REPORT OF THE
BOARD OF HOUSING AND
COMMUNITY DEVELOPMENT ON

The Feasibility and Need for Requiring Certain Facilities to be Equipped with Fire Suppression Systems

TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA

SENATE DOCUMENT NO. 7

COMMONWEALTH OF VIRGINIA
RICHMOND
1991

NEAL J. BARBER
DIRECTOR

COMMONWEALTH of VIRGINIA

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

Fourth Street Office Building
205 North Fourth Street
Richmond, Virginia 23219-1747
(804) 786-1575

November 1, 1990

MEMORANDUM

TO: The Honorable L. Douglas Wilder and the Honorable Members of the 1990 Virginia General Assembly

VIA: The Honorable Lawrence H. Framme, III

FROM: Neal J. Barber Neal

SUBJECT: Senate Joint Resolution No. 1 (1990)

The 1990 General Assembly, by Senate Joint Resolution No. 1 (1990), requested the Board of Housing and Community Development to study the feasibility and need for requiring hospitals, nursing homes, psychiatric hospitals, homes for adults, congregate facilities which house the elderly and handicapped, and child caring institutions to be equipped with fire suppression systems.

Enclosed for your review and consideration is the report that has been prepared in response to this resolution.

/dbb

Enclosure

cc: Mr. Bill Porter
Mr. Ray Vaughan

REPORT OF THE BOARD OF HOUSING AND COMMUNITY DEVELOPMENT

The feasibility and need for equipping hospitals, nursing homes, psychartic hospitals, homes for adults, congregate facilities, and child-caring institutions with automatic sprinkler systems

Report for Senate Joint Resolution 1 passed by the 1990 General Assembly

Agency Contact:
Gregory H. Revels, CPCA
Program Manager
Code Development Office
205 North Fourth Street
Richmond, Virginia 23219
(804) 371-7772

SENATE JOINT RESOLUTION NO. 1

Requesting the Board of Housing and Community Development to study the feasibility and need for requiring certain facilities to be equipped with fire suppression systems.

Agreed to by the Senate, March 9, 1990
Agreed to by the House of Delegates, March 7, 1990

WHEREAS, the Commonwealth of Virginia is fortunate to have the services of many high-quality hospitals, nursing homes, psychiatric hospitals, homes for adults, and child-caring institutions; and

WHEREAS, the citizens of the Commonwealth of Virginia derive great benefit from the excellent services of these facilities and institutions; and

WHEREAS, ensuring the protection of public health, safety, and welfare is an all-encompassing concern, a matter which must include not only the provision of outstanding human services and health care, but must also include the structural soundness, comfort, and safety of the buildings in which these services are delivered as well; and

WHEREAS, the Board of Housing and Community Development has been authorized to promulgate regulations controlling the safety of the structures suitable for hospitals, nursing homes, psychiatric hospitals, homes for adults, and child-caring institutions pursuant to the Uniform Statewide Building Code, as set forth in §§ 36-97 through 36-119.1 of the Code of Virginia; and

WHEREAS, the fire safety record of the hospitals, nursing homes, psychiatric hospitals, homes for adults, and child-caring institutions in Virginia has been exemplary; and

WHEREAS, Virginia, however, has experienced tragic injuries and deaths through fire during 1989; and

WHEREAS, many facilities and institutions are not required by the present regulations of the Board of Housing and Community Development to be equipped with fire suppression systems; and

WHEREAS, the Board of Housing and Community Development has already begun a discussion of fire suppression systems in certain buildings which are not presently required to be equipped with such devices; and

WHEREAS, the concern and sorrow created by the disastrous fire in 1989 has generated the need for a careful examination of the many issues related to fire suppression systems; now, therefore, be it

RESOLVED by the Senate, the House of Delegates concurring, That the Board of Housing and Community Development is hereby requested to study the feasibility and need for equipping certain buildings with automatic sprinkler systems. As part of its study, the Board is requested to identify the number of buildings used as hospitals, nursing homes, psychiatric hospitals, homes for adults, congregate facilities which house the elderly and handicapped adults, and child-caring institutions that are not equipped with fire suppression systems; to examine the fire safety records of such institutions and facilities; to determine any structural problems with installation of fire suppression systems in these facilities and institutions; to estimate the cost of retrofitting these facilities with recommended systems; and to identify any other methods or systems deemed appropriate for increasing the fire safety of these facilities. During the course of its study, the Board shall seek the cooperation of relevant state agencies including the Department of Health, Department of Medical Assistance Services, Department of Social Services, and the Department of Mental Health, Mental Retardation and Substance Abuse Services; and, be it

RESOLVED FINALLY, That the Board of Housing and Community Development is further requested to report its findings and recommendations to the Governor and the General Assembly by November 1, 1990, as provided in the procedures of the Division of Legislative Automated Systems for processing legislative documents.

I. INTRODUCTION

Senate Bill 1, Senate Bill 369, House Bill 790, and Senate Joint Resolution 1 were enacted by the 1990 General Assembly in response to a tragic nursing home fire which killed 12 elderly patients and forced the evacuation of 96 others. Senate Bill 1 amends §32.1-126.2 of the Code of Virginia to prohibit the Commissioner of the Department of Health from issuing, or renewing, a license for any nursing home or nursing facility after January 1, 1993 unless it is equipped with a fire suppression system which meets the standards promulgated by the Board of Housing and Community Development. Senate Bill 369, and House Bill 790, amend §36-99.5 of the Code of Virginia to require the Board of Housing and Community Development to establish standards for requiring the installation of smoke detectors in nursing homes and nursing facilities.

A. Senate Joint Resolution 1 states in part;

"Whereas, the concern and sorrow created by the disastrous fire in 1989 has generated the need for a careful examination of the many issues related to fire suppression systems; now, therefore, be it
RESOLVED by the Senate, the House of Delegates concurring, That the Board of Housing and Community Development is hereby requested to study the feasibility and need for equipping certain buildings with automatic sprinkler systems. As part of its study the Board is requested to identify the number of buildings used as hospitals, nursing homes, psychiatric hospitals, homes for adults, congregate facilities which house the elderly and handicapped adults, and child-caring institutions that are not equipped with fire suppression systems; to examine the fire safety record of such institutions and facilities; to determine any structural problems with installation of fire suppression systems in these facilities and institutions; to estimate the cost of retrofitting these facilities with recommended systems; and to identify any other methods or systems deemed appropriate for increasing the fire safety of these facilities."

This report contains the findings and recommendations of the Board of Housing and Community Development which resulted from the study, and includes a description of the final regulations that were adopted in response to Senate Bills 1 and 369, and House Bill 790.

B. The Hillhaven Nursing Home Fire

On October 5, 1989 a fire at Hillhaven Rehabilitation and Convalescent Center in Norfolk killed 12 patients and forced the evacuation of 96 others. Hillhaven is a 168 bed facility which is licensed by the Virginia Department of Health as a nursing

home in accordance with §32.1-126, Code Of Virginia.

An investigation of the Hillhaven fire was conducted by the City of Norfolk, the Virginia State Fire Marshal's Office, the Virginia Department of Health, and the National Fire Protection Association.

