Inherent Design Problems

STACK EFFECT

Exhaustive studies by the Canadian National Research Council spelled out in specific terms the problems of stack effect.

"Stack effect" may be defined as that phenomenon which is expressed when temperatures outside buildings are lower than temperatures inside buildings, smoke migrates upward. Air, fed through openings on lower levels moves upward through elevator shafts, dumbwaiters, mail chutes, utility "poke-throughs" and even through the exterior skin of a building to higher floors. The most lethal quantities of smoke in a high rise may well exceed the smoke many floors above the fire scene.

In warm climates where temperatures outside the building are higher than interior temperatures, smoke migrates downward.

Therefore, present day air handling systems, combined with heat dampers must be redesigned to exhaust smoke at or near the fire floor.

Heat dampers designed to prevent the movement of fire from one area to another may also "bottle-up" smoke, or allow it to migrate to higher floors in cold climates and to lower floors in hot climates.

Additional air handling units to eject smoke are needed.

COMMUNICATIONS AND EGRESS

In present day high rise structures, methods of communication between building management personnel or the fire department and occupants disbursed on multi level floors, should be developed.

Canadian code writers are requiring fire resistive areas of refuge on alternate floors. Some building owners and architects object to this because it deprives the owner of rentable office space and its effectiveness depends upon a clear system of communication to direct occupants to safe areas. The physical and psychological behavior of occupants is not completely predictable. Age, physical condition, mental alertness and stability cannot be forecast on a scientific basis.

ACTIVE VERSUS PASSIVE FIRE CONTROL

Because of its great height, the high rise building must be structurally sound. Its capacity to withstand live load stresses, wind stresses and sustained heat must be superior to low level structures which lend themselves to fire fighting operations outside the building. Fire control can be approached from three viewpoints:

1. Containment.
2. Extinguishment.
3. Fuel control.

Traditional code writers have maintained that effective fire control in high rise buildings depends on confinement of a fire to the smallest possible area. In older high rises, like the Empire State or Chrysler Buildings, fire walls as structural members are massive. Permanent partitions of metal lathe and plaster, and heavily insulated structural members created conditions in buildings of this vintage which can be likened to a furnace. Small areas were capable of withstanding intense heat. Lack of central air condition systems and facile venting prevented massive fire damage. That kind of construction is no longer economically feasible nor functionally desirable.

Most modern fire proofing techniques depend largely on sprayed on asbestos insulation. Post mortem examinations of fires in modern high rise buildings offer evidence that spray on insulation has not performed satisfactorily. In the One New York Plaza fire, investigation proved that steel members had shed some of their fire proofing. Steel, oxidized before it was protected, did not hold its protective coating and lost its capacity to insulate against heat. Severe deflection and structural damage resulted.

Indeed the New York Board of Fire Underwriters, after studying two recent high rise fires have issued a directive which removes insurance rate credit on buildings protected by spray-on asbestos. The result: from a rating standpoint, these buildings have been reclassified from *five resistive to unprotected noncombustible,* and fire insurance rates may be increased by as much as 400 per cent.

ACTIVE FIRE CONTROL

Automatic sprinklers have not been required in high rise buildings, except for basements, mezzanines, mercantile and shopping areas, restaurants and bars, or storage and utility rooms.

There are basically three reasons for this—

1. *Fire Insurance Rates.*—Fire Insurance Rates for older commercial office buildings are frequently as low as 2½c per $100. From a purely economic standpoint, these low rates would not amortize the cost of sprinkler installation within a reasonable time. By increasing insurance rates from 2½c to 15c, sprinklers would be encouraged.

2. *Safety Record.*—Loss of life in older office buildings has not been significant.

3. *Reliability.*—Some have alleged that sprinklers are not reliable enough. Structures of the Empire State Building vintage were built during the period of stable building costs. The concept of trading off automatic sprinkler systems for reduced fire proofing, for exit distance travel or permission to utilize materials of higher flame spread ratings predicated on sprinkler protection was not economically mandatory.

With building construction costs rising more than 13% per year, code writers have become convinced that the building industry cannot tolerate constant adding of fire protection features. As evidence of this trend, the Southern Standard Building Code was amended in 1970 to permit the fire proofing, including columns, beams, joists, interior bearing and nonbearing walls to be reduced by one hour when automatic sprinklers are installed throughout, leaving a minimum fire proofing requirement in high rise buildings at one hour.

The 1968 New York City Building Code permits unlimited height and areas in office buildings coupled with permission to reduce fire proofing, in some instances are up to three hours. To date, few architects seemed to have grasped the significance of this code change.

BUILDING SYSTEM DESIGN

Today's code writers are talking about total building systems design; that is the development of integrated and combined systems of fire proofing, egress, communications, smoke control and extinguishment.

