FIRE RESEARCH AND SAFETY ACT OF 1967

HEARINGS

BEFORE THE

CONSUMER SUBCOMMITTEE

OF THE

COMMITTEE ON COMMERCE

UNITED STATES SENATE

NINETIETH CONGRESS

FIRST SESSION

ON

S. 1124

FIRE RESEARCH AND SAFETY ACT OF 1967

APRIL 4 AND 5, 1967

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TUESDAY, APRIL 4, 1967

U.S. SENATE,
COMMITTEE ON COMMERCE,
CONSUMER SUBCOMMITTEE,
Washington, D.C.

The subcommittee met at 10:00 a.m. in room 5110, New Senate Office Building, the Honorable Howard W. Cannon presiding.

Senator CANNON. The subcommittee will come to order.

This morning the Committee on Commerce opens hearings on S. 1124, the Fire Research and Safety Act of 1967, introduced by Senator Magnuson for himself and Senator Cotton. This bill would amend the Organic Act of the National Bureau of Standards to authorize a fire research and safety program, among other things. Immediately following my remarks, when they are published in the record of these hearings, there will be inserted a copy of S. 1124, the Fire Research and Safety Act of 1967, the accompanying statement of purpose and need, and the letter from Acting Secretary of Commerce Trowbridge transmitting the act in draft form to the President of the Senate.

Senator Magnuson was unable to be present today, but he eloquently discussed this well-thought-out approach to a difficult and complex problem when he introduced the bill on February 28. A copy of his remarks will be added to the record following my own. A statement by Senator Cotton will also be placed in the record.

Without anticipating the testimony of any of the witnesses we are about to hear, I would like to state my own personal reaction to the enormity of this problem.

President Johnson, in his consumer message to the Congress on February 16, asked for 10 specific consumer protection bills. One was the Fire Research and Safety Act of 1967, which the President said "should be one early step in a major national effort to reduce shameful loss of life and property resulting from fires."

The President's statement has made us all more aware of the tragic loss our Nation suffers from fire. You must have noticed the unusual range and spectacular nature of the fires which have been in the news in only the first 3 months of 1967: The gas explosion fires in New York City; the McCormick Place Exhibition Hall destroyed in Chicago; our three brave astronauts lost in the Apollo spacecraft at Cape Kennedy; two more airmen perished in a similar fire in Texas; the Dale Penthouse Restaurant fire in Alabama, in which 25 people out for an evening dinner died; and just last week nine teenage girls died in a New Orleans motel bathroom while trying to escape from the fire caused by an airplane crash.

Staff counsel assigned to this hearing: Norman K. Maleng.

Those horrible incidents were merely the fires that were in the news. Simultaneously hundreds of other fires inflicted loss in hundreds of other households throughout our great land. We can always rejoice when, as in the case of Senator Hart's summer home, destroyed by fire the day after he spoke in favor of this bill, there was no loss of life. But the national and the individual economic loss is significant, too. And there is something we can do about fires.

In the words of the President:

> We must begin by developing improved information about the number and causes of fires and their costs in terms of property, lives, and injuries.

We must conduct research into the causes and nature of fires, educate the public on fire hazards and fire safety, improve our fire services, and conduct appropriate demonstration projects.

(Above-mentioned documents follow:)

[From the Congressional Record, Feb. 28, 1967]

Fire Research and Safety Act of 1967

Mr. Magnuson. Mr. President, on behalf of myself and the senior Senator from New Hampshire [Mr. Cotton] I send to the desk, for appropriate reference, the proposed Fire Research and Safety Act of 1967.

One of the earliest and one of the most important discoveries of mankind was the use of fire. Yet throughout history, fire has also posed a threat to man, when it is an uncontrolled and unwanted fire. Some fires have gone down in history—the great fire of London in the 13th century, for example. Other fires receive scant attention in the daily newspapers. Yet to the victims of fire, the results are equally tragic.

It is ironic that here in the United States, with all of our vast technical know-how, the per capita death rate from fire is four times as high as the rate in the United Kingdom and more than six times as great as the rate in Japan.

President Johnson, in his message, "To Protect the American Consumer" said: "We can do better, and we must."

These are my sentiments, exactly. I have therefore introduced a bill, the Fire Research and Safety Act of 1967, which is designed to help cut down the toll of 12,000 lives and $1¾ billion in property losses that the Nation suffers each year as a result of fires.

There is not a Member of this body who has not come into contact, directly or indirectly, with the human tragedy behind the grim statistics. Earlier this month, in the Lake Stevens area of Snohomish County in my home State of Washington, a fire in the middle of the night took the lives of an entire family—mother, father, and three little children. The children never even had a chance to get out of their beds. And this is not an exceptional case. A casual glance at newspapers around the country would reveal many similar stories of tragedy and loss.

There are a number of public and private institutions that are active in the field of fire safety. Without their efforts, the situation today would no doubt be much worse than it is. However, there is still much more that needs to be done. We are making no headway at the present time in reducing the per capita death rate from fires. Moreover, the number of fires per capita and the property damage per capita have increased during the past 5 years. Obviously, something must be done to correct this deteriorating situation.

The bill I have introduced would amend the Organic Act of the National Bureau of Standards to authorize a comprehensive fire research and safety program. This objective would be accomplished through support and expansion of existing public and private programs, wherever possible.

Specifically, the proposed program would include: First, investigation of the incidence of fires, and research on the causes of fires; second, education of the public on fire hazards and safety techniques; education of firemen on firefighting methods including the development of fire safety courses; third, reference and data services to provide information on all aspects of fire safety; fourth, support for demonstration projects on improved methods for the prevention and control of fires, and for projects designed to improve fire services; and fifth, grants to State and local governments, and to other public and nonprofit institutions for the purpose of achieving the objectives outlined in the bill.

I believe that the proposed program is a well thought out approach to a difficult and complex problem. It may be that some fires cannot be avoided, as, for example, those started by lightning and other natural causes. Nevertheless, most of the causes of fires are related to human carelessness in the highly technological and potentially hazardous environment we have created for ourselves in the 20th century.

In my opinion, the problem of fire safety is a perfect example of a problem which can best be resolved through the cooperative efforts of public and private organizations, and through a working partnership of government at all levels, Federal, State, and local. The bill I have proposed takes just such an approach. I urge all Members to study the proposals carefully, and I believe the public interest will be well served through swift enactment of this legislation.

STATEMENT BY SENATOR COTTON FOR CONSUMER SUBCOMMITTEE HEARINGS ON S. 1124, THE FIRE RESEARCH AND SAFETY ACT OF 1967, APRIL 4, 1967

The best estimates I have seen indicate that fire in the United States causes 12,000 deaths and $1.75 billion loss per year. In dollar loss alone, that is $8.98 for every man, woman, and child in America. Our per capita death rate from fires is twice Canada's, four times the United Kingdom's, and six and one-half times Japan's rate. While our much higher death rate may reflect the hazards that accompany our higher standard of living, doesn't this indicate that we must put forth greater fire safety efforts?

I support this bill because fire is such a universal hazard. There is no time or place where man may safely relax his guard. His home, his places of amusement, his cities, his vehicles of transportation, and his natural resources are all vulnerable to fire. When you have widespread drought, as New England has experienced for the last five years, the threat of fire to our forests, towns, and homes is greatly increased.

I also support this bill because we need better fire knowledge and technology. We are proud of our fire chiefs, fire departments, fire marshals, our Smokey Bear campaigns, and our schools and other organizations which are already doing a magnificent job. We must back them up with the best fire technology mankind can devise. That is as sensible, indeed as mandatory, as backing up our medical doctors with the tools, drugs, and medical knowledge they require to protect our health.

No State has a monopoly on the fire problem. No State lacks some things to be proud of—and some to deplore. I am proud of the many fine fire departments in New Hampshire. I regret to report that in my State four people recently died in a nursing home fire. Four elderly persons—too few to make the news nationally. But what a terrible tragedy is any unnecessary loss of life!

The aged and babies and children are particularly vulnerable to fire, and the programs envisioned by the Fire Research and Safety Act of 1967 would offer the beginning of far greater protection to the old and the young. But fire is universal, and the benefits of this bill would extend to all of us—and to future generations. I am proud to have my name alongside Senator Magnuson's on this bill.