The investigation concluded that "the probable cause of the fire was careless disposal of smoking materials. When it was discovered, the blaze was in the flaming stage and probably involved bedding materials, including the polyurethane decubitus pad. The fire grew and spread rapidly, reaching flashover 3 to 4 minutes after discovery and just before the fire department arrived." [1]

The investigation also concluded that the building substantially complied with all applicable fire safety codes prior to the fire; however, the door to the room of origin was open during most of the fire. "Further (the nursing staff's) prompt actions in shutting other patient-room doors may have been negated by the doors' lack of positive latches". [2]

Shortly after the Hillhaven tragedy a fire at Shenandoah Homes, a retirement home in the county of Roanoke, resulted in the death of four elderly residents. Although one floor of Shenandoah Homes was licensed by the Department of Social Services as a Home For Adults, the remainder of the building was used as apartments for the elderly. The cause of the fire, which started in a third floor apartment, was determined to be electrical in nature.

II. FINDINGS

A. Fire Protection in Health Care Facilities

The health care facilities listed in Senate Joint Resolution 1 fall into two distinct categories; those which house ambulatory residents, and those which house nonambulatory patients. The model building codes recognize that these two occupancies represent different hazards; therefore, they require different levels of fire/life safety protection.

Facilities that serve ambulatory residents, which are capable of responding to an emergency condition without any personal assistance, are provided a level of protection that is similar to that required for multiple-family dwellings (e.g. apartment buildings, dormitories, etc.). This protection includes providing

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[1] *Hall, Jr. John R.: "The Elderly, the Sick and Health Care Facilities" Fire Journal July/August 1990. (Pages 34-37)*

[2] *Ibid.*

fireresistance rated assemblies between individual units, and smoke detectors within each unit.

Providing fire protection in health care facilities which house nonambulatory patients is more complex than that required for the facilities which cater to the ambulatory. Fire safety experts, and the model code-writing organizations, have long recognized that health care facilities which house nonambulatory persons create significant barriers to providing adequate life safety during a fire. Specifically, the physical limitations of patients make evacuation a cumbersome and inefficient method of assuring their safety. For example, carrying a patient that is connected to life support equipment up or down exit stairs is virtually impossible. This vertical evacuation problem was the basis for creating the "defend in place" concept to assure that adequate life safety is provided to immobile persons. The primary objective of the "defend in place" concept was to minimize the need for evacuating patients during a fire emergency by compartmentalizing spaces with fireresistance rated construction, providing early notification of a fire, and extinguishing the fire during its incipient stages.

1. **Compartmentalization**

The first level of protection required by the defend in place concept is to compartmentalize spaces with fireresistance rated construction, and automatic closing doors, so that fire and smoke will be confined to the room of origin. A second level of protection is provided by subdividing each floor of the building into at least two areas with a fireresistance rated smoke barrier. This allows patients to be moved to an area of safe refuge on the floor on which the fire is located. Any further evacuation would involve the vertical movement of patients to other floors, or out of the building.

2. **Smoke Detection and Fire Alarms**

The defend in place approach is also dependent upon facilities being equipped with smoke detectors and fire alarm systems. These systems are provided so that staff will receive enough warning to evacuate the room of origin and implement the fire emergency plan.

The smoke detectors are required to be installed within patient sleeping rooms, and in corridors of buildings which are not equipped with a fire suppression system. Smoke detectors which are located within patient sleeping rooms are required to provide a visual display on the corridor side of the room, and an audible and visual alarm at the nurse call station attending that room. The patient room smoke detectors may be connected to the fire alarm system in lieu of providing the signals to the nurse call station.

A fire alarm system is required so that the fire department will receive early notification of a fire emergency, thereby preventing manual suppression operations from being delayed. These fire alarm systems are activated by smoke detectors,

sprinkler water-flow switches, and manual pull stations which are located not more than 5 feet from any exit on each floor (i.e. exit stairways). Health care facilities which house ambulatory residents must also install fire alarm systems; however, they are exempt from connecting the smoke detectors to the fire alarm system if they are equipped with a complete automatic fire suppression system. This is mainly due to the ambulatory residents ability to exit the building without assistance, and the activation of sprinkler system alarms which are monitored in the same manner as a fire alarm system.

3. **Fire Suppression Systems**

The defend in place concept also relies on the health care facility being equipped with a fire suppression system; however, a number of exceptions have been developed to this requirement. These exceptions have resulted in fire suppression systems only being required for facilities which either 1) exceed a reasonable height limit from which to deliver efficient firefighting and rescue operations, or 2) lack an adequate number of staff to implement the defend in place concept. The code-writing organizations considered the exceptions appropriate because health care facilities typically have a low fire load; are required to incorporate compartmentalization, smoke detection and fire alarm systems; and have trained staff available to assist patients.

Although the model codes adopted these exceptions, they granted extensive construction tradeoffs to facilities which were equipped with suppression systems. Examples of the tradeoffs which were recognized in the model codes include eliminating the required fireresistance ratings for corridor walls, and permitting an increase to the total square footage of the building.

B. <u>Automatic Sprinkler System Technology</u>

1. **NFiPA 13 Systems**

The conventional fire sprinkler system has long been recognized for its property protection capabilities, and its ability to enhance life safety. For example, the National Fire Protection Association has never received a report of a multiple fatality fire in a building which was equipped with a functional sprinkler system.[3]

A sprinkler system consists of an arrangement of sprinklers, valves, and piping which are connected to an adequately sized water supply. The design and installation of the conventional system is regulated by the National Fire Protection Association Standard Number 13 "Standard for the Installation of Sprinkler Systems" (NFiPA 13). The sprinkler system activates when the heat from a fire melts a fusible element which is located in each sprinkler; therefore, each sprinkler operates

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[3] *<u>National Fire Protection Association Fire Protection Handbook 16th Edition</u>, Section 18, Page 183.*

independently. The melting temperature of the fusible element is established by the NFiPA 13 Standard, and is referred to as the rating of the sprinkler. Sprinkler ratings, and the spacing of the sprinklers, are based on the anticipated fuel load of the occupancy that is being protected. Health care facilities are generally considered light hazard occupancies; therefore, the rating of the sprinklers range from 135-170 degrees Fahrenheit, and each sprinkler usually covers an area no greater than 225 square feet.

Although the NFiPA 13 sprinkler system was previously not considered a necessity for all health care facilities, the development of a new quick response sprinkler (QRS) has caused building code professionals, fire protection experts, and the health care industry, to reassess the minimum level of life safety which can reasonably be provided in facilities that care for the sick and elderly. This new sprinkler uses improved designs and materials in sprinkler components to compliment the defend in place approach to life safety.

2. NFiPA 13R and 13D Systems - Quick Response Sprinklers

The origin of the QRS sprinkler can be traced back to research studies conducted by the United States Fire Administration in an effort to address the nation's residential fire problem. These studies began in 1976, and focused on the ability to reduce fire losses by installing sprinklers in residential housing. The result of this study was the development of the residential "quick response" sprinkler.

Basically, quick response sprinklers are designed to react to heat faster than the conventional type of sprinkler. This reduced reaction time is achieved through improved designs in fusible elements, which collect heat more efficiently and have a smaller mass than the standard fusible element. The result of these design changes is that the sprinkler activates quickly enough to anticipate that a room which is on fire will remain occupiable. It should be noted that this expectation cannot always be considered valid for slow-smoldering fires, as they may produce a sufficient volume of smoke to kill a person before the heat activates the sprinkler. The QRS sprinkler also changed the traditional concept that sprinklers were mainly property protection devices, to one which now promotes sprinklers as effective life safety devices. There are three different types of quick response sprinklers available; residential sprinklers, quick response standard sprinklers, and an early suppression fast-response (ESFR) sprinkler.