Obviously extinguishment immediately and automatically upon the inception of the fire mitigates and in some instances eliminates the necessity for redundant, diverse and integrated systems. Because office buildings are highly compartmentalized, it's probable that more than 95% of fires in sprinklered buildings would be controlled or extinguished by a single sprinkler. It is hard to imagine any fire in such a building opening more than four sprinklers.

To preclude the possibility of malfunction of sprinklers, systems should be supervised. This would eliminate the possibility of closed control valves. It would monitor water level in pressure or gravity tanks, and detect freeze ups. Most important it would immediately and automatically notify the fire depart-

ment as water flows from the first sprinkler. Such a system could simultaneously locate the fire and notify both firemen and building employees where the fire is. Such systems could be used to automatically actuate air handling systems. Air temperatures in the area of the fire would be reduced immediately as the fire is extinguished. The source of smoke, combustion itself, would be eliminated. In the total scheme of a system's approach to fire control in high rise buildings, the concept of automatic fire extinguishment should be paramount and thematic. Just as the best defense is a good offense in sports parlance, so immediate fire extinguishment must be central to any concept designed to resolve The Tall Dilemma.

Recent construction, sprinklered high rise buildings

Name of building and city	*Stories above ground*
Georgia Pacific, Portland, Ore	27
Knights of Columbus, New Haven, Conn	23
Sears Roebuck,[1] Chicago, Ill	110
Imperial Bank of Canada,[1] Toronto, Canada	57
Regency Hyatt House, Atlanta, Ga	
Coastal States,[1] Atlanta, Ga	26
Space Needle, Seattle, Wash	600 feet

[1] Under construction.

SEARS TOWER, SOLUTION TO "THE TALL DILEMMA"

The Sears Tower, the world's tallest and largest privately owned office complex, now under construction in Chicago, will include a complete system of automatic sprinklers which will extend throughout its 4.4 million square feet of space. When completed the structure will rise 1,450 feet above street level; 110 floors above grade atop three subterranean levels.

Although not required by the Chicago Building Code, the incorporation of a sprinkler system in this huge structure is based on a determination of Sears Management to make the building as safe as modern fire protection technology will permit. Fifty thousand sprinklers will be installed in accordance with the NFPA No. 13 Standard For Installation of Sprinklers. A light hazard piping schedule will protect the offices in the towers. The subterranean levels will utilize "ordinary" hazard spacing. Water supplies will be provided by two independent but integrated sources. Lower floors (from the third level below grade to the 29th floor) will be fed by two mains from a public grid. Ten fire department connections act as auxiliary support to the two combination sprinkler standpipe risers.

Ten automatic fire pumps, monitored by a proprietary alarm system, will be positioned in mechanical rooms from the third lower level to the 88th floor. Two 1500 gpm pumps located in the basement will feed systems for the first 28 floors. On the 29th floor, two 1500 gpm pumps and a 1000 gpm pump will take over the job. Three 1000 gpm pumps will feed sprinklers from the 64th to the 87th floor and two 750 gpm pumps will service the rest of the building. All systems will be tied together and looped at varying intervals to assure an integrated "Fail Safe" water supply system.

Two 10,000 gallon water storage tanks will be placed in position in mechanical rooms on the 64th and 88th floors, and a 15,000 gallon tank will be located on the 31st floor.

To detect tampering, or inadvertent closure of control valves, a proprietary alarm system monitors all control valves throughout the building. Control valves monitored with tamper switches are positioned on each floor. Sprinklers and standpipes are fed from hydraulically calculated common risers. Water supply systems are interconnected and looped.

Additionally, the proprietary supervisory alarm system has the capability of locating any fire that might occur and notify building employees of a water flow or valve impairment.

Sears' management has solved The Tall Dilemma.

THE ROLE OF SPRINKLERS IN THE "SYSTEMS APPROACH"

There seemed to be a consensus among the seventy top fire portection experts who participated in the April, 1971 GSA seminar. A "Systems Approach" to the writing of building code provisions effecting high rise buildings would be utilized

in the development of code provisions for this occupancy. The "systems approach" is an effort to integrate those interrelated factors that effect the safety of buildings and their occupants, and to evaluate those factors and assign quantitative weights to each element with a view to translating those values into code requirements.

In broadest terms, such an approach would consider five facets of the problem:

1. Occupant protection,
2. Life support systems,
3. Fire propagation and movement,
4. *Fire control and extinguishment,*
5. Structural systems.

In reality, these elements are inseparably interrelated, but obviously "fire control and extinguishment" is paramount. If fires can be immediately and automatcially extinguished, all other problems are *ipso facto* resolved.

Clearly the greatest weight should therefore be assigned to "*fire control and extinguishment.*" Maximum weight should be given to extinguishment which occurs in the shortest possible time. A fire controlled in *two* minutes by a sprinkler system deserves a higher value than a fire extinguished by a fire department in *ten* minutes. Time establishes the order of values.