THE SECRETARY OF COMMERCE,
Washington, D.C.

Hon. HUBERT H. HUMPHREY,
President of the Senate,
Washington, D.C.

DEAR MR. PRESIDENT: In his message to the Congress "To Protect the American Consumer," the President recommended comprehensive fire safety legislation to authorize a major national effort to develop and support ways of reducing our shameful loss of life and property from fires. To carry out the President's recommendation, I am now transmitting to you four copies of the "Fire Research and Safety Act of 1967," and a statement of purpose and need.

The following highlights indicate the scope of our national fire problem:

> In 1965, an estimated 12,000 deaths were caused by fire. Our per capita fire death rate for 1965 is twice Canada's rate, four times the rate for the United Kingdom, and six and one-half times Japan's rate.
>
> There is no program for gathering data from every State and locality about the causes of fires, and available fire cause data is not detailed enough to guide planning of research or to support fire education adequately.

Most fire research today is of an applied nature. More basic research is needed so that we may understand the fundamentals of fires.

While there are significant voluntary activities in information dissemination and public education, they are not adequately supported.

Today, only two of our colleges and universities offer a four-year professional fire safety course.

The significant Federal fire prevention and control programs, such as our forest fire and civil defense programs, are specific in nature. We have relied largely upon the States, private associations and industry to deal with our overall need for fire prevention and control. Without their efforts, our losses from fires would be much greater; but the problem is growing, and a comprehensive national program is needed if we are ever to reduce the deaths, injuries and property damage caused by fire.

To institute such a comprehensive program, we need the Fire Research and Safety Act of 1967. The Act would have three major purposes:

1. Increasing our knowledge of fire through comprehensive research and data gathering.
2. Disseminating more knowledge about fire through public education, expanded fire information reference services, education for the fire services, and development of fire safety curricula and courses.
3. Encouraging local and individual initiative by supporting worthy projects that would demonstrate improved fire safety.

Insofar as it is practicable, these purposes—particularly the first two—should include providing additional support for expansion of deserving existing programs. The program for carrying out these purposes should give appropriate consideration to all facets of our national fire problem. If this program is authorized, the Department would establish a fire research and safety center for administering the legislation and carrying out appropriate fire safety liaison and coordination.

We owe a great deal to those individuals and organizations who, since our Nation began, have worked for better fire protection for us all. Our losses to fire would have been much heavier had we not had the benefit of their work. However, the detrimental effects of fire have grown in spite of such efforts, and will no doubt continue to grow as our standard of living grows and as our ways of living become more complex.

We now lose one and three-quarter billion dollars in property annually to fire, and those losses are growing. Yet we devote a miniscule percentage of these annual losses to learning more about fire and developing better techniques for combatting fire.

As the President said, we can do better, and we must. The time has come for a new national commitment to the goal of reducing the considerable burden that fires lay upon us year after year. The program proposed herein will not immediately end that burden—for no one knows for sure just *how* we can best reduce our fire, death, injury and property loss rates. But this program will enable us rapidly to acquire more knowledge about the causes of fire and ways of combatting it and to communicate this knowledge effectively to all who can use it.

I urge the Congress to give prompt and favorable consideration to this urgently needed legislation.

The Bureau of the Budget adivses that enactment of this legislation would be in accord with the program of the President.

Sincerely yours,

ALEXANDER B. TROWBRIDGE,
Acting Secretary of Commerce.

STATEMENT OF PURPOSE AND NEED

This proposed "Fire Research and Safety Act of 1967" would amend the Organic Act of the National Bureau of Standards to authorize a comprehensive fire research and safety program to gather comprehensive fire data, conduct intensive fire research, educate and train in fire protection and safety and support demonstrations of improved and experimental fire protection and safety.

The best estimates available indicate that in 1965, fire in the United States caused 12,100 deaths and property damage amounting to $1,741,300,000 or ($8.98 for every man, woman, and child). Our per capita fire death rate is twice Canada's rate, four times the rate for the United Kingdom, and six and one-half times the rate for Japan. While our much higher per capita death rate may reflect the hazards that accompany our higher standard of living, this merely indicates that we must put forth greater fire safety efforts as our living standards rise, if we are to eliminate excessive loss of life to fire.

Over the past five years, the best privately estimated per capita fire death rate from all causes has remained relatively constant (although U.S. Public Health Service figures for non-transportation fires have increased nine percent). Over the same period the estimated per capita number of fires in the United States has increased nine percent and the estimated per capita property damage has increased four percent. Our 1965 estimated per capita property damage contrasts with $6.85 for Canada, the next highest per capita loss among major countries. Japan, with a population of about one-half that of the United States, has a per capita loss of only $1.32 and its total number of fires in 1965 is about 1/40 of the number that occurred in the United States.

The ravages of uncontrolled fires have dotted the pages of histroy from its beginning. Great fires that are well known go back at least to Nero's Rome in the middle of the first century. King John promulgated building ordinances to prevent the spread of fire between buildings after the London fire of 1212—three years before the Magna Carta. Research and testing of building constructions for fire resistance in this country started early in the last century but remained at a very low level until the great fires in Chicago, Baltimore and San Francisco, the last two in the first decade of this century. The resulting impetus to fire studies has lead to a more systematic approach and to the present collection of standard test methods.

At about the same time that fire testing and research was beginning to grow, the gathering of fire information and attempts at public education on fire safety took on a new stature. The National Fire Protection Association, founded in 1896, is the chief source for educational materials and consolidated fire information.

ROLE OF FIRE IN PUBLIC SAFETY

Fire strikes at man both physically and economically. There is no place or time when he may safely relax his guard. His homes, places of amusement, cities, transportation, and national resources are all vulnerable to fire. Fires start from natural causes such as lightning, but most causes are related to man's carelessness among the hazardous surroundings he has made for himself.

Fires in homes and apartments take many lives every year. Tragedies strike in places of public assembly despite laws and recommendations on construction, decoration, occupancy, and means of egress. Large losses of life have occurred in just the past few years as a result of fires in schools, hospitals, hotels, and restaurants. The recent tragedy in a penthouse restaurant in Montgomery, Alabama, took 25 lives.

Without the significant efforts of private and public organizations in the field of fire safety, the record would be much worse. However, this record can and should be improved. Greater support of fire safety programs will be needed, if such improvement is to be achieved. The Federal Government should provide needed support through a national fire safety program, including direct financial support of activities of private non-profit and public organizations, and increased Federal activities to provide technical support for their programs. The national program should encourage local initiative by supporting improved methods and techniques for preventing and controlling fires, reducing personal injury and property damage, or improving the efficiency, operation or organization of the fire services.

Comprehensive and detailed information on fire causes and effects is essential to the best use of available resources to minimize the harm from fires. These resources must be directed to the most significant areas of the overall problem, which are only partially identified at present. For example, present fire cause data are not detailed enough to permit analysis to determine where research and other activities will be most beneficial. Similarly, education in fire safety and protection is hindered by a lack of detailed information on the nature and scope of the problem.

INFORMATION

Our present national efforts to gather information on fire causes and effects are carried on by private organizations. These organizations depend on voluntary cooperation of their members and others who are interested enough to provide reports. The National Fire Protection Association is generally recognized as having the best compilation of data on fire causes and losses of life and property. Despite diligent effort on the Association's part, however, it receives statewide loss data from only about half of the States, and data on causes from about one-third of the States. The present NFPA budget, derived from members' dues plus the sale of publications cannot support staff operations in the field to gather directly the data which is not supplied to the Association. Nor can the Association appeal to any incentive for cooperation in the data gathering other than a common interest in fire safety.

Another group gathering data is the insurance industry. However, their primary interest is in the area of establishing insurance rates, and their data, and analyses thereof, are of appropriately limited scope.

We need more fire information than voluntary efforts have been able to gather. The proposed legislation would authorize Federal support that could be used to increase that level of effort significantly. Voluntary and uniform reporting of fire information could be achieved by grants to local organizations. The information gathering program would utilize a standardized reporting system, and one or more teams of experts to investigate selected fires in depth and evaluate and improve the reporting system. There would also be a clearinghouse service for fire information, which would maintain a comprehensive library, provide materials and an abstract service, publish bibliographies and maintain rosters of those having highly specialized expertise.