In 1980 the residential QRS sprinkler was incorporated into the sprinkler standard for one and two family dwellings and mobile homes (designated NFiPA 13D), which was initially adopted in 1975. In 1989, the National Fire Protection Association adopted a separate standard for sprinklering low-rise multifamily dwellings (designated NFiPA 13R), which uses the residential and quick response standard sprinkler. The 13D and 13R standards attempt to couple proper system design with the economic problems associated with sprinklering residential housing. For example, the standards establish design criteria which significantly reduce the water supply necessary to protect the building, and require sprinklers to be located only

in those spaces where the fires normally occur (i.e. living areas), rather than including areas such as concealed attic spaces.

3. **Model Code Recognition of QRS Technology**

The new QRS technology has recently been recognized and implemented by model code-writing organizations as providing a necessary level of protection to occupants of small health care facilities. Specifically, NFiPA and BOCA have eliminated the exceptions to installing sprinklers in health care facilities, and adopted provisions which permit the use of sprinkler systems designed in accordance with the 13R and 13D standards.

The National Fire Protection Association publishes a construction standard which establishes the minimum requirements necessary to provide a reasonable degree of safety from fire in buildings and structures(designated NFiPA 101). This standard was amended to allow Residential Board and Care facilities which house fewer than 16 residents to install fire suppression systems which are designed in accordance with the NFiPA 13D and 13R standards. These amendments were adopted in November of 1989, in an effort to provide the residents of small facilities with improved life safety protection at a reasonable cost. Likewise, the BOCA National Building Code was amended in June of 1990 to similarly permit the NFiPA 13D and 13R systems to be used in small facilities. There are two remaining model code-writing organizations which will consider adopting similar requirements in the fall of 1990.

4. **Fire Alarm/Detection vs. QRS Sprinklers**

The development of the Quick Response Sprinkler has also initiated a debate on the need to continue providing smoke detectors in the sleeping rooms of health care facilities which house nonambulatory patients. The American Hospital Association has issued a report which concludes that "smoke detection and sprinkler protection may not be able to make a significant impact on reducing fire deaths that occur in hospitals, since most of the deaths are the result of the victim being intimate with ignition. However, the use of quick-response sprinklers may be able to reduce the fire deaths of both the occupants of the room of origin and the occupants outside the room of origin". [4]

The report is based on an analysis of the statistical fire data collected by the National Fire Protection Association's Fire Data Analysis Division, full-scale fire tests conducted by the National Institute for Science and Technology's Center for Fire Research, predictive modeling of hospital patient room fires, the physical capabilities of hospital patients, and the response and impact that sprinklers and smoke detectors have on patient life safety. The report identifies the following as key factors which affect patient life safety in hospitals;

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[4] *William E. Koffel, P.E.: "Estimating the Effectiveness of State-of-the-Art Smoke Detectors and Automatic Sprinklers on Life Safety in Hospitals" July 1987.*

1. The major fire hazard scenarios,
2. The locations and capabilities of the occupants,
3. The response time of sprinklers and smoke detectors, and
4. The effect of sprinklers on the development of hazardous conditions.

Opponents of the American Hospital Association's position suggest that smoke detectors have proven their effectiveness as life safety devices by notifying staff, which have been able to evacuate immobile patients. These opponents also argue that there is a moral obligation to provide both smoke detectors and sprinklers, so that immobile patients will be assured the optimum level of fire protection which is currently available.

C. The Fire Safety Record of Health Care Facilities

1. National Statistics

In November of 1989 the National Fire Protection Association (NFiPA) published an extensive report of statistical data on the fire problem in the United States entitled "The U.S. Fire Problem Overview Report through 1988, Leading Causes and Other Trends".

The report provides an overview of the U.S. structure fire problem based on property classification (e.g. Educational, Mercantile, Institutional, Assembly, etc.). The data provides the average number of the fires which occurred annually in each category from 1983 to 1987, and lists the number of civilian deaths and injuries, and the direct property loss (in millions of dollars) attributable to these fires. This data was collected through the U.S. Fire Administration's National Fire Incident Reporting System. The data collected through this system is provided by fire departments around the nation on a voluntary basis. The Board considered this data to be representative of the fire problem which exists in the different classes of buildings found in the United States, even though the statistics do not represent all fires which occurred from 1983 - 1987.

The NFiPA reported an annual average of 16,800 fires in all types of health caring institutions. Hospitals and care-of-sick facilities represented 6100 of these fires; care-of-aged facilities represented 3900 fires; and care-of-mentally-handicapped represented 2500 fires. Fires in hospitals and other care-of-sick facilities accounted for an annual average of 10 civilian deaths and 175 civilian injuries;care-of-aged facilities accounted for 17 civilian deaths and 93 civilian injuries; care-of-mentally handicapped facilities accounted for 5 civilian deaths and 64 civilian injuries. Property loss figures were $5.8 million for hospitals and other care-of-sick facilities; $3.8 million for care-of-aged facilities; and $2.8 million for care-of-mentally handicapped facilities.

In comparison, the NFiPA reported the following total annual average of all structure fires; 826,800 fires, 4950 civilian deaths, 23,820 civilian injuries, and $6,045.5 million in direct property loss. The NFiPA statistics also clearly indicate

that residential properties represent the most significant fire problem in the United States. For example, one- and two- family dwellings accounted for 473,300 fires, 3,689 civilian deaths, 13,522 civilian injuries, and $2,794.5 million in direct property loss. Multiple-family dwellings accounted for 114,500 fires, 870 civilian deaths, 5,699 civilian injuries, and $637.9 million in direct property loss. Therefore, according to the NFiPA report, these two classes of property represent 71% of all fires, 92% of all civilian deaths, 81% of all civilian injuries, and 57% of all direct property loss.

The report contains a separate section on fire causes in Care-of-Sick and Care-of-Aged Facilities. This section states that "...an overwhelming majority of fatal victims in these fires are very close to the point of ignition, which tends to be clothing, a mattress, or bedding, ignited accidentally or deliberately by a lighted cigarette, match, or lighter."

The data indicates that an annual average of 61% of fire fatalities in facilities that care for the sick (i.e. hospitals) can be attributed to patients igniting their clothing or bedding with smoking materials (as was the case in the Hillhaven fire). An additional 34% of the deaths were caused by incendiary fires or fires with suspicious origins. Incendiary fires are those which are deliberately started (e.g. arson, etc.),and suspicious fires are those which appear to have been incendiary but lack sufficient evidence to conclude that they were deliberately set. Since clothing and bedding materials are usually made of synthetic fibers which ignite and burn readily, one could conclude that flaming fires are responsible for 95% of the fire fatalities in facilities that care for the sick (61% smoking + 34% incendiary/ suspicious = 95% total). A similar pattern is evident in facilities which care for the aged (e.g. Homes for Adults, etc.), where 72% of the fire deaths were directly linked to smoking materials, and 12% of the deaths were due to fires of suspicious origin.

2. **Virginia Fire Statistics**

The Department of Fire Programs collects and monitors all data which is submitted to the National Fire Incident Reporting System from the Commonwealth. The data compiled by Fire Programs from 1987-1988 confirms the national trend of fires in health care facilities being caused by smoking materials. This data documents a total of 5 health care facility fires which resulted in injuries. Four of the five fires were caused by either a lighter, matches, or cigarettes. No fatalities were attributed to any of these fires.