If a fire is extinguished in less than five minutes, all of the other four essential elements are thereby cancelled out. *Occupant protection* is assured; *life support systems* become unnecessary. *Fire propagation and movement* have been eliminated and *structural systems* are safeguarded.

Only automatic sprinkler systems are capable of performing these simultaneous functions:

Detect a fire,

Automatically extinguish or control a fire using only the amount of water needed to accomplish this purpose,

Can:

(*a*) Sound an automatic alarm inside and/or outside the building;

(*b*) Notify building employees and/or the fire department of the exact location of the fire; and

(*c*) Actuate smoke ejection systems.

The skeptics and critics of sprinkler protection maintain that sprinklers control and extinguish only 96.2% of fires in sprinklered buildings and that level of reliability does not warrant assignment of paramount value in a systems approach to codes. They argue that structural engineers would not design bridges that are only 96% safe.

What are the facts?

Every five years the National Fire Protection Association publishes its bi-decade "Automatic Sprinkler Tables." The (1965) edition contains an analysis of 75,290 fires reported to the NFPA during the period 1925 to 1964, inclusive.

72,419 (96.2%) fires were reported as extinguished or controlled, and 2,871 (3.8%) of fires were not controlled by sprinklers.

415 fires in sprinklered office buildings were reported. Of these, 403 (97.1%) fires were reported as extinguished or controlled by sprinklers, and 12 (2.9%) fires were not controlled by sprinklers.

The preface of the NFPA tables contains this admonition:

"Since there are numerous fires controlled by one or two sprinklers with too little loss to report, the record printed here represents only a fraction of the total numbe of fires causing sprinklers to operae. If it were possible to include a complete record, the efficiency of sprinkler performance shown by these tables would even more closely approach 100 per cent."

If the truth were known, it is probable that the 75,290 fires reported to the NFPA represents not more than 1% of the total number of fires in sprinklered buildings.

To understand the meaning of these statistics one must appreciate how the data is gathered and why the statistics can be misleading.

Most reports come from fire insurance authorities; some come from fire chiefs or fire marshals.

Owners are reluctant to report small fires that are extinguished by one or two sprinklers. High deductible insurance coverage obviates the need to report such losses.

Even where low deductible policies are in effect owners are reluctant to report small claims to avoid the possibility of increased insurance premiums.

When fires are controlled or extinguished by one or two sprinklers, fire departments are frequently not summoned. So records of fires that are unknown to the fire departments are not available.

Even when fire departments have been notified, fire chiefs seldom have the time or clerical facilities, or may not be motivated, to report small fire losses to the NFPA.

One fire chief in a city of 150,000 told us that he had never completed an NFPA questionnaire and his department had responded to thousands of fires in sprinklered buildings during the past 29 years. He could recall only one fire where more than four sprinklers were opened and that fire was extinguished by eight sprinklers.

So if the tens of thousands of reports on small fires extinguished by one or two sprinklers were made available, sprinkler systems would reach a near 100% performance record to which the preface of the NFPA sprinkler performance tables have referred.

If our assumption is correct then the NFPA statistics reflect a 1% sampling of performance experience, mainly measuring the largest insurance claims and less frequently reported small loss fires, then about 7.5 *million* successful extinguishments have occurred during the forty-year reporting period. We must assume that virtually every instance of unsatisfactory performance is included because losses are high and insurance claims have been filed. If this hypothesis is correct then the number of fires not controlled by sprinklers is about 1 in every 34,000.

Sprinkler performance in high rise buildings would necessarily be even better. Fire loading is low and the interior of these buildings is compartmentalized. Sprinkler systems in these buildings should be supervised. This would eliminate the possibility of closed control valves, detect freezing conditions within systems, send a trouble signal when air pressure is reduced below safe limits in pressure tanks or when water level in gravity tanks is decreased. These features, coupled with automatic water flow alarms to notify building employees and/or fire departments that a sprinkler is operating bring first aid to the sprinkler system and assure minimum water damage.

One large central station alarm company in the United States reports that supervision of sprinkler systems has resulted in a 99.98% freedom from malfunction. In Australia where supervisory systems are mandatory within large metropolitan areas, sprinklers control or extinguish fires in 99.89% of cases.

Critics of sprinkler systems like to cite the annual "*Major Property Loss Fires*" report which appears in the NFPA Fire Journal each May. Excerpts from this report are printed and distributed widely by opponents of sprinklers.

Supervisory Service for Sprinkler Systems

Surveillance systems, capable of performing a wide range of functions to assure dependability of sprinklers may include:

Monitoring of Control Valves to Guard Against "Shut-Off" Trouble Signal (Fail-Safe) to:

Fire Department;
Building Employees, Maintenance Crew; and
Central Station for Relay to Programmed Response.