The information gathered under this program would aid in planning, research, and in providing fire safety education. The clearinghouse service would furnish useful fire information to the fire service and others interested in fire safety throughout the country.

RESEARCH

The present research effort is carried on by fire equipment and building materials industries, trade associations, universities, non-profit organizations, commercial laboratories, and Government agencies. The industry and trade association research, for the most part, is of an applied, product-oriented nature. Individual companies conduct little basic research. Industry has made use of trade associations as a mechanism for industry-wide support of research on common problems. But this work also is predominantly applied research. Industry tends to look to those who are not profit motivated for the basic research information.

The Federal Government's funding for fire research program is about six million dollars, concentrated mainly in the Forest Service and Department of Defense, the latter including the Office of Civil Defense. Smaller amounts go to the National Bureau of Standards, National Science Foundation, Bureau of Mines, and the Department of Health, Education, and Welfare. The research of the Government agencies is largely mission-oriented, and not applicable to many common fire safety problems.

The primary deficiency of these research programs is that inadequate attention is given to establishing an understanding of the basic nature and behavior of fire upon which could be based a theory and more efficient practice of fire prevention and control. Instead, great reliance is placed on the less efficient method of empirical fire testing, to determine the fire resistance of various materials. The number of samples of building materials and assemblies that can be fire tested is limited because of cost, thus restricting technological innovation in the building industry.

A major research gap is in the area of fire department operations. The need for research here is becoming critical. Increasing costs of operating community services, the trend to great agglomeration of communities into metropolitan regions, and the rapid social and technological change are imposing demands on fire services for greater efficiency. In rural areas, the longer distances and uncertain water supplies, plus the hazard of large quantities of stored combustible agricultural products on many farms, place great demands on local fire services.

The legislation will authorize additional research nearly equal to the present Federal level immediately, much of which will be used, through contracts, to support fundamental studies in the universities and other non-Federal facilities. There would also be development of improved methods and techniques for preventing and controlling fires, and for rehabilitating injured persons and damaged property.

EDUCATION

The National Fire Protection Association, the International Association of Fire Chiefs, and the National Safety Council each has a national program in fire prevention education. Of these, NFPA's is the largest and includes Spring Clean-Up Week and Fire Prevention Week in October. Government and local public education programs are generally related to the national programs and make use of their educational literature.

Despite these efforts at public education, many members of the public are complacent and do not take the precautions needed to reduce the occurrences of fires caused by carelessness. Inadequate financial resources now preclude existing programs from fully effective use of mass communication media and of other public educational activities. The legislation would authorize grants to state and local fire service groups and support to nationalfire education groups for public fire safety education. It will also authorize Federal technical support of such educational activities.

Insufficient attention is given to fire prevention education in our institutions of higher learning. Engineering, architecture, city planning and comparable curricula should include fire problems and design approaches that will minimize fire occurrence and spread. Such design should become an integral part of the overall practice of those professions. Specialized training in the scientific and engineering aspects of fire protection are also needed. Only two universities offer four-year curricula leading to degrees in fire protection engineering. The proposed legislation would authorize grants for the development of curricula and course material to facilitate the establishment of fire protection curricula in additional colleges or universities, and facilitate the introduction of fire protection courses in other curricula.

Most professional fire personnel lack sufficient training in command and control of disaster operations and in the control of special hazards. Education and training is essential to attainment of the highest levels of competence for the fire services. Many states have fire service schools offering short courses. However, the content and amount of training varies from state to state, and even within states since individual participation in some cases is dependent on the availability of local funds. The proposed legislation would authorize grants and support of the development of and participation in professional extension courses for fire service personnel and officers. We believe the objective should be the establishment of a program of periodic professional training for all fire services personnel, and for the staff of State Fire Marshals Offices or other offices whose responsibilities have significant relationship to fire. Such increased education should enhance professional stature and encourage career and executive development in the fire services, thereby attracting greater numbers of highly qualified individuals to this important area of public service.

DEMONSTRATION PROJECTS

Many interested firemen and other public spirited individuals have applied themselves to problems of public education, fire safety, and fire department operations. Frequently, these individuals have not been able to support, or find support for, practical demonstrations of the feasibility of improved training aids, operational procedures, public education programs, or other fire safety methods and techniques. Ideas for useful demonstration will also result from Federal fire safety activities. The proposed legislation would authorize Federal support of appropriate demonstrations, and thus would encourage local and individual initiative in the solution of fire safety problems.

NATIONAL FIRE RESEARCH AND SAFETY CENTER

This proposed legislation would state the sense of Congress that the Secretary should establish a fire research and safety center. While much of the research under this program will be performed outside the Federal Government or in other Federal facilities, neither private nor Government facilities in this country are equipped for certain kinds of research, such as growth and spread of fires within full-scale multistory buildings or the interactions among structural elements under fire conditions. The results of these and similar studies could lead to advanced design practices reducing the likelihood and spread of fires. Consequently an advanced research center is needed for performance of such fundamental studies.

Additionally, the center would provide a central focus for management of the national fire safety program under this proposed legislation. By establishing close contact with research personnel, the center would facilitate development of necessary staff competence for both technical support of non-Federal activities and scientific management of contracts and grants.

Finally, the program also would utilize fully existing competence and facilities of other Federal agencies, and would be coordinate carefully with related existing Federal programs.

[S. 1124, 90th Cong., first sess.]

A BILL To amend the organic Act of the National Bureau of Standards to authorize a fire research and safety program, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "Fire Research and Safety Act of 1967."

DECLARATION OF POLICY

SEC. 2. Congress finds that a comprehensive fire research and safety program is needed in this country to provide more effective measures of protection against the hazards of death, injury, and damage to property. The Congress finds that it is desirable and necessary for the Federal Government, in carrying out the provisions of this Act, to cooperate with and assist public and private agencies. The Congress declares that the purpose of this Act is to amend the Act of March 3, 1901, as amended, to provide a national fire research and safety program including the gathering of comprehensive fire data; a comprehensive fire research program; fire safety education and training programs; demonstrations of new approaches and improvements in fire prevention, control, and reduction of death, personal injury, and property damage. Additionally, it is the sense of Congress that the Secretary should establish a fire research and safety center for administering this Act and carrying out its purposes, including appropriate fire safety liaison and coordination.

FIRE RESEARCH AND SAFETY AMENDMENTS

SEC. 3. The Act entitled "An Act to establish the National Bureau of Standards" approved March 3, 1901, as amended (15 U.S.C. 271–278e) is further amended by adding the following sections:

"SEC. 16. The Secretary of Commerce (hereinafter referred to as the Secretary) is authorized to—

"(a) Conduct directly or through contracts or grants—

"(1) investigations of fires to determine their causes, frequency of occurrence, severity, and other pertinent factors;

"(2) research into the causes and nature of fires, and the development of improved methods and techniques for fire prevention, fire control, and reduction of death, personal injury, and property damage;

"(3) educational programs to—

"(A) inform the public of fire hazards and fire satefy techniques, and

"(B) encourage avoidance of such hazards and use of such techniques;

"(4) fire information reference services, including the collection, analysis, and dissemination of data, research results and other information, derived from this program or from other sources and related to fire protection, fire control, and reduction of death, personal injury, and property damage;

"(5) educational and training programs to improve, among other things—

"(A) the efficiency, operation, and organization of fire services, and

"(B) the capability of controlling unusual fire-related hazards and fire disasters, and

"(6) projects demonstrating—

"(A) improved or experimental programs of fire prevention, fire control, and reduction of death, personal injury, and property damage,

"(B) application of fire safety principles in construction, or

"(C) improvement of the efficiency, operation, or organization of the fire services.

"(b) Support by contracts or grants the development, for use by educational and other nonprofit institutions, of—

"(1) fire safety and fire protection engineering or science curriculums; and

"(2) fire safety courses, seminars, or other instructional materials and aids for the above curriculums or other appropriate curriculums or courses of instruction.