D. <u>Virginia's Health Care Community</u>

Senate Joint Resolution 1 requested the Board to "identify the number of buildings used as hospitals, nursing homes, psychiatric hospitals, homes for adults, congregate facilities which house the elderly and handicapped adults, and child-caring institutions that are not equipped with fire suppression systems".

1. **Number of Unsprinklered Facilities**

The following information defines each type of facility included in the study,including its applicable Use Group Classification, and identifies how many are not equipped with fire suppression systems.

a. **Hospitals; Psychiatric Hospitals (Use Group I-2)**

Section 32.1-126 of the Code of Virginia requires the licensure of General Inpatient Hospitals and Outpatient Surgical Hospitals by the Commissioner of the Department of Health. Also, §37.1-179 of the Code of Virginia requires all institutions which provide treatment for the mentally ill to be licensed by the Commissioner of the Department of Mental Health, Mental Retardation and Substance Abuse Services. Therefore, the Board's study of Hospitals/Psychiatric Hospitals was based on those facilities which are licensed by the Department of Health, and the Department of Mental Health, Mental Retardation and Substance Abuse Services.

The building code classifies hospitals as Use Group I-2 buildings. Use Group I-2 buildings are those used for medical, surgical, psychiatric, nursing or custodial care on a 24-hour basis of six or more persons who are not capable of self-preservation. A facility with five or less occupants is classified as a residential use group.

The study identified 113 General Inpatient Hospitals, of which 61 are not equipped with a complete sprinkler system. Fifty-three of these 61 hospitals are equipped with a partial sprinkler system. Only 19 of these 53 hospitals have more than 50% of their total square footage sprinklered. The Board also identified 17 Outpatient Surgical Hospitals, of which 2 are not sprinklered; 13 Private Psychiatric Hospitals, of which 5 are not sprinklered; and, 17 State Psychiatric Hospitals, of which 3 are not sprinklered, and 4 are equipped with partial sprinkler systems.

b. **Nursing Homes (Use Group I-2)**

Section 32.1-126 of the Code of Virginia also requires all nursing homes and nursing facilities to be licensed by the Commissioner of the Department of Health. Therefore, the Board's study on nursing homes was based on those facilities which are licensed by the Department of Health. It should be noted that these are the same facilities which are subject to the amendments made by Senate Bill 1 to §32.1-126.2 of the Code of Virginia. Nursing homes are also classified as Use Group I-2 buildings by the building code.

The Board identified a total of 216 nursing homes and nursing facilities, of which 29 were not equipped with complete fire suppression systems.

c. **Homes for Adults (Use Groups I-1, I-2,)**

Section 63.1-175 of the Code of Virginia requires all homes for adults to be licensed by the Commissioner of the Department of Social Services. Therefore, the homes for adults included in the Board's study were based on those facilities which participate in the licensing program administered by the Department of Social Services. The list of Homes for Adults recognized by the licensing program includes 470 facilities, of which 238 are not equipped with fire suppression systems.

The building code classifies Homes for Adults as Use Group I-1 or I-2, depending on the physical capabilities of the residents. Use Group I-1 buildings are those which house six or more individuals who, because of age, mental disability or other reasons, must live in a supervised environment but who are physically cable of responding to an emergency situation without personal assistance. A facility with five or less occupants is classified as a residential use group. Nonambulatory residents must be housed in facilities which are classified as Use Group I-2, because they are not physically capable of responding to an emergency without personal assistance. It should be noted that the model building codes do not allow these types of facilities to be classified as multiple-family residences (Use Group R-2) because the occupants require some level of personal supervision; however, in 1984 the Board was requested to amend the code to classify these facilities as R-2 uses when they house no more than 20 ambulatory residents. The Board approved the amendment at that time because these small facilities posed a similar level of risk as multifamily dwellings.

Another key aspect of homes for adults is that a significant number of the residents are classified as auxiliary grant recipients, and are eligible to receive no more than $581 per month from the State (this rate increases in 1991 to $602 per month). Auxiliary grant recipients represent 38% of the total number of residents which are located in unsprinklered Homes for Adults.

It should also be noted that during their 1987 update of the building and fire regulations,the Board considered a request to require all Homes for Adults to be equipped with sprinklers, regardless of when they were constructed. The Board did not accept the proposal at that time, but directed all interested parties to work together and develop a joint proposal for their future consideration.

d. **Child Caring Institutions (Use Groups I-1, I-2, or R-2)**

The Board's study of child-caring institutions included residential facilities maintained for the purpose of receiving children that are separated from their parents or guardians for full-time care, maintenance, protection and

guidance. These institutions typically provide 24 hour care to children with mental, emotional, physical, and learning disabilities.

These facilities are generally licensed under the Department of Social Services Interdepartmental Licensure and Certification Process. This process regulates most of the facilities that fall under the jurisdiction of the 1) Department of Social Services; 2) Department of Mental Health, Mental Retardation, and Substance Abuse Services; 3) Department of Education; and 4) the Department of Corrections. In addition to these facilities there are ten child-caring facilities that are not regulated as part of the Interdepartmental Licensure and Certification process, as well as five other child-caring institutions that house children with special problems. These five child-caring institutions are public schools for children with mental, emotional, physical, and learning disabilities. Although technically classified as schools, these facilities were included in the study because their services, including housing, are similar to the other child-caring institutions.

The building code classifies these facilities as either Use Group I-1, I-2, I-3 or R-2. The application of these uses depend on the age of the children, their physical capabilities, and the level of supervision provided by the facility.

Use Group I-3 buildings are those which are inhabited by six or more persons who are under some restraint or security. An I-3 facility is occupied by persons who are generally incapable of self preservation due to security measures not under the occupants' control.

Use Group R-2 buildings are multiple-family dwellings having more than two dwelling units, including all boarding houses and similar buildings arranged for shelter and sleeping accommodations in which the occupants are primarily not transient in nature.

The Board identified a total of 226 child-caring institutions, of which 17 facilities which are either fully or partially sprinklered. The 17 sprinklered facilities house almost 39% of the total population of children which are located in these institutions.

e. **Congregate Facilities Housing the Elderly and Handicapped Adults (Use Group R-2)**

The Board found congregate facilities to be the most difficult type of housing to evaluate during their study because the residents do not normally require supervision; therefore,no State agency has any regulatory control over their operation. Also, the State agencies, and private and non-profit institutions (i.e. FHA, HUD, VHDA), which are involved in funding congregate housing have no consensus definition for these facilities. Therefore, for the purposes of this study, the Board has defined congregate facilities to be those buildings

or facilities with a central food preparation and eating area which house elderly and disabled persons who do not require medical treatment or institutional care. It is important to remember that these facilities are theoretically no different from an apartment complex, because the occupants live and function independently, and are capable of responding to an emergency condition without any personal assistance.

Based on this definition the Board made the following conclusions;

1. These facilities fall into two categories - privately financed, and publicly assisted.

2. Privately financed facilities are located in recently constructed buildings which contain a larger capacity than publicly assisted facilities. Publicly assisted facilities are generally located in older buildings, many of which are renovated to accommodate this form of housing.

The Board identified a total of 20,712 dwelling units that were located in congregate facilities, of which 11,095 were sprinklered. All of the privately financed facilities are sprinklered.