Water Flow Alarm to:

1. Notify Fire Department, Building Personnel or Central Station. Programmed Instructions Relayed to Fire Department;
2. Sound Internal and/or External Alarms;
3. Activate Smoke Control System; and
4. Locate Fire.

Monitor—

Low Water in Gravity Tank;
Low Air Pressure in Pressure Tank;
Fire Pumps;
Freezing Pipe Conditions;
Air Lines; and
Water Heaters.

Most systems are of the "Fail-Safe" type. Will function even in power "blackouts."

Systems can be automated and programmed to monitor pumps, tanks and other key systems and components at pre-determined time intervals.

Here's a summary of large loss fires in sprinkled buildings in 1970. The source of this data is the May, 1971 NFPA Fire Journal.

FIRES	COMMENTS
Seven (7) involved closed sprinkler control valves.	Valve supervision would send an automatic trouble signal to building employees or the fire department indicating which valve is closed. Standard operating fire department procedure requires trained firemen to stand by control valve to prevent premature shutoff during fire.
One (1) fire in a building under construction.	Water service had not been turned on.
One (1) fire. High piled polyurethane stock in warehouse. Water distribution blocked by stock piled around sprinkler. Building collapsed breaking sprinkler pipe.	Conditions in light hazard office building not similar to extra hazard high pile stock.
Five (5) fires in partially sprinklered buildings.	Fires began in areas where NO SPRINKLERS were installed. How does one measure the effectiveness of sprinklers where they were NOT provided?
One (1) fire. Water Supply tank drained for servicing.	Supervisory system would notify fire department, building maintenance crew and/or insurance carrier that building is temporarily unsprinklered.
One (1) fire started on top of roof. Caused by gas-fired roof mounted furnace to supply heat to paint drying oven in furniture factory.	How does one start a fire on the roof of a fire resistive high rise building?
One (1) fire. Fire pump shut down.	Supervisory system would send trouble signal to notify fire department, building maintenance and/or insurance carrier that building was TEMPORARILY UNSPRINKLERED.
One (1) exposure fire. Fire across street. Public water supply robbed by fire department.	High rise buildings would have dual (2 source) water supply systems. Zoning and "set back" requirements and fire resistive exterior walls or exposure sprinklers should be required.

In the development of a systems approach which will include occupant protection, life support systems, fire propagation and movement, fire control and extinguishment and structural systems, the first order of priority must be given to "*fire control and extinguishment.*" If fires are extinguished, requirements for all other related systems may be mitigated or eliminated. The key to the protection of life and property rests on one simple principle: A reliable means of automatically extinguishing and controlling fires in the shortest possible time. This principle deserves first consideration in the development of a systems approach to high rise code requirements.

AUTOMATIC SPRINKLER PERFORMANCE TABLES, NATIONAL AUTOMATIC SPRINKLER AND FIRE CONTROL ASSOCIATION, INC., SUMMARY—LIFE SAFETY OCCUPANCIES

Occupancy	Number of fires	Number of fires extinguished	Number of fires held in check	Satisfactory systems performance	Fires controlled by— 1 sprinkler	2 or less sprinklers	3 or less sprinklers	More than 3 sprinklers	Unsatisfactory sprinkler performance
Mercantiles	82	49	32	81	49	64	73	8	1
Hotels, motels, multiple residences	31	25	5	30	22	28	29	1	1
Bowling lanes	24	22	2	24	21	22	23	1	----
Nursing homes	21	18	3	21	16	20	20	1	----
Hospitals	17	13	4	17	11	15	15	2	----
Restaurants	9	7	2	9	3	7	7	2	----
Assembly and office buildings	6	3	3	6	4	4	5	1	----
Schools and colleges	35	29	5	34	24	31	32	3	1
Cumulative totals in numbers	225	166	56	222	150	191	204	19	3
Cumulative totals in percent		74.1	25.0	99.1	66.5	85.4	90.6	8.6	.9

Note: An analysis of 225 fires in completely sprinklered life safety occupancies (light or ordinary hazard). 99.1 percent of these fires were extinguished or controlled by sprinklers. The 3 instances of unsatisfactory performance resulted from closed valves. Simple automatic valve supervision by central station, proprietary or remote station systems would send an automatic trouble signal alerting building employees and/or the fire department that water is shut off.

NATIONAL AUTOMATIC SPRINKLER & FIRE CONTROL ASSOCIATION, INC.,
White Plains, N.Y., February 6, 1973.

Subject: Fire Safety—High Rise Buildings

DEAR SENATOR WILLIAMS: With reference to your letter of January 30, 1973, it would be fair to estimate that the cost of sprinkler installation in high rise buildings would range between one and two per cent of the total cost of a high rise structure.

We hasten to point out, however, that the whole thrust of the newly adopted Section 1807—Special Provisions for High Rise Apartment Houses, Hotels, Condominiums and Office Buildings of the Uniform Building Code (1973) which we transmitted to you, is toward the reduction of total construction cost when sprinklers are specified as an alternate to other building requirements.