"SEC. 17. With respect to the functions authorized by section 16 of this Act—

"(a) Grants may be made only to States and local governments, other non-Federal public agencies and nonprofit institutions. Such grants may be up to 100 per centum of the total cost of each project for which such grant is made. The Secretary shall require, whenever feasible, as a condition of approval of a grant, that the recipient contribute money, facilities, or services to carry out the purpose for which the grant is sought. For the purposes of this section, 'State' means any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, the Canal Zone, American Samoa, and the Trust Territory of the Pacific Islands; and 'public agencies' includes combinations or groups of States or local governments.

"(b) The Secretary may arrange with and reimburse the heads of other Federal departments and agencies for the performance of any such functions, and, as necessary or appropriate, delegate any of his powers under this section or section 16 of this Act with respect to any part thereof, and authorize the redelegation of such powers.

"(c) The Secretary may perform such functions without regard to section 3648 of the Revised Statutes (31 U.S.C. 529).

"(d) The Secretary is authorized to request any Federal department or agency to supply such statistics, data, program reports, and other materials as he deems necessary to carry out such functions. Each such department or agency is suthorized to cooperate with the Secretary and, to the extent permitted by law, to furnish such materials to the Secretary. The Secretary and the heads of other departments and agencies engaged in administering programs related to fire safety shall, to the maximum extent practicable, cooperate and consult in order to insure fully coordinate efforts.

"(e) The Secretary is authorized to establish such policies, standards, criteria, and procedures and to prescribe such rules and regulations as he may deem necessary or appropriate to the administration of such functions or this section, including rules and regulations which—

"(1) provide that a grantee will from time to time, but not less often than annually, submit a report evaluating accomplishments of activities funded under sectiou 16, and

"(2) provide for fiscal control, sound accounting procedures, and periodic reports to the Secretary regarding the application of funds paid under section 16."

EFFECT ON OTHER LAWS

SEC. 4. Nothing contained in this Act shall be deemed to repeal, supersede, or diminish existing authority or responsibility of any agency or instrumentality of the Federal Government.

AUTHORIZATION OF APPROPRIATIONS

SEC. 5. There are authorized to be appropriated, for the purposes of this Act, $10,000,000 for the fiscal year ending June 30, 1968, and such sums as may be necessary for each of the following four fiscal years, and such appropriations are authorized to be made without fiscal year limitations.

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, D.C., March 28, 1967.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
U.S. Senate.

DEAR MR. CHAIRMAN: In reply to your request of March 2, 1967, for our views on S. 1124, a bill to amend the organic Act of the National Bureau of Standards to authorize a fire research and safety program, and for other purposes, we have no special information regarding the merits of this legislation. However, we would suggest that in order to assure access to records necessary for the audit and examination of the epxenditure of Federal funds, the proposed section 17 of this Act be amended to add subsection (f) stating:

"(f) The Secretary and the Comptroller General of the United States, or any of their duly authorized representatives, shall have access for the purpose of audit and examination to any books, documents, papers, and records cf the grantees that are pertinent to the grants received under section 16."

Sincerely yours,

FRANK H. WEITZEL,
Assistant Comptroller General of the United States.

Senator CANNON. Our first witness is Dr. J. Herbert Hollomon, Acting Under Secretary, Department of Commerce, accompanied by Dr. Astin, Director of the National Bureau of Standards, Department of Commerce.

You may proceed.

STATEMENT OF J. HERBERT HOLLOMON, ACTING UNDER SECRETARY OF COMMERCE, ACCOMPANIED BY JOHN CHRISTIAN, SPECIAL ASSISTANT TO THE DIRECTOR OF THE INSTITUTE OF APPLIED TECHNOLOGY, NATIONAL BUREAU OF STANDARDS; DONALD MALONE, ATTORNEY ADVISER, DEPARTMENT OF COMMERCE; JAMES RYAN, ASSISTANT CHIEF, FIRE RESEARCH SECTION, NATIONAL BUREAU OF STANDARDS; GORDON CHRISTENSON, ASSISTANT GENERAL COUNSEL, DEPARTMENT OF COMMERCE

Mr. HOLLOMON. Mr. Chairman, Dr. Astin and I both have brief prepared statements. I would like to suggest that I proceed and if you have questions for me, I answer them, or Dr. Astin can immediately proceed, following me, whichever is your pleasure.

Senator CANNON. Why don't you both proceed with your statements and then we will follow with the discussion at that time.

Mr. HOLLOMON. Thank you.

With me also this morning, to Dr. Astin's right is John Christian, special assistant to the Director of the Institute of Applied Technology, NBS, who is a member of the National Fire Protection Association; on his right is Mr. Donald Malone, an attorney in the Department of Commerce; on my left is Mr. James Ryan, Assistant Chief, Fire Research Section, National Bureau of Standards, also a member of the National Fire Protection Association; and on his left is Mr. Gordon Christenson, Assistant General Counsel of the Department.

Mr. Chairman, I appreciate the opportunity to appear in support of S. 1124, the proposed Fire Research and Safety Act of 1967. In recommending this legislation in his consumer message, President Johnson urged the Congress to continue its tradition of more than 100 years of concern with the safety and welfare of the American public. The bill before you reaffirms the fundamental American belief in the value of a human life. It is predicated on the assumption that the loss of 12,100 lives and $1.75 billion of property in fires in the United States in 1965 is unacceptable for a country whose resources are unmatched anywhere.

Among the major nations of the world, the United States has the highest per capita death rate from fires; twice that of Canada, four times that of the United Kingdom and remarkably, six and one-half times that of Japan. It is unconscionable to accept this loss of life and property as an inevitable consequence of our higher standard of living.

But as appalling as these statistics may be, their very incompleteness and uncertainty also are measures of the problem. The fact is that this third largest category of accidental deaths is remarkably undocumented and unanalyzed. Tabulations which describe fire losses and casualties are based on statewide data from only about half of the States. National losses are estimates, at best. Data on the causes of fires were obtained from only one-third of the States.

No regulatory measures are included in the bill, but the proposed legislation would authorize on the national level a comprehensive systems approach to and in the reduction of the loss of life and property resulting from accidental fires. A coordinated attack on the problem at all levels, utilizing resources in the private, as well as in the public sector, is proposed. The bill provides support for:

1. Investigations of fires as to their causes, frequency of occurrence, nature, and severity of losses, and other pertinent factors.
2. Research into the causes and nature of fires, and the development of improved methods and techniques for the reduction of personal injuries and property damage.
3. Education of the public on fire hazards and on fire safety.
4. Education and training of fire service personnel in the utilization of new techniques.
5. Improving formal education curricula in fire safety up to and including graduate levels.
6. Fire safety information services.
7. Demonstration projects on fire prevention, control, and the reduction of personal injury or property damage.

The act authorizes the Secretary of Commerce to conduct these activities directly or through the use of contracts and grants. The program would be authorized for a period of 5 years with a first year authorization of $10 million.

This legislation is long overdue. Almost daily we hear of fires in homes, factories, and offices, in private vehicles and public buildings, in large cities and small communities. Fires can disrupt business activities, engineering projects, and private lives. We need more knowledge about fires in planning some of our important national programs. For example, this Nation is beginning to rebuild its cities, and faces the task of doubling by the year 2000 the number of buildings presently in use. It is already late for us to be beginning intensively the kind and amount of research required to design buildings which are more resistant to fires and to develop more efficient and effective ways to fight fires in urban environments. Yet this is precisely the point in time when a modest investment in a program as proposed here can have a profound effect on the safety of our citizens in the cities and suburbs we will be building. We should now take effective steps to protect the massive investment we will be making in the literal rebuilding of our country, just as we have done in the past to help protect our forests and prairies from excessive loss by fire.

The Federal Government has a proper and necessary role to play in helping State, local, and private groups to plan for a safer future for our citizens.

Private organizations are already deeply engaged in many aspects of the total problem, but the resources available to them are limited and are inadequate. The National Fire Protection Association has long been active in collecting data on fires. I have already remarked on the incompleteness of that which is available and, because they must rely on voluntary submission of data, the situation is not likely to improve significantly if left alone. Insurance companies too collect data but only that relevant to their needs, and they can hardly be expected to use their own resources for a data collection and analysis program sufficiently broad and comprehensive to meet the total national problem. Both kinds of organizations, as well as others in the firefighting community, are engaged in educating the lay public but this is hampered by a lack of funds. Because there are insufficient data, there is no way to evaluate the effectiveness of these programs. The proposed legislation would provide funds for the various public and private institutions to utilize their capabilities and potentialities more effectively in a coordinated effort.