E. Developing Proposed Regulations

Pursuant to the Hillhaven and Shenandoah Retirement Home fires, the Board of Housing and Community Development advertised their intent to amend the building and fire regulations to require certain existing health care facilities to be equipped with fire suppression and alarm systems. This notice was followed by a public meeting, held on December 11, 1989, to solicit public input as to the appropriateness and content of any amendments.

1. Ad Hoc Committee Recommendations

The Board also directed staff of the Department of Housing and Community Development to organize an Ad Hoc Committee of those interest groups which would be affected by this regulatory activity. This Committee met on two occasions, for the purpose of developing consensus recommendations to submit to the Board during their study of the issues related to equipping existing facilities with additional fire protection systems. The membership of this committee included the Department of Social Services; the Department of Mental Health, Mental Retardation and Substance Abuse Services; the Virginia Health Care Association; the Virginia Association of Homes for Adults; the Virginia Fire Services Board; the Virginia Hospital Association; the Virginia Department of Health; the Virginia State Fire Chiefs Association; the Virginia Association of Non-Profit Homes for Adults; the Virginia Building and Code Officials Association; and the Virginia State Building Code Technical Review Board.

The Board requested that the Committee specifically respond to the following concerns;

a) How will the health care industry accommodate patients in facilities operating near 100% capacity while retrofitting fire protection systems?

Committee response: The health care advocates suggested that accommodating patients would not pose a significant burden unless extensive asbestos removal needs to be undertaken.

b) What is a reasonable time frame by which to expect compliance with a retrofit requirement?

Committee Response: The maximum suggested time frame was 3-5 years because of the number of facilities which would have to be retrofitted.

c) Are the sprinkler system thresholds established by the national code-writing organizations consistent with the operational characteristics of the health care industry?

Committee Response: The nursing home industry suggested the use of an NFiPA 13 system for any building with over 25 beds. The Home for Adults industry suggested the NFiPA 13 system for any building with more than 21 residents; NFiPA 13R for buildings over 2 stories in height when housing 20 or less residents; and NFiPA 13D for buildings up to 2 stories in height housing 12 or less residents. The Homes for Adults industry also suggested that retrofitting with these sprinkler systems would render all facilities safe for housing nonambulatory residents.

2. **Draft Regulations**

The Board responded to the public input by drafting proposed amendments to the Uniform Statewide Building Code, Volume I New Construction Code (VR 394-01-21); the Virginia Uniform Statewide Building Code, Volume II Building Maintenance Code (VR 394-01-22); and the Virginia Statewide Fire Prevention Code (VR 394-01-6).

The proposed amendments to the USBC Volume I eliminated the option of constructing new health care facilities without fire suppression systems. This proposed change was based on historical fire experience, which indicated that automatic sprinkler systems offer a more reliable approach to providing early detection, fire containment and fire suppression to protect the patients and residents occupying institutional facilities. Also, these changes were identical to the proposals under consideration by the BOCA model code organization during their 1990 code change cycle. The proposed changes included permitting small health care facilities which house ambulatory occupants to install sprinkler systems which comply with the NFiPA 13R and 13D standards. Also, nonambulatory health care facilities (Use

Group I-2) would be permitted to install single station smoke detectors (i.e. smoke detectors which are not connected to a fire alarm system) in patient sleeping rooms which are equipped with quick response sprinklers.

The proposed amendments to the USBC Volume II required all existing hospitals, homes for adults, and nursing homes to be retrofitted with fire suppression, detection, and alarm systems within four years of the proposed effective date of the amended regulations (August 1, 1994).

The proposed amendments to the Statewide Fire Prevention Code simply authorized the local fire official, or State Fire Marshal, to enforce the retrofit provisions of the Building Maintenance Code in those jurisdictions which elected not to enforce Volume II.

F. Fiscal Impact of Sprinklering Existing Health Care Facilities

During their development of proposed regulations the Board reviewed the following issues in an attempt to assess the economic impact that retrofitting fire protection systems would have on Virginia's health care community;

1. **Sprinkler System Costs:** Consultations with the National Fire Sprinkler Association, sprinkler contractors, fire protection engineers, and equipment suppliers revealed no accurate method of evaluating installation costs for each type of sprinkler system. Several variables which affect installation costs include the availability of an adequate water supply, the materials used to construct the building, the configuration of spaces within the building, and how spaces within the building are used. Installation estimates for the NFiPA 13 system ranged from $1.50-2.50/square foot of building area. Two estimates for the NFiPA 13R and 13D systems were $1.00-2.00/square foot, and $150 per sprinkler head. These estimates do not include the cost of providing an adequate water supply, local water connection fees, or asbestos removal.

2. **Number of Affected Facilities which could use the NFiPA 13, 13R and 13D sprinkler standards:** The application of each standard is limited by the number of residents in a facility, and their physical capabilities. For example, the NFiPA 13R and 13D systems can only be installed where the residents are physically capable of responding to an emergency condition without personal assistance (i.e.Use Groups I-1,R-2 or R-3). Therefore, the use of 13R and 13D systems is limited to Homes for Adults housing ambulatory residents. Hospitals, nursing homes, and those homes for adults which house patients which are not capable of self-preservation, are not permitted to use the 13R and 13D systems. The changes being considered by BOCA limit the application of the 13R system to new facilities which house up to 16 occupants, and the 13D system to new facilities which house up to 8 occupants. The Board identified 238 Homes for Adults which would need to be sprinklered, with 76 located where no public water supply is available. The BOCA thresholds would require one hundred eighteen of these homes to install the NFiPA 13 system, 83 could install the 13R system, and 37 could use the 13D system. All 29 unsprinklered nursing homes, and 61 unsprinklered hospitals, would be required to

install the NFiPA 13 system.

3. **Private Water Supply Costs:** The cost to provide a private water supply will vary based on the type of sprinkler system installed, and the size of the facility. Also, fire pumps may be required if the local water pressure is not adequate to meet the needs of the system. Low estimates to supply a 13D system would be $4000, a 13R system: $5000, and a 13 system: $3000. The information provided by the Department of Social Services and the State Fire Marshal indicated that 39 Homes for Adults would be required to provide a private water supply for the NFiPA 13 system; 25 would need to provide private water for the 13R system; and 12 need to provide private water for the 13D system. The Board determined that most nursing homes and hospitals already have an adequate water supply to supplement the demand of a sprinkler system.

4. **Public Water Service Charges:** Section 15.1-292 of the Code of Virginia authorizes localities to establish service charges and tap fees for providing public water to users. Therefore, many jurisdictions have promulgated separate connection fee costs for sprinkler systems. These fees vary from one locality to the next, and are based on the size of the line being served. The total cost for these charges can approach $50,000.

5. **Inspection, Removal and Disposal for Asbestos-Containing Materials:** Section 36-99.7, Code of Virginia, prohibits local building departments from issuing a building permit allowing an building built prior to 1978 to be renovated or demolished until the local building department receives certification from the owner that the building has been inspected for asbestos. Therefore, all of those facilities which were built prior to 1978 would have to be inspected for the presence of asbestos-containing materials (Hospitals have already been required to conduct asbestos inspections by §324-126.1, Code of Virginia). Asbestos inspection costs range from .10-.15 cents/square foot, while removal and disposal could cost up to $25/square foot of material. Factors which affect removal costs are where the asbestos is located (e.g. in walls, above ceilings, on structural steel, or on piping or ductwork, etc.) and whether the material must be replaced. The estimated costs do not include laboratory sample analysis or air monitoring.