An identical code proposal to Section 1807 of the Uniform Building Code has been submitted to the other major building code congresses by the International Association of Fire Chiefs. If adopted by all three nationally recognized model building code groups, this code provision will apply to about 74% of all municipal jurisdictions in the United States with populations over 10,000.

In those cities which adopt code provisions similar to Section 1807 of the UBC, sprinklers will, in all likelihood, result in substantial reductions in the total cost of erecting high rise buildings.

Therefore, the estimate that sprinker systems cost between one and two per cent of the total cost of construction of high rise buildings must be understood in the context of the total building code requirements.

By reason of the installation of sprinkler systems, fireproofing may be reduced, flame barriers over windows may be eliminated, distance between exit systems may be increased (in some cases, permitting the elimination of one or more exit systems), less costly interior wall finish may be specified by the architect, and smoke proof enclosures may be eliminated.

In a word, sprinkler systems are encouraged in this code to compensate for a variety of other "passive" fire protection requirements.

Should you need additional information or further explanation, do not hesitate to contact us.

Cordially yours,

RAYMOND J. CASEY,
President.

ITEM 2.—LETTER FROM JOHN HANS GRAHAM & ASSOCIATES, CHARTERED, TO SENATOR WILLIAMS, DATED JANUARY 23, 1973

JANUARY 23, 1973.

DEAR SENATOR WILLIAMS: Renewed interest in fire safety regulations for hi-rise apartments for the elderly as evidenced by the Hearings before your committee prompted me to express our concern. Since the speaker schedule for your well prepared Hearings is apparently filled. I wish to go on record as follows:

Measures should be made mandatory, which will be in excess of currently applicable codes and regulations for fire-resistant, Class "A" structures. At present they cover fire safety features for the use of limited flamespread materials, standpipes, fire stair towers, fire alarms, fire extinguishers and others.

Such a proposed measure is used throughout the projects which we are designing for the B'nai B'rith Senior Citizens Housing Foundations in the form of automatic ionization-type smoke detection and smoke evacuation systems, which effectively remove smoke at the ends of each residential floor, ahead of stairs. These systems could be effectively connected to the local fire alarm loop. It is well known that smoke is the real killer in apartment conflagrations, exceeding the deadly effect of fire.

Further safety measures could be a full or partial automatic sprinkler system, possibly extending from the mandatory standpipes, subject to Code Amendments and subject to the local Fire Marshal's approval. Others may be a rate-of-temperature rise type automatic fire alarm annunciator system, smoke locks open to the sky and additional smoke screens.

The present economic limitations prohibit the construction of complete sprinkler systems and other safety measures recommended above. Therefore, financing should be made available for the same.

If desired, we could furnish further details.

Respectfully yours,

JOHN HANS GRAHAM.

ITEM 3.—LETTER FROM LAWRENCE M. KUSHNER, ACTING DIRECTOR, DEPARTMENT OF COMMERCE, TO SENATOR WILLIAMS, DATED JANUARY 24, 1973

JANUARY 24, 1973.

DEAR SENATOR WILLIAMS: We are enclosing a copy of our test report on the carpeting which was taken from the corridor of the "Baptist Towers" apartment building in Atlanta, Georgia.

The test report uses a flame spread index to indicate the flammability of a material. This flame spread index is based on an arbitrary scale where asbestos cement board is given a value of 0 and red oak a value of 100. The index for the carpeting in question was 334. The test method we used is ASTM E162.

The Social Security Administration and the Public Health Service (under the Hill-Burton Act) specify a maximum flame spread index of 75 for carpeting used in corridors in nursing homes. Although this specification is based on the ASTM ES4 test method, the flame spread indices of ASTM ES4 are roughly comparable to those of the ASTM E162 test method we used.

There are currently no national standards governing the smoke generating properties of floor covering materials. The smoke generation number indicated in the test report is based on the maximum optical density (674) developed during the non-flaming condition in the test chamber. The higher the number the greater the amount of smoke being developed. To provide a basis for comparison with common materials, vinyl abestos tile will have a maximum optical density of 400 and vinyl tile will go up to 460. Wool, nylon and acrylic carpets that we have tested, which meet Federal Specification DDD–C–95, have been under a maximum optical density of 460.

We hope that the above information will make the test report more useful to you.

Sincerely,

LAWRENCE M. KUSHNER,
Acting Director.

[Enclosure]

U.S. DEPARTMENT OF COMMERCE,
NATIONAL BUREAU OF STANDARDS,
Washington, D.C., January 23, 1973.

REPORT OF TEST

REPORT NO. FR 38.34

Report on floor covering taken from "Baptist Towers", Atlanta, Georgia corridor on December 1, 1972.