The provision of firefighting services is traditionally a local and municipal function in our country. Such services are provided from a limited tax base, often unable to meet adequately the growing needs for services. Funds are so heavily committed to meet the day-to-day requirements that consideration of the long-range problems is ignored or deferred.

To depend on each State or city to do its own research might lead to great duplication and inefficiency. Many of the problems of fire prevention and control are similar throughout the country. Moreover, it is not likely that through the use of local resources, even the largest of cities could make the investment for the kind of research which is needed. Research is needed not just within conventional physics and chemistry laboratories. We must learn how entire buildings behave in fires. Experiments on a "real world" scale are required.

The Federal Government has a direct interest in such a program in order to make more effective its own investment in a variety of specialized fire research programs. This investment is now at the $6 million annual level but meets only those requirements related to the special missions of the agencies conducting the programs. From the point of view of minimizing its own fire losses, the Federal Government has a great need for the program. The property loss to the Government in 1965 was $330 million, and the total investment of the Federal Government in buildings and materials will grow as our country grows.

But probably the most compelling reason for attacking this problem on the national level is that accidental fires threaten everyone in this country. The poor who live in the slum tenements in the cities and those who live in rural shacks, our vast and growing middle class whose largest single investment of a lifetime is in their homes, those from all economic levels at their work or seeking occasional relaxation in theaters and restaurants—all ages as well as all economic levels have their share of victims.

Gentlemen, we have here, in the proposed Fire Research and Safety Act of 1967, the opportunity to apply science and technology directly to meeting a pressing national problem. I believe that the reasons for moving ahead with it are compelling.

Senator CANNON. Thank you, Dr. Hollomon.

Dr. Astin, if you want to proceed, we will go into some of the questions.

STATEMENT OF A. V. ASTIN DIRECTOR OF THE NATIONAL BUREAU OF STANDARDS

Mr. ASTIN. Mr. Chairman, I appreciate the opportunity to support the Fire Research and Safety Act of 1967.

Existing programs concerned with the fire problem are many and diffuse. These programs are in the Federal Government, State and local governments, industry, university, and private organizations. They cover basic and applied research; technical studies; education; fire prevention and safety programs; training; fire hardware development; standards development and testing; and actual fire control activities. Most of the scientific research is sponsored or performed by the Federal Government. Except for military fires and forest and rural fire control, most of the other programs are carried on by agencies other than the Federal Government.

A significant characteristic of these programs is that they are largely specific programs aimed at specific problems. In other words, they are in the main mission oriented. This relatively random approach is no longer sufficient to meet the need. Furthermore, increasing and rapid social and technological change is making the problem and its solution extraordinarily complicated. But, on the other hand, we have available to us now new sophisticated tools of analysis that will help us resolve the complication. These tools enable us to take a system, rather than an individual or specific, approach to the problem. Such an approach also permits a coordinated attack with the most effective use of advanced technology.

The loss in life and property due to fires is appalling—but the situation would be incalculably worse if it were not for the unflagging and commendable efforts of industry (especially the insurance industry), universities, and such private, nonprofit organizations as the National Fire Protection Association, the International Association of Fire Chiefs, and the National Safety Council.

The President called for a reduction in fire losses. To do this, existing efforts need reinforcement and strengthening. Basically, this would take two forms:

Federal support of private nonprofit and public activities, and

Increased technical support for these and other fire prevention and protection programs.

A solid national technical capability on which public and private groups could draw would stimulate the application of technology and innovation to the attack on the problem.

Since the bill is an amendment to the Organic Act of the National Bureau of Standards, I would like to outline briefly the interest and activities of the National Bureau of Standards in this field.

The NBS got its first fire problems about 1904 as a result of the disastrous Baltimore fire. At that time, it was found that hose couplings were not compatible with hydrants in different parts of the city. The fact that the hoses of fire engines from one region could not be coupled onto a hydrant in another location contributed greatly to the inability of the fire services to bring that catastrophe under control. As a result of this, we became involved in proposing standard couplings for fire hoses and hydrants.

The next impact took place in 1914 when the Congress provided a special appropriation to the Bureau to study the fire resistance characteristics of building materials. This was the beginning of the continuing program of activity in this area. One of the first major studies was a joint effort with the Underwriters Laboratories and the Associated Factory Mutual Insurance Companies. Such cooperation with public and industry associations has continued to the present. The results of the first 15 years of effort were summarized in a very important publication in 1931 which was a basic document relating to the construction of buildings for fire safety.

We have continued over the years, a relatively modest program in this area, a reasonably stable, and nonexpanding one at a level currently of about $200,000 per year. The program is devoted mainly to developing ways of measuring the properties of building materials under fire exposure.

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The Bureau has also served as a focus for the fire research interests of the Federal Government. The Federal Council for Science and Technology assigned the Bureau the responsibility of increasing Federal participation in fire research and recently requested the Secretary of Commerce to establish an Interagency Fire Research Committee, to coordinate the Federal role in fire research. This Committee has been established and is chaired by the Bureau.

PROPOSED PROGRAM DETAILS

The fire safety program envisions the strengthening, expansion, and voluntary coordination of the already significant efforts of the many private organizations and individuals, as well as the local, State and Federal organizations active and competent in the field. The provision of Federal funds, through contracts and grants will assist these groups to establish a broader financial base and, thereby, to increase the effectiveness and extend the scope of their activities in behalf of public safety. The participation of the Federal Government is expected not only to widen the technical and financial base, but to increase public awareness of the seriousness of the problem.

The Bureau would administer the act, if approved, in the following manner:

DATA ON FIRES

The incompleteness of the data—both in responses from State and local governments, and in the depth of information about particular fires—would be filled in by a more complete reporting service. The Bureau would provide assistance to existing programs to develop and conduct a comprehensive data collection, tabulation, and analysis effort.

The magnitude of this effort would require the use of computers. Computers would permit a quicker view of the problem; the identification and prediction of trends; be a data source for research; and also provide the contributors with frequent feedbacks of information and analyses.

The Bureau would also support in-depth investigations of selected fires by teams of experts, to determine fire causes in detail. These teams would be standing teams such as those the Public Health Service already has in the field of accident investigation. The Bureau would do laboratory analyses and provide selected experts for these investigations to take advantage of an interdisciplinary approach, something the Bureau is especially well equipped to do.

The Bureau would also support clearinghouse services for all types of fire safety information. The clearinghouse services would augment existing information services, as well as answer questions from fire departments and others needing specialized fire information. It would locate experienced personnel to handle unusual problems.

RESEARCH

The lack of understanding of why and how a fire develops and spreads, of the behavior of structural materials and interior materials in fire, and of how to predict these behaviors without actually burning down a building each time, underlie our inability to make much in the way of significant advances in fire technology. Not enough research is going on here or anywhere in the world. The Bureau would augment and broaden its existing fire research effort and its contract program to place significantly more emphasis on fundamental fire research studies in the areas of fire behavior, materials response, detection and control.

New building materials and products raise questions of how they would be affected by fire and whether they would produce toxic products in a fire. While this is an activity properly undertaken by private industry as part of product R. & R., the Bureau would continue to develop methods by which these products and materials could be best evaluated.

At the present time there is essentially no research directed toward the problems of the fire services beyond that exploratory work being done under the sponsorship of the Office of Civil Defense. A major research program to aid the fire services is becoming a critical need because of the increasing costs of operating community services, the accelerated trend to merging communities into metropolitan regions, and rapid social and technological changes which are imposing demands on fire services for even greater efficiency. The Bureau would initiate a broad research program of in-house work and contracts in fire defense analyses, including special studies in certain areas, such as communication systems and equipment, and especially the personal protection equipment of the individual firemen.

EDUCATION

Education and training are essential to attaining the highest levels of competence for the fire services. The fire services recognize the shortcomings of technical education, of local restrictions limiting mobility at any level, of policies of advancement only from within, and of fire executive development.

The Bureau will provide grant-in-aid support to the development of and participation in professional extension courses for fire service personnel and fire officers. The objective of this increased education should be professional status, career development, and executive development of the fire officers.