6. **Fire Alarm System Costs:** Like sprinkler systems, the Board identified several variables that affect the costs of installing fire alarms and smoke detectors in an existing health care facility. For example, the extent to which the building is already protected, or the number of additional areas which will require coverage. Also, the majority of hospitals and nursing homes are already equipped with these systems. The impact of retrofitting these systems will primarily affect those homes for adults which house from 6 to 20 residents (i.e. those previously classified as Use Group R-2 facilities by the Board's 1984 amendment).

   The following estimates were published by Marshall and Swift in Valuation Quarterly. This document is an appraisal guide for developing replacement costs for buildings, and contains indexes of building and equipment costs. This guide is

updated quarterly to reflect continuing changes in national and local economies.

The cost of installing single and multiple-station smoke detectors will range from $25-$100 per detector, depending on the type of detector and power source (i.e. AC or battery operated). Smoke detectors which are connected to the fire alarm system are estimated from $210-$315 per detector. The cost to install a control panel for the fire alarm system will range from $525-$625, depending on its capacity and the number of functions it can perform. Also, fire alarm systems are designed with separate zones, allowing the alarm panel to pinpoint the location of a fire. For example, a three story nursing home may have three zones, one on each floor. Therefore, any fire alarm signal would indicate the floor a fire is located on. The cost to provide each zone ranges from $115-$145. Manual pull stations can be installed and connected to the fire alarm system for $160-$265 per pull station.

G. <u>April 26, 1990 Public Hearing</u>

On April 26, 1990 the Board of Housing and Community Development held a public hearing to solicit public input regarding their proposed amendments to the building and fire regulations. Also, the Board invited all concerned parties to submit written comments up until May 4, 1990. All of the comments submitted to the Board originated from one of seven different groups: nursing homes;mental health facilities; homes for adults; hospitals; State Agencies; Local Governments; and Construction Industry Associations.

The comments submitted by the nursing home industry were provided by the Virginia Health Care Association(VHCA), which represents more than 90% of the nursing homes in the State. The VHCA supported those portions of the proposed regulations which required sprinklers and fire alarms; however, they did not support the provisions for requiring smoke detectors. The VHCA submitted the following arguments for not retrofitting nursing homes with smoke detectors;

1. Smoke detectors add little or no additional safety in an already sprinklered building,

2. Smoke detectors have a high false alarm rate, which ultimately results in slower response times by fire departments because of the "Cry Wolf" syndrome,

3. Prohibitive installation costs, which range from $300 to $350 per detector (excluding the option of installing single station detectors), and $30-$60 per year to maintain. According to VHCA the total estimated cost to install detectors in existing nursing homes would exceed $7,000,000.

4. The single station smoke detector is not an appropriate option for either new or existing nursing homes, because patients are typically nonresponsive. This scenario creates too great of a liability for the provider.

The VHCA further suggested that the regulations should require the installation of quick response sprinklers. The VHCA also requested that the regulation be clarified with respect

to buildings which are equipped with partial fire protection systems.

Comments from the Mental Health Care community were submitted by the Virginia Alliance for the Mentally Ill (VAMI) and the Executive Director of the Southside Community Services Board (CSB).

The VAMI supported the application of proposed regulations to nursing homes and large homes for adults (i.e. 15 or more residents). VAMI did not agree that a need exists to sprinkler smaller facilities which house ambulatory residents but agrees that detectors, extinguishers, and a practiced fire evacuation plan are appropriate. This position was based on the ability of the mentally disabled to respond appropriately during a fire emergency.

The CSB suggested that the economic impact of the regulation must be carefully reviewed. A community service board provides services to mentally ill, mentally retarded, and chemically dependent persons. There are 40 boards statewide which house 1388 mental health residents, and 782 mentally retarded residents. Sixteen boards, housing almost 90 residents, are licensed as homes for adults. The CSB also suggested that the regulation could place several facilities out of business, and result in transferring those residents into State facilities at a cost of $45,000 per resident.

The Virginia Association of Homes for Adults, several home for adult operators, and the Honorable Franklin P. Hall 69th District, submitted comments on behalf of the Home for Adults industry. Generally, all comments supported the concept of equipping new and existing homes with sprinklers, fire alarms, and smoke detectors; however, none of the comments endorsed implementing the proposed regulations unless funding is provided.

The basis for this position is:

1. Implementing the proposed retrofit requirements without funding will result in the displacement of fixed income residents, and will put many of the smaller homes out of business. Subsequently, the fixed income resident will be returned to a single family dwelling setting, which exposes them to greater fire hazards than exist in an unsprinklered home for adults; and

2. Virginia's home for adults industry has not had any fire related fatalities to date; therefore, the proposed regulations do little to improve their fire safety record.

The State's hospital industry was represented by the Virginia Hospital Association (VHA), the American Nurses Association, and the Honorable Senator Virgil H. Goode, Jr. 20th District.

The hospital industry's comments opposed those portions of the regulations which required existing hospitals to be equipped with sprinklers and smoke detectors.

This position was based on the following;

1. National and State fire loss statistics; which indicate an injury and life loss of less

than 1% in hospitals from 1983-87.

2. Requirements of the Federal Government, which requires compliance with the maintenance criteria of the National Fire Protection Association's Life Safety Code (NFiPA 101).

3. The economic and logistic impact of implementing the proposed regulations.

4. The American Hospital Association study of smoke detector and sprinkler responses to patient room fires. The study supports the elimination of smoke detectors in patient rooms that are equipped with quick response sprinklers.

The VHA supported requiring existing hospitals to install fire alarm systems. The hospitals also recommended that a minimum time frame to comply with any retrofitting of sprinklers would be 7-10 years. This much time would be necessary to secure funding and address logistical issues while remaining functional (e.g. moving patients, sprinklering operating rooms,etc.).

The American Nurses Association recommended deleting the option to install single station smoke detectors in patient sleeping rooms which are equipped with quick response sprinklers.

The Board also received comments from the National Fire Sprinkler Association, the Automatic Fire Alarm Association, and the Concrete Masonry industries. All comments supported the implementation of the proposed regulations; however, the fire alarm and concrete industries suggested further amendments.

The concrete industry suggested that sufficient fire safety can only be achieved through a balanced design concept. The "balanced design" concept consists of three components; fire detection (smoke detectors); fire suppression (sprinklers); and compartmentalization (fire walls/separations). Therefore, the proposed regulations did not address the total fire safety issue because only 2/3 of the balanced design concept (i.e. smoke detectors and sprinklers) was satisfied. The industry did not submit any specific amendments to incorporate the remaining 1/3 (fire walls/separations) of the balanced design approach.

The fire alarm industry recommended deleting the option of installing single station smoke detectors in patient sleeping rooms which are equipped with quick response sprinklers. The industry suggested that a supervised smoke detector must be installed in order to provide hospital and nursing home staff with an opportunity to rescue a patient which is intimate with a fire before they are severely injured.

The State Agencies which submitted comments to the Board included the Department of Mental Health, Mental Retardation and Substance Abuse Services (DMHMRSAS), the Department for the Aging, the Department of Social Services, and the Department of Fire Programs. All comments supported the implementation of the proposed regulations.

The comments submitted by the Department of Fire Programs were subdivided into the

following four parts;

1. Quoted information regarding the effectiveness of sprinklers. The majority of these quotes are part of the 15th and 16th editions of the National Fire Protection Association's Fire Protection Handbook.