1.0 Material

Carpeting having a looped pile of 100% polypropylene. Pile tufted to a primary backing of polypropylene fibers which is bonded to a secondary backing of foam rubber. Weight of carpet, 86 oz/sq yd: thickness 7/16 inch. Carpet received in gold and green samples, which were identical in weight, construction and fiber. Tests were conducted on green samples only.

2.0 Pill test

One sample was exposed to the pill test and it passed.

3.0 Flame spread index

Three samples were tested in accordance with the ASTM E162–72 procedure, and mounted per section 4.9.2. The results were:

Flame spread	Heat evolution	Flame spread index
12.37	28.0	346
12.90	26.0	335
12.52	25.6	320
Average		334

4.0 Smoke generation properties

Three samples each were subject to flaming and non-flaming exposures in the Smoke Density Chamber and tested in accordance with Appendix II, NBS Technical Note 708, Test Method for Measuring the Smoke Generation Characteristics of Solid Materials".

The results were:

Maximum optical density

Flaming	322
	320
	307
Nonflaming	666
	675
	680

IRWIN A. BENJAMIN,
Chief, Building Fires and Safety Section
(For the Director).

ITEM 4.—LETTER FROM E. C. BIERWIRTH, NATIONAL SALES MANAGER, PYROTRONICS, TO SENATOR WILLIAMS, DATED MARCH 21, 1973

MARCH 21, 1973.

DEAR SENATOR WILLIAMS: After listening to the testimonies, the questions and the answers at the Senate Committee on the Housing for the Elderly hearings covering fire protection on February 27 and 28, 1973, I sense the possibility of confusion. Although most of the people who testified were experts in the field of fire protection and fire fighting, their recommendations were in disagreement. Some said that complete automatic sprinkler coverage of all areas of the building was essential and all that was necessary for life safety. Others stated that early warning fire detection would offer a higher degree of safety to life. A combination of sprinkler systems and early warning fire detection was still another recommendation made by other experts. What is needed?

Having 17 years experience in the field of early warning fire detection, I also qualify as an expert and I present the following thoughts for your consideration. I have both witnessed and conducted many fire tests which included ionization type, photoelectric smoke type, and thermal type fire detectors comparing their response and performance to various kinds of fires. As sprinkler heads are thermally responsive, there is a direct relationship to them and thermal type fire detectors. With all of these tests in mind, I am convinced, that early warning fire detection is essential to life safety in any area where people might be sleeping or non-ambulatory. In any type of living unit, be it multi-room apartment, single hotel room, dormitory room, hospital or nursing home room or ward, etc., both the possibility and the probability of a developing fire being of such a nature that it would produce dangerous levels of toxic gases and smoke, prior to the heat increase necessary for thermal response, is very great. In other words, people within the area of the fire outbreak could be dead or unconscious before the actuation of thermal detectors or sprinkler heads.

To document this fact, I offer Exhibit No. 1,[5] which shows that in 14 fatal fires, 8 took place in sprinklered areas and only in two cases did the sprinkler head open. In at least five of these fires, where the approximate burning time of the fire prior to discovery ranged from five minutes all the way up to one hour, the early warning that an ionization detector or a smoke detector provides, could have saved these lives.

Further documentation as to the effectiveness of ionization detector response to small fires is to be found in Exhibit No. 2 and Exhibit No. 3. Both of these testimonials explain successful fire detection experiences with ionization detectors.

Now that the requirement and effectiveness of early warning fire detection is established, we come to an important question. Is early warning fire detection all that is necessary to assure maximum life safety? Depending on the particular circumstances, the answer could be either *yes* or *probably* or *no*.

The circumstances required for a "yes" answer are listed as follows:

1. Immediately following detection, the fire is extinguished by either the tenant or responsible staff personnel; or

1–A. The occupants of the fire threatened area can be quickly evacuated; and

2. The structure and the contents are of such a nature that the smoke, heat, and flame of the fire will be confined to the area of origin until the Fire Department arrives; and

3. An assured automatic signal is sent to the Fire Department and they have unhampered and reasonably short travel to the building involved.

In cases where step No. 1 can be assured, the early warning detection and immediate extinguishment of the fire eliminates the threat. However, when step No. 1 is not successful, we have to depend on steps 1A, 2, and 3 in combination.

If any of the points in 1A, 2, and 3 break down for any reason and cannot be maintained through completion, we are now presented with concernable risk. Even so, in the case of the Baptist Tower tragedy where so many things worked against safety from the fire, an automatic early warning fire signal to the tenants would probably have resulted in the safe evacuation of everyone in the building. The same simultaneous signal to the Fire Department would probably have resulted in their finding all tenants outside the building upon their arrival and with only a much smaller fire to concentrate their efforts on.