A consideration of sound fire principles should start at the drawing board. This would do much to prevent potential problems which later would have to be corrected at more expense, or even worse, result in a fire. The required fire protection information should be part of the curricula for architects, designers, engineers, city planners, and other professions that should be better aware of, and should apply, up-to-date safety principles in their work. The Bureau would provide grants-in-aid for the development and introduction of such fire protection information into the established curricula.

The increasing complexity of fire technology accents the need for a fire science curriculum and for more graduates in fire protection engineering. There are only two degree programs in fire protection engineering which together graduate about 27 men a year. There are about four jobs awaiting each graduate. The Bureau would support the development of new fire science and engineering curricula in the Nation's colleges and universities and stimulate the matriculation and graduation of fire protection engineers.

State and local fire safety programs should be improved to include more extension courses to train appropriate industrial and institutional personnel in the most effective methods of fire prevention and control. This would be done through grant-in-aid and technical support by the Bureau.

The Bureau would also support the efforts of private nonprofit associations to educate the public in fire safety in their homes and businesses. There would be direct support for nationwide efforts and grants-in-aid for local public educational programs.

Assistance to these various educational and training programs is an integral part of the comprehensive approach to the fire problem. For besides the direct effect of well-trained professionals, and a more fire-conscious public, these programs provide a way of introducing the results of research to those who can use it to prevent and fight fires.

DEMONSTRATION PROJECTS

From both the research and the education and training programs will come information and ideas which need to be tried in the "real world" of the fire protection engineer, the fire marshal, and the fire services. There will also be a feedback of ideas from the field which will need to be tried. The Bureau will provide grants to State and local governments and to nonprofit organizations concerned with fire to demonstrate these new ideas. The purpose will be to spur technological innovation at all levels.

FIRE CENTER ADMINISTRATION

A center for administering the act would be established at the Bureau. It would follow the pattern of organization and have the status of our other centers, such as our Center for Computer Sciences and Technology. Our present fire research staff would be incorporated in an expanded research effort, both to handle an increased in-house program and to assist in administering and monitoring the research contracts and grants. The Bureau program would make increased use of systems analysis to better define critical problem areas and to determine the relative benefits to be derived from work in these areas. The Bureau would make maximum use of advisory groups for both identifying actual fire problems and plotting the technical approach.

This information would serve as a guide in structuring the fire information, research, education and training, and demonstration programs.

CONCLUSION

The proposed legislation authorizes $10 million for the first fiscal year. Most of the amount appropriated would be used for contracts and grants.

I regard the proposed bill as a right and proper step the Federal Government ought to take to permit those who have been struggling so valiantly for so long against fire to take a giant technological step forward. In the characteristic pattern of Bureau operations, we would be proud to be their springboard.

If the committee should wish more detailed information on any aspect of this bill, I shall be happy to provide it.

Thank you, sir.

Senator CANNON. Thank you, Dr. Astin.

Dr. Hollomon, there is a bill before Congress to establish a Presidential commission to study the national fire problem. Could the bill we are considering be improved by amending it to provide for such a commission, and would it serve a useful purpose in view of the program to be implemented by the bill?

Mr. HOLLOMON. It is my opinion, Mr. Chairman, that it is clearly evident today that there is a severe problem compounded by lack of information, and that we need to get on with the job. I don't think that we should delay the action proposed in this legislation until we have a report from some commission. I also think there are some things this program does not do, and purposely so, because we felt there was lack of information upon which to base a Presidential recommendation to the Congress.

The latter matters are such things as standards development which may or may not be mandatory, or the development of direct grant-in-aid for operation, facilities, or equipment on a continuing basis to the cities and municipalities. These are possible additional steps which we do not believe should, or can, be proposed now. Such a commission could look into what the future steps are that should be taken in regard to the national fire problem and could use the information that was being developed in the program we have just described.

To put it bluntly, this committee should consider seriously whether such amendment would be helpful and would insure to the Congress that they would have coming back in a few years adequate and additional recommendations for further steps that the Congress might wish to take in the matter.

We would be happy to work with the staff in seeing whether we could develop appropriate language, Mr. Chairman, if you wish.

Senator CANNON. In other words, if the bill were so amended, it would sort of tie it into a package, one package, rather than having two pieces of legislation that might be fragmented off in different directions?

Mr. HOLLOMON. Yes, sir. I would like to make this point very clearly. It is our position, and I feel very strongly, that we should not wait to take these immediate actions, which have been so long delayed, until we have a Commission. We believe it is clear there are certain things that need to be done right now. This would not prejudice that Commission from making subsequent and additional recommendations.

Senator CANNON. If such a Commission were set up, what kinds of people would you think should be on it?

Mr. HOLLOMON. I believe that it should be broadly representative of the country in this general matter.

For example, I clearly think that there should be on it a municipal fire chief, someone who really understands the problems of the fire departments. I think that there should be on it similar people from smaller communities who have problems which are quite different from, let's say, New York City or Los Angeles.

I think there should be people on it who understand modern technology, people who have studied this problem over many years.

I think there should be on it someone who knows the insurance activity. There should be someone on it who understands the relationship between municipal, Federal, and State Governments which create problems with grants and related matters.

And there should be people who represent the general public.

I believe there should be individuals on this Commission, if there is to be a Commission established, who serve not as representatives of a segment of the society, but as individuals who in total represent the best we can bring to bear on this activity.

I would be particularly anxious to see some people on it who really know what the fire problem is locally.

Senator CANNON. Perhaps this should be directed to Dr. Astin.

In implementing the program provided for by this bill, wouldn't the National Bureau of Standards seek advice from essentially the same types of people that you are talking about in the Commission?

Mr. HOLLOMON. We both can answer. I think there are two different problems; one is to seek advice on implementing the various aspects of the present bill, which are research, investigation, education, and demonstrations. Here we will need, obviously, the best advice on a technical basis we can get from the country for each of these different aspects of the program. I would think this advice might well come from a different set of people than the people Congress would ask to look at this whole broad problem and come back with recommendations. I don't believe they are the same individual people. I believe a Commission would be broader and much more representative; the Bureau advisory group would be more technical, more knowledgeable of the specific problems, but still representative.

Dr. Astin may want to comment.

Senator CANNON. Do you have any further comment, Dr. Astin?

Mr. ASTIN. No, I think Dr. Hollomon has summarized it. There would be some overlap in the skills. But in general the orientation to provide advice as to the adequacy of an ongoing program would be different from a look at the broad national requirements.

Senator CANNON. Doctor, I was shocked by one portion of your statement where you said there are only two college degree programs in fire protection engineering which together graduate about 27 men a year. Where are those programs located?

Mr. ASTIN. One is at the University of Maryland, and the other at the Illinois Institute of Technology.

Senator CANNON. Why has there been such a limitation in our educational programs, particularly when you indicate that there are four jobs waiting for every graduate?

Mr. ASTIN. I am not quite sure why there is so little opportunity for study in this field. Part of it may be lack of ability to finance courses. Part of it might be lack of readily available information to put into curriculums.

There could be a whole host of reasons which we think we could deal with under the authority of this act.

Senator CANNON. Have you examined their curriculums to see whether it is adequate to satisfy the type of need we are talking about?

Mr. ASTIN. I have not examined it myself. Some of our staff people have looked at it, but I could not give you an answer at this time on the adequacy of the curriculums.

Senator CANNON. Would any of your staff care to comment on it?

Mr. HOLLOMON. Mr. John Christian.

Mr. CHRISTIAN. Sir, we have examples of the curriculums here. I myself am a graduate of the fire protection and safety engineering curriculum of the Illinois Institute of Technology. I must admit at that time—and the curriculum has improved, but still needs further improvement—it was not a strong type of engineering program. It was not as strong as, say, the mechanical engineering programs or the chemical engineering programs. It did not bring to bear all the technological information which we have.

Senator CANNON. Did it appear to be a weaker program because of the lack of interest from prospective students in the program, or do you have a view on it?

Mr. CHRISTIAN. The weakness of the program was more because there was a lack of technological information to be brought to bear.

There had not been at that time enough research in the gathering of fire behavior data to give us theories which one could then apply in school.