2. The potential fiscal impact for not equipping existing health care facilities with sprinkler systems. This part lists injuries, fire damage, loss of revenue, litigation, insurance and increasing local fire suppression services as potential costs which result from not sprinklering.

3. Two State maps which list the number of nursing homes and homes for adults within each locality, and the type of fire suppression service provided by each locality (i.e. volunteer firefighters, paid firefighters, or combination of both).

4. Report of a joint subcommittee studying the supply and demand of nurses in the Commonwealth. The report cites 67% of Virginia's hospitals as experiencing nursing shortages, with the Roanoke and Shenandoah Valley areas averaging the highest vacancy rates (14%). Southwest and Northern Virginia average the lowest vacancy rate (6%). The report offers 8 recommendations for increasing the population of nurses in the State.

DMHMRSAS provided three statements concerning the fiscal impact of the regulations. This economic impact statement estimated a cost of $6.1 million for sprinklering only the living areas of affected DMHMRSAS facilities. They also suggested that compliance with the August 1, 1994 deadline is questionable due to the time necessary to complete the State's capital budget process, and comply with rules contained within the State Capital Outlay Manual.

The list of local government representatives that commented on the proposed regulations included the Loudoun County Board of Supervisors, local fire officials throughout the State, and the State Fire Chiefs Association. All comments supported the proposed regulations.

Specific recommendations included the following amendments:

1. Extend the compliance deadline to 5-7 years,and

2. Require the installation of the NFiPA 13R and 13D systems in those Homes for Adults which do not have adequate public water available.

3. The State Fire Chiefs Association recommended establishing an Ad Hoc Committee to resolve the issue of permitting single station smoke detectors in patient sleeping rooms that are equipped with quick response sprinklers.

These comments also included reports of two recent sprinkler system activations in facilities that care for the aged. Both systems controlled the fire, and provided ample time for evacuating the building.

H. Recommendations of the Board

The Board of Housing and Community Development reviewed all public comments and technical information concerning the proposed regulations requiring existing nursing homes, hospitals, and homes for adults to be equipped with sprinklers, fire alarms fire detection systems and smoke detectors. Pursuant to their study the Board has concluded that:

a. The persons housed in the facilities listed in Senate Joint Resolution 1, either a) must be supervised and cannot be considered capable of self preservation in an emergency (Use Group I-2), b) must live in a supervised environment, but can reasonably be expected to exit a building in an emergency (Use Group I-1), or c) they live and function without any supervision (Use Group R).

b. Fire suppression, detection, and alarm systems need to be installed in existing nursing homes and homes for adults which house residents that meet the criteria listed in category (a) above (Use Group I-2). Existing homes for adults which house the occupants listed in categories (b) and (c) (Use Groups I-1 and R-2), do not need to be equipped with fire suppression or alarm systems since the occupants of these facilities have the ability to exit the facility on their own in the event of fire. Also, additional study needs to be conducted before the Board can conclude that adequate fire safety currently exists in hospitals.

1. Response to Senate Bill 1

The 1990 General Assembly enacted Senate Bill 1, which amended the Code of Virginia by adding §§32.1-126.2 and 36-99.8. The addition of §32.1-126.2 prohibits the Commissioner of the Department of Health from issuing or renewing the license of any nursing facility or nursing home after January 1, 1993, unless it is equipped with a fire suppression system which complies with the regulations of the Board of Housing and Community Development. An exemption is provided for facilities which are located on the ground floor of a general hospital. The addition of §36-99.8 requires the Board of Housing and Community Development to establish the standards for installing fire suppression systems in these facilities by October 1, 1990.

The Board has adopted the following as final regulations to become effective October 1, 1990 in response to Senate Bill 1:

All existing nursing homes which are licensed by the Department of Health shall be equipped with sprinklers by January 1, 1993 unless they are already protected or are located on the first floor of a general hospital. The following sprinkler system thresholds are established to minimize the economic impact of retrofitting these facilities;

BUILDING HEIGHT (STORIES)	SPRINKLER SYSTEM REQUIRED
1	NFiPA 13D
2 and 3	NFiPA 13R
4 or more	NFiPA 13

Any nursing home which elects to install an NFiPA 13 system can take advantage of all

tradeoffs recognized by the building code. All patient sleeping rooms shall be equipped with quick response sprinklers to afford infirmed residents optimum protection.

The Board also amended the regulations for new construction, to be consistent with the changes approved by the BOCA membership at their June 1990 Annual Conference. The amendments require all new health care occupancies to be equipped with sprinkler systems, and permit the use of NFiPA 13R and 13D systems in small facilities which house ambulatory residents.

These new construction regulations also mandate the installation of quick response sprinklers within patient sleeping rooms, while eliminating the requirement for installing a smoke detector within the patient room. This decision was based on the NFiPA statistics, which indicate that 1) 95% of fatal fires in health care facilities are flaming fires that will be controlled or extinguished by activation of the sprinkler system, and 2) that smoke detectors cannot provide any significant degree of protection in this predominate fire scenario.

2. **Response to HB 790 and SB 369**

The General Assembly also enacted House Bill 790, and Senate Bill 369, which amended §36-99.5:1 to require the Board of Housing and Community Development to promulgate standards for equipping nursing homes with smoke detectors. Therefore, the final regulation which becomes effective on October 1 will also require nursing homes to be equipped with smoke detectors, a fire protective signaling system, and an automatic fire detection system. (A fire protective signaling system is designed to transmit alarms, supervisory signals, and trouble signals, in the event of fire. The system is activated by manual pull stations, smoke detectors, and sprinkler system water flow switches. An automatic fire detection system consists of smoke detectors which are connected to the fire protective signaling system.) The final regulation exempts the installation of smoke detectors within patient sleeping rooms as they do not provide a significant degree of life safety beyond that afforded by the quick response sprinkler. The final regulation will also require Homes for Adults to be equipped with these systems; however, the smoke detectors located in resident sleeping areas are permitted to be battery powered devices as provided by the existing text of §36-99.5:1. Exemptions are provided for nursing homes and homes for adults which are already equipped with these systems.

3. **Response to SJR 1**

The 1990 General Assembly also passed Senate Joint Resolution 1 to request the Board to study the feasibility and need for requiring certain facilities to be equipped with fire suppression systems. The resolution requires the study to include hospitals, nursing homes, psychiatric hospitals, homes for adults, child-caring institutions, and congregate facilities which house elderly and handicapped adults. The Board's recommendations for requiring these existing facilities to be equipped with fire protection systems is listed below.

Homes for Adults: All existing homes for adults which would be classified as Use Group I-2 should be equipped with sprinklers, as recommended for nursing homes. Although the residents of these homes do not need the same degree of skilled care provided by nursing homes, they exhibit physical limitations similar to nursing home patients (i.e. not capable of exiting the building). Therefore, the fire protection provided to these people should be

equivalent to that required for patients in nursing homes. This would require 43 homes to install sprinkler systems. Twenty of these homes would be permitted to install a NFiPA 13D system, 17 homes the 13R system, and six homes would have to install the 13 system. The total population of these 43 homes is 2254 residents. Auxiliary grant recipients, which are eligible to receive up to $581.00 per month ($602/month effective 1991) from the State, represent 23% of this population (518 residents).