This is where the value of automatic sprinklers for life safety come to serve their purpose. In most fire situations involving health care, commercial or multi dwelling buildings, automatic sprinklers will not only confine the fire to its area of origin but will extinguish it. In giving this type of performance, the occupants in other apartments on the fire floor and on other floors are offered assurance that the fire is not going to grow to major proportions that could threaten life throughout the entire building, regardless of other possible adverse circumstances. A complete sprinkler system does provide great assurance to life safety for all occupants outside the area of fire outbreak. By itself, it can not offer the necessary degree of life safety to the occupants within the immediate area of the fire.

From these points one can draw the following conclusions:

1. Ideally and where costs do not have to be considered, the highest degree of life safety in any building would be total coverage of an early warning fire detection system and total sprinkler coverage as a back up.

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[5] Retained in committee files.

2. A complete early warning fire detection system by itself offers a very high degree of life safety. In most situations, it will permit safe evacuation of the fire threatened area and result in convenient control and extinguishment of the fire either by attending personnel or by the fire department. It is, however, dependent on some human reactions.

3. A complete sprinkler system by itself, will protect against a major fire involvement and prevent multiple loss of life. It does not provide adequate protection to the occupants within the fire area especially when they might be asleep or non-ambulatory. A very important statistic to introduce here, is the fact that the ratio of the single life loss fire versus the multiple life loss fire is approximately 10 to 1. We have had all kinds of attention called to the Baptist Tower fire, the Howard Johnson, New Orleans fire and other tragic multiple life loss fires. If we were to add up all of these publicized fire deaths over a one year period, we would find that they totaled only 1/10th of the single life loss fires that we were not informed of during the same time period.

4. Without much compromise, a combination of early warning fire detection and automatic sprinklers is a very sound approach that is being taken by many fire protection groups. The N.F.P.A. (National Fire Protection Association), Safety to Life Committee, H.U.D. and various State Fire Marshals have revised their standard requirements and codes along this line. This is documented in enclosed Exhibits 4 and 5.[6]

Early warning fire detection in the rooms to assure immediate evacuation, backed up by automatic sprinklers in the corridors to assure fire confinement certainly offers the most fire protection for life safety, for the least cost. This approach should prevent almost all life loss possibilities to fires in housing for the elderly.

E. C. BIERWIRTH,
National Sales Manager.

ITEM 5.—LETTER FROM RALPH E. COLLINS TO SENATOR WILLIAMS, DATED MARCH 9, 1973

MARCH 9, 1973.

Re: Fire Protection in Housing for the Elderly.

DEAR SENATOR WILLIAMS: I had the honor and pleasure of attending your Subcommittee Hearings on February 27 and 28, 1973, to examine the problems of fire safety in high-rise buildings for the elderly. I want to thank you for a well conducted hearing and for making this hearing open to the public, which made my attendance possible.

I am sure that you are well aware by now that the means and approach to fire protection in these types of facilities is very controversial. Nevertheless, we do have a serious problem and action must be taken to alleviate this problem.

In light of the controversy, I feel it important to submit my thoughts to you on this subject. First, let me state briefly my qualifications. I am presently employed in the insurance industry and working in fire protection. Prior to my present job, I was employed at the Kennedy Space Center as a Fire Protection Engineer and was responsible for all of the fire protection systems at the Space Center and, in addition, served the position as Assistant Manager and aided the Manager in his endeavors to provide overall fire protection for the complex. I graduated from the University of Maryland in 1964, taking my degree in Fire Protection Engineering.

I agree with your opening statement that with our advanced know-how, we can prevent these multiple death tragedies. You ask if we have a cost factor problem and if we need stronger and stricter codes. My answer to the question is no. I feel very strongly that present day codes do not address the problem in hand. When you examine the history and development of our building codes in this country, you will find that they are predicated on stopping the horrendous conflagarations which this country experienced at the turn of the century. The building codes do not necessarily address the interior fire problem of a given building. Nevertheless, due to the combustibility factor and to the discipline factor, our fire loss experience in buildings which comply with these codes has been favorable during the first half of this century. I suspect that we have a change in the combustibility factor, a breakdown in discipline, and a changing attitude by society as well as new construction techniques which, all coupled

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[6] Retained in committee files.

together, have resulted in our more recent serious loss experiences. Of course, we have not conducted the necessary research to confirm my suspicions. I firmly believe that revising and amending our present day codes is not the answer to our problem and will result in a higher cost factor.

I propose that we disregard present day codes and standards and utilizing present day knowledge, examine and define the problem which will then define the protection requirements to solve the problem. I must echo the statements of Dick Bland and Chet Schirmer and must reemphasize Dick Bland's statement that we do not have sufficient knowledge of the physics and chemistry of fire and the combustion process and, therefore, must consider alternative protection measures until this necessary knowledge is gained. Further, I would like to expand these comments to say that we do not have sufficient knowledge and experience with sophisticated fire protection systems beyond the automatic sprinkler system which has proved itself most worthwhile through accurate performance data over the past 75 years and more.