Mr. HOLLOMON. Mr. Chairman, I might comment——

Senator CANNON. I was going to say, Doctor, you might comment as to whether or not you think this type of program would perhaps provide some stimulus in the educational field, too.

Mr. HOLLOMON. Without any question. I think that one of the very important aspects of developing a good curriculum on any campus is to have research and engineering going on there that is related to the problem.

We spend a couple of hundred million dollars each year in this country supporting graduate engineering research. Of that program about 80 to 85 percent is supported by the Atomic Energy Commission, the NASA, the NSF, and the DOD; those four agencies. Obviously, the kind of program that is supported is related broadly speaking to their kinds of needs. The kind of support that is given for research and engineering at the graduate level in the fire field is almost negligible. As a consequence, therefore, you do not get professionals, or research people, or students at sophisticated levels, interested.

Another aspect of the problem, it seems to me, from talking to a number of fire chiefs and firemen, is that few of these educational activities are aimed really at their local needs, nor is there adequate relationship between the institution and the needs of the fire departments. Both of these, it seems to me, could be handled, at least in part, by this kind of legislation.

A point which is sort of amazing to me: We talk about the Federal Government support of this program. The total research budget of the Federal Government having to do with fires is about $6 million, of which $3 million is on forest and prairie fires; about one and a half million, DOD-type fires. About $1 million is civil defense, leaving about a quarter million as a total basic research program that has to do with the broad problem in this country, to be compared with a total research budget of the Federal Government of more than two and a half billion dollars.

I just think that with a quarter million dollars compared to two and a half billion dollars, the problem of stimulating any kind of activity in the universities with decent curriculums is self-evident. It is nothing compared to two and a half billion dollars.

Senator CANNON. Thank you very much for your testimony. If you have no further remarks to add, our next witness will be Mr. William Buck, president of the International Association of Firefighters, who will introduce a group who will appear with him as a panel.

Thank you, gentlemen.

STATEMENT OF WILLIAM BUCK, PRESIDENT, INTERNATIONAL ASSOCIATION OF FIREFIGHTERS, WASHINGTON, D.C. AND JACK BOSTICK, CHAIRMAN OF INTERNATIONAL ASSOCIATION OF FIREFIGHTERS LEGISLATIVE COMMITTEE

Mr. BUCK. Mr. Chairman, I am William B. Buck, president of the International Association of Firefighters, AFL–CIO, representing some 120,000 professional firefighters.

If I may, Mr. Chairman, I would like to introduce to you, the others on our panel this morning. To my right, is Mr. Jack Bostick, chairman of the International Association of Firefighters, Legislative Committee. To my left is Chief Lester Schick, the president of the International Association of Fire Chiefs; and, to his left is Chief David Gratz, chairman of the Federal Committee of the International Association of Fire Chiefs, and also chairman of the Board of Trustees of the International Fire Administration Institute.

With your permission, Mr. Chairman, I would like to read a joint statement developed between the firefighters and fire chiefs.

Senator CANNON. You may proceed.

Mr. BUCK. Following my statement, I would like to turn it over to Mr. Bostick to supplement my statement.

Mr. Chairman and honorable members of the committee, the national fire problem is a grave one. In 1966, the toll of lives lost by fire exceeded 12,000 men, women, and children; while the direct material loss to property exceeded $1.8 billion.

The total effect on our national economy of this annual loss is beyond calculation. We, therefore, are gratified to endorse the President and the Congress in its effort to combat uncontrolled and unwanted fire as provided for in S. 1124.

To justify the need for such legislation, one would only have to recall such recent tragedies, in loss of lives as well as the inestimable monetary loss, as the Penthouse Restaurant in Montgomery, Ala., and the Chicago Convention Center fire.

We cannot stand idly by when we are confronted by such alarming statistics as annual fire loss amounting to approximately $9 for every man, woman, and child in our country. Even more alarming is the fact that our per capita fire death rate is twice that of Canada; four times that of the United Kingdom, and six and one-half of that of Japan.

Despite our present national efforts to combat this growing problem, it hasn't been enough. We need legislation to authorize Federal support in the major areas, such as research, education, and prevention.

To this point we have indicated our support of S. 1124 and have briefly stated our reasons why we feel the Congress should give favorable consideration.

However, at this time, we would like to discuss with you and later submit an amendment which we, who have served many years at the grassroots of this whole problem, feel is vitally necessary.

The national fire problem is a complex and involved one that requires careful study and planning. The problem is intensified as we become more urbanized. We can no longer afford the luxury of random planning. We must begin with building construction and city planning at its earliest stages, its physical layout, its building codes, the materials and their character, the structural aspects as they relate to the spread of fire, thereby endangering the lives of those who occupy such buildings.

Fire prevention methods must be reevaluated in light of rapid changing technological advancement.

Fire control and suppression methods must be reexamined so as to gain the maximum use of new and sophisticated techniques.

At the present time, one of the big cost factors to municipal cities and urban developments is the sharp increasing cost of apparatus and equipment. Most fire apparatus, as well as some of the appliances, are bought and built by specifications prepared by the individual purchasers.

We believe that after careful study, standardization of apparatus and equipment may be possible. Such standardization would not only save vast sums of money, but would, in an atomic age, be of greater significance in its adaptability for universal use by all cities and communities.

However, effective implementation of this legislation can only be accomplished through the assistance of those who are most familiar with the problems to insure that existing activities are not duplicated.

Another problem of vital interest and concern today is that of recruitment as well as adequate compensation. Although it has not been publicized to any great extent, every major city in the country is having problems recruiting fire personnel.

What we have tried to say to you is that we feel that the fire problem is a most complex one and one that in addition to the approval of S. 1124 needs additional coordinated study by such people as may be designated and who are eminently well qualified by their experience in this field.

We therefore respectfully request that an amendment setting up such a commission be accepted and made a part of S. 1124 now before you for your consideration, and we submit the following:

S. 1124 provides prompt attention to clearly defined problem areas. This is proper and we support it. Other areas appear to represent problems or potential problems that are not clear. Rather than to suggest precipitous entry into such areas, we feel it appropriate that such areas receive careful attention and study at a high level. We urge that the bill before this committee be amended to provide for the appointment of a commission by the President, composed of 20 people.

This Commission would study all aspects of the national fire problem, either as to need to be brought into the program, or to be attacked differently than provided for by this bill. The Commission would report to the President and the Congress in 18 months on further legislation or other appropriate measures to establish the scope and course of this fire research and safety program beyond the first 2 years. The Commission and the program will complement one another. The Commission in its study period will draw heavily on the programs to be supported through S. 1124. Its interim and final reports will be most important in shaping this program and the national fire safety.

Respectfully submitted, William Buck, president, International Association of Fire Fighters; Chief Lester R. Schick, president, International Association of Fire Chiefs; Chief David B. Gratz, chairman, board of trustees, International Fire Administration Institute.

Senator CANNON. Thank you very much Mr. Buck, for your statement.

Mr. Bostick, do you have any additional comments you would care to offer?

Mr. BOSTICK. Yes, Mr. Chairman.

We in the fire service are certainly indebted to Senator Magnuson for his concern and the attention he has shown in introducing S. 1124. I might say that the International Association of Fire Fighters represents 94 percent of the professional firefighters in the United States. We want to express our appreciation.

After more than 35 years experience as a firefighter in the city of Fort Worth, I have witnessed quite a few improvements in the methods and procedures of protection of life and property. But, not enough.

I am reminded of a proverb attributed to the good Dutch people of Pennsylvania: "We get so soon old, and yet so late smart."

No city has the financial capability to properly explore the many facets of the fire problem. We are too busy fighting fires. We have no time to properly pursue the reasons why the fire started in the first place.

Of course, we have directed our time and talents in this direction. We found a few of the answers, with the limited resources that we have. But the answers have been too few and the duplication of effort has been multiplied many times without proper analysis or application.

We have heard that more than 12,000 people, women and children, lose their lives each year as a result of fire. Let's look at the future conditions.

There are untold thousands who are disabled or maimed for life or incapacitated for long periods, who are transformed from healthy productive people to invalids, who must require the care and attention of others. The $1.8 billion figure of fire loss last year is based on the reported figures. We have reason to believe it is much larger since we have no accurate system of determination and this is a direct loss. When we account for the many man-hours of loss in productivity, that is forever gone, the loss that results during the rebuilding period, the many inconveniences, et cetera, then we must assume the indirect loss supersedes the direct loss.