Sprinkler system cost estimates were originally provided to the Board by the National Fire Sprinkler Association, sprinkler contractors, and fire protection engineers, which suggested that a retrofit installation of the NFiPA 13 system would range from $1.50 -$2.50/square foot, and the 13R and 13D system would average $1.00 - $2.00/square foot. The Board also solicited Homes for Adults for actual sprinkler system estimates to compliment the projected costs provided by sprinkler industry representatives. These actual estimates revealed average system costs of $1.54 - 7.94/square foot ($989 per resident) for the NFiPA 13 system, and $1.97 - 9.47/square foot ($2,312 per resident) for the 13R system. This disparity between the actual and projected cost estimates is primarily due to mandated connection fees, standby charges, and metering costs established by local water utilities. These water service fees substantially exceeded the cost of the sprinkler system hardware (e.g. piping and sprinkler heads, etc.) in 8 of 21 estimates.

The Board has also reviewed the October 10, 1990 briefing prepared by staff of the Joint Legislative Audit and Review Commission (JLARC). The Board agrees with the staff's recommendation to comprehensively revise the homes for adults regulatory system to incorporate standards for several levels of care, and suggests that resident's ability to exit the home be included as criteria for providing a specified level of care. For example, those homes which provide the lowest level of care should be permitted to house only ambulatory residents. The Board also agrees with the JLARC staff recommendation that auxiliary grant funding be linked to these separate levels of care, and suggests that their recommendation to sprinkler existing homes not be approved unless the new funding system includes a specific increase for auxiliary grant recipients which occupy sprinklered homes.

The Board is primarily concerned that implementing regulations to sprinkler existing homes is predicated on the ability of homes to pass the cost of the sprinkler system along to the fixed income, auxiliary grant residents. There is significant concern that driving homes which cater specifically to auxiliary grant residents out of business will result in residents being relocated from a relatively fire-safe environment into buildings which represent the greatest threat to life from fire (i.e. multiple and single family dwellings). The deadline for compliance would be three years from the approval of such increased funding.

Congregate Care Facilities: The Board does not recommend requiring existing congregate care facilities to be equipped with suppression systems; however, the General Assembly should study the need to require the licensure of these facilities. The building and fire regulations classify congregate facilities as multifamily dwellings because they house elderly and handicapped residents which live and function without supervision. Subsequently, this lack of resident supervision exempts these facilities from licensure as a Home for Adults. The basis for the Board's recommendation is their concern that the aging process will result in the facility providing supervision to the residents, without undergoing a commensurate review of the need to provide increased levels of fire safety (e.g. sprinklers, etc.). The Board suggests that the probability for this event to occur would be reduced by providing continued oversight of congregate facilities functional operations in conjunction with an

existing or expanded licensing program.

Hospitals: The Board has determined that additional information must be collected and reviewed before they can complete their study of hospitals; however, they do recommend that the General Assembly require all hospitals to be smoke-free.

The Board has requested that the State Fire Marshal submit fire safety validation surveys for each of the 61 hospitals which have been identified as lacking complete suppression systems. The State Fire Marshal normally conducts no more than four validation surveys each year at the request of the Joint Commission on the Accreditation of Healthcare Organizations (JCAH). These surveys assure that a hospital is maintained in compliance with the National Fire Protection Association Life Safety Code (NFiPA 101), and is a condition for retaining accreditation and being eligible to receive Medicaid/Medicare funding. The Board has also requested that the State Fire Marshal submit an accurate count of the number of patient beds which are not protected by sprinklers, and an estimated cost for sprinklering these facilities.

The Board is also investigating the need to amend those portions of the Statewide Fire Prevention Code, or other regulations which address hospital staff preparedness, to guarantee that hospital staff are properly trained, and will respond appropriately during a fire emergency.

The Board anticipates that their continued study of hospitals will require an additional public hearing, and that the study will be completed by June 1, 1991.

The Board's recommendation that smoking be prohibited in all hospitals is based on the national fire statistics compiled by the NFiPA which indicate that 61% of hospital fire deaths result from the careless disposal of smoking materials.

Child-caring Institutions: The Board's study of child-caring institutions included overnight facilities which are maintained for the purpose of receiving children separated from their parents or guardians for full-time care, maintenance, protection and guidance. These institutions typically provide care to children with mental, emotional, physical and learning disabilities. Regulation of child-caring institutions generally falls under the jurisdiction of the Department of Social Services, Department of Education, or the Department of Corrections. The Board recommends equipping existing child-caring institutions which would be classified as Use Group I-2 or I-3 with sprinkler systems because of the inability for children to exit the facility without assistance from the institution's staff. Child-caring institutions which house more than five children that are 2-1/2 years of age or less, or house children that are not capable of self-preservation, would be classified as Use Group I-2 facilities. Child-caring institutions which detain six or more children, that are incapable of self-preservation due to security measures not under their control, would be classified as Use Group I-3 facilities. The Use Group I-3 designation normally includes those facilities operated by the Department of Corrections.

The Board has identified 11 unsprinklered child-caring institutions which are currently licensed to house children that are 2-1/2 years of age or less. Also, the Department of Corrections operates 11 detention homes that are not sprinklered. The Board recommends giving these facilities three years to complete the installation of the sprinkler systems.

4. **Reducing Economic Impact**

The Board recommends that the General Assembly enact legislation to prohibit local water utilities from:

1. Requiring water meters on sprinkler systems, and

2. Charging any water service fees for sprinkler systems. Examples of such fees include standby charges, and connection fee costs which exceed those actually required for labor and materials to connect the sprinkler system to the water main.

   A sprinkler system which is connected to a public water main does not increase the demand on a local utility's water supply. The hydraulic design of these systems is based on their ability to operate off of the existing water supply provided by the local utility, and the system only uses that water when a fire occurs.

   Given the use of common firefighting practices and sprinkler system design criteria, sprinkler systems actually reduce water consumption when fires occur. Sprinkler heads are typically designed to flow only 20 gallons of water per minute at a pressure of 12-15 pounds per square inch. Historically, sprinkler systems have an effective operation of over 90%, and control the fire with the activation of no more than two sprinklers. Therefore, a sprinkler system would successfully control over 90% of typical fire scenarios with a maximum flow rate of 40 gallons per minute. Comparatively, fire department personnel are instructed to use a 1-1/2 inch fire lines at a minimum flow of 95 gallons per minute and a pressure of 100 pounds per square inch. It should also be noted that when this water is used by the fire department it is not metered. If a building is equipped with a sprinkler system, the first priority of the department is to supplement the water supply of the sprinkler system.

   Many localities also require building owners to install costly backflow prevention devices, such as reduced pressure principle backflow preventors, on public water mains which supply sprinkler systems. Therefore, the Board also suggests permitting sprinkler systems to be connected to water mains in accordance with the American Waterworks Association Manual M-14. This manual identifies appropriate, economical methods of providing backflow protection for sprinkler systems that are connected to potable public water systems.

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--- The Department of Social Services
--- The Department of Health
--- The Department of Mental Health, Mental Retardation and Substance Abuse Services -
-- The Department of Corrections
--- The Virginia Health Care Association
--- The Virginia Association of Homes for Adults
--- The Virginia Hospital Association
--- The Virginia Fire Services Board
--- The Virginia State Fire Chiefs Association
--- The Virginia Association of Non-Profit Homes for Adults
--- The Virginia Building and Code Officials Association
--- The Virginia State Building Code Technical Review Board