We know the performance level of the automatic sprinkler system assuming 100% protection. Contrary to the statements made by the systems development system, we do not know the performance level of many of the systems which are proposed in lieu of 100% automatic sprinkler protection and without a better understanding of the combustion process and the fire phenomena, we cannot know the performance level. We do not have sufficient information at this time to know the response time of an ionization type products of combustion detector in a real fire situation. Of course, the information is available in a laboratory situation which cannot be duplicated at every fire situation due to the complexities of the combustion process.

Some people advocate compartmentation and the use of products of combustion detectors. While we do have sufficient technical knowledge to provide adequate compartmentation, I challenge the reliability of the compartmentation system based on a simple single failure point analysis of the system. I appreciate the efforts and the ideals of the architect and the engineer and for that matter the builder, however, it has been my unfortunate experience to find that the component parts of a compartmentation system lack any degree of reliability and consist of numerous single failure points. Where you lack reliability in a single failure point, you must assume failure and suffer the consequences. The architect and HUD can ideally achieve compartmentation through the use of the common door check. However, it remains a basic fact that it is a single failure point and lacks any degree of reliability to assure fire safety.

While in Washington attending yours hearings, I visited a high rise home for the elderly in Northern Virginia. The facility had two Class A fire doors equipped with self-closing door checks to compartmentize the trash room from the remainder of the building. Both door checks were broken beyond repair and the doors were found in a standing-open position, thus defeating the purpose of the architect and the engineer of compartmentizing and confining a fire in the trash room. Fortunately, we have not had a fire in that trash room to date.

The trash chute which terminates in this trash room is equipped with a spring operated metal door which is chained in the open position. The fire department informed the building management that this door would close automatically in the event there was a fire in the trash room. The building management could not understand how the door would close and I agree as the chain was not equipped with a fusible link which would melt and shut the door in the event of a fire. Again, we have a single failure point which would have failed and allowed the fire to spread from the trash room up the chute to all floors within the building, and the fire department did not note the missing link. I emphasize and illustrate these two points because they are common to my everyday field experiences. We are not prepared, to date, to combat these type deficiencies.

As part of our compartmentation efforts, we must control the development and spread of smoke in the building. In order to control the spread of smoke we must have sufficient knowledge of the dynamic process which causes smoke spread. We do not have this knowledge to date and cannot guarantee that large quantities of smoke can be controlled. Therefore, we must control the development of the smoke and a simple way of doing this is to maintain small fires small, and even extinguished.

One of the statements presented during your hearings advocated the use of smoke detectors and partial sprinkler protection based on the philosophy that a sprinkler head will not protect the individual. Although the fire problem is many fold and ill defined, the primary problem is the fire exposure to oneself which

is created by another. Contrary to this gentlemen's statement, it is my philosophy that I will control my own destiny and by this I mean I do not require smoke detection to save myself, but adequate protection facilities to reduce the severe fire exposure which I suffer from my careless neighbor. If we cannot achieve and afford 100% sprinkler protection and 100% products of combustion detection, I will exercise my rights to prevent a fire within my own confined area and advocate the use of automatic sprinkler protection where the fire occurs to prevent a severe fire from spreading and exposing the area I would be occupying. This can only be achieved at this time by 100% automatic sprinkler protection.

To be cost effective, we must disregard add-on features to present day fire safety requirements and start anew. We must take a total systems approach to the problem, a problem which we are not able to totally define, and build the necessary protection features to achieve fire safety. For example, we might take a totally structurally sound building which has not been equipped with any fire safety features, add a 100% sprinkler protection system, and then determine the need for other protection features in addition to the sprinkler protection. Based on the performance record of the sprinkler system, we may find that an adequate and reliable sprinkler system by itself will give us more protection than any combination of all of the other alternate proposals. In other words, we may not need compartmentation of any degree, smoke control systems of any type, special elevator systems, standpipe systems, and/or fire-proof furnishings and finishes, etc.

We do not want to compromise production nor do we want to seek trade-offs from existing codes. What we want to do is provide the most reliable cost effective system that will reasonably afford the greatest degree of fire safety. This is extremely difficult to achieve primarily due to the various interest groups involved. Unfortunately, many of these interest groups tend to muddy the water to the point where no one can see clearly what the basic problem is and, therefore, what the basic protection needs could be. It has been my experience that these interest groups cannot see the total picture and, therefore, cannot apply a total systems approach to the problem.

Based on my knowledge and experience with the fire problem as we know it today, I attempt to solve the problem from a total systems approach with no preconceived ideas. Like Dick Bland says, present day knowledge and technologies point to the need for 100% automatic sprinkler protection. Who knows what the future holds for us?

Thank you for your attention to my comments. I hope my thoughts prove beneficial to your endeavors.

Sincerely yours,

RALPH E. COLLINS.

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