We are the best housed people that ever lived, but we cannot afford to waste the God-given resources that our factories and forests produce or that our techniques contrive.

When we consider the magnitude of the problem, there are many intangibles in the fire problem but we have not directed enough attention to the tangibles.

We must seek safer ways to build and provide for safer cities, and set and practice safer standards.

The fire problem requires the attention of many experienced and skilled people, beginning with the architect who plans the buildings; the city planners who promulgate the building codes; the city legislators who pass the ordinances; the fire engineer who must try and fit the pieces together; and, last but not least, the fire service that must prevent and suppress the actual fires.

Gentlemen, the fire service has experienced many problems. The protection of life and property from fire costs each individual community well in excess of 10 percent of the city's total budget, not to mention the cost of fire insurance that is controlled by the fire loss itself.

The needs of the fire protection in each community is fast exceeding the city's grasp.

We are coping with a severe shortage of trained firefighters. There was a day when every boy wanted to become a firefighter, but now they apparently want to become astronauts or something else other than firefighters.

We are losing many trained firefighters to the attractive offers of private industry. We must develop more sophisticated methods in the fire service, better tools, better training to cope with the increasing problem. We must diligently and cooperatively seek, explore, and develop the answers to our problems, and consummate the recommendations of the experience and skill in the many scientific facets of the protection of life and property from fires, floods, natural and unnatural disasters.

S. 1124 provides for the investigation, research, education, demonstration, dissemination on a stop-gap basis and on the obvious. We fully support and we also respectfully submit that an amendment should be made to have a high-level commission appointed to make a very thorough study.

This commission should be composed of experienced and knowledgeable people in the main field of fire protection and more particularly the professional firefighter and front-line soldier who in the final analysis is going to experience the problems firsthand.

If the committee is so disposed to amend, in compliance with our recommendations, we would be most happy to work with the legal staff in preparation of the same.

Thank you, sir.

Senator CANNON. Thank you, Mr. Bostick, for that very fine statement.

Mr. Schick, do you have any comments to add?

Mr. SCHICK. Mr. Chairman, I am Chief Lester Schick, of Davenport, Iowa, and president of the International Association of Fire Chiefs. As such I represent, in effect, the soldiers mentioned by Mr. Bostick. We are the people on the firing line, the people who have the primary responsibility of providing the protection of the life and the property on the local level.

Some time ago a group of representatives of the fire service, the operational service, and the educational group interested in the fire service, had occasion to meet in February of 1966 and develop what has become known as the Wingspread Conference Report. We have made a copy of this report available to the committee and it is presently in the joint statement read by Mr. Buck.

This was an ad hoc committee in effect. I would like to just read several of the statements involved which are presented by this committee after considerable study and consideration.

First of all, this ad hoc committee offers these statements of national significance as an aid to clearer understanding of the fire problem and of the steps to be taken in achieving the objectives of bringing the national fire problem into sharp focus. The committee is not attempting to pass on any specific pending legislative proposals, programs or methods. Its purpose is to urge careful consideration of the objectives set forth in the statements and of the best means of accomplishing those objectives through administration, education, and research.

I would like to comment briefly on several of the 12 statements established. Unprecedented demands are being imposed on the fire service by rapid social and technological change.

The scale of business and government operations today, the complexity of modern technology and organization, and the swift increase in new knowledge, the population explosion, rapid growth of urban communities, need for efficiency and economy on the part of the commercial and industrial community to compete in our private enterprise system, particularly under the pressure of imports of our foreign trade commitments, require that fire executives and administrators be better educated than their predecessors and better prepared to understand and facilitate change.

The mobility of individuals and the whole segments of our society brings about societal change and behavioral patterns which pose tremendous problems for the fire service.

The erection of high-rise structures, large undivided commercial and industrial buildings and solid-wall structures in outlying areas, brings to many small, undermanned and ill-equipped fire departments problems of a magnitude never before faced.

The deterioration of cental business sections and the transition of older residential areas help to create slums. Certain ethnic groups are affected by environmental change in a way which compounds the fire problems.

Technological changes in manufacturing processes, science, use of chemistry, nuclear energy, and so forth, are confronting fire departments with problems far greater than they can handle.

This societal and technological change should be thoroughly researched to determine causes and possible relationship to fire service planning needs.

This has been commented on both by Mr. Buck and by Dr. Hollomon in his statement.

The public is complacent toward the rising trend of life and property loss by fire. We have exerted our efforts on a local level. We have had the support of the insurance industry, NFPA and many others in the creation of fire prevention materials and programs which we have attempted to take to the public. Yet we find the loss of life, the monetary loss increasing continually and the public seems to be complacent. We wonder why this is true.

There is a serious lack of communication between the public and the fire service. This reflects on our increased fire loss, this complacency.

The behavior patterns of the public have a direct influence on the fire problem. It is most interesting when we think in terms of the facts that many people in Puerto Rico where they have about 250 fires a year in the whole of the island, when we take these same people, put them in the large city areas of Harlem, for example, in New York, we find this same number of fires occurring on almost a weekly basis. What is behind this difference? Ofttimes we are told it is due to the fact that our buildings are built to burn.

Gentlemen, in 2 years as a member of the fire service, and 20 serving as a chief officer of our department, I have found it is the people causing the fire. We are not getting to the people.

The insurance interest has exerted a strong influence on the organization of the fire service. This dominance seems to be waning. The fire service must provide the leadership in establishing realistic criteria for determining proper levels of fire protection.

Municipalities are in fact obligated to provide fire protection based on a criteria established by a profit-oriented organization.

Gentlemen, we feel that there is a time when we should take a long and hard look at this and determine just what is the level that is needed to provide the fire protection that we can afford, rather than that that is needed to protect an insurance investment.

Another thing, the traditional concept that fire protection is strictly a responsibility of local governments must be reexamined. And again it was mentioned that we are seeing the creation of metropolitan types of government, the expansion of jurisdictions in many areas. We feel in the fire service the time has come when we should do a very comprehensive study of the organization of the service, and I might refer to the British fire service.

I had occasion to work with them shortly after World War II, to make a visit there as president of the international association in September and October of this past year. And I am impressed by the organization and their ability to have in effect a minimum number of people available on a standby basis if you will, and yet the ability to call in masses when the largest effort is required and needed on the job.

And again the economics enter in, and the fact that we are finding it difficult on the local level to finance the operation of the fire service. I think a study is needed to determine whether or not this could better be done by expanding our jurisdiction, by giving a more effective, a more efficient service, and possibly a more economical service.

Comment was made about building in fire protection in buildings and entering into the area of fire codes and so forth. We are reurbanizing, through our urban renewal programs, our cities. We are thinking in terms of building up new cities. And now is the time to build in fire protection in those buildings.

It should become almost mandatory as these programs proceed that we build fire protection in the form of the sprinkler systems, automatic protection and detection systems into these buildings.

With this type of ability in fire protection I think the need for the standby fire service might possibly be reduced and therefore the economic drain upon the individual community could likewise be reduced.

Gentlemen, I present this approach in the Wingspread Conference primarily to support the need for the amendment as proposed by Mr. Buck for the establishment of a commission to study the broader aspects.

These are the broader aspects which are not included in the bill as proposed under S. 1124. I would hope that we could coordinate in effect the efforts of both of these groups and possibly lead the operational service, the men on the line, the men who face these problems firsthand to cooperate with the Department of Commerce not only in the establishment of the programs but also in the direction that these programs might take.

Mr. Chairman, I thank you very much on behalf of the 6,000 members of the International Association of Fire Chiefs for the opportunity of making this presentation.

Senator CANNON. Thank you, Chief Schick. Do you think that the commission should look into questions such as the setting of standards, either voluntary or mandatory, for firefighting equipment?

Chief SCHICK. I think that this is an area that they might well look into. I think there is a need. Again, with 20 years experience in a town of 100,000 population, with the responsibility of drawing up specifications, and recommending purchases to our city council, I think very definitely there is a need toward this end because I believe again as we look again at the total economic approach that we are in effect paying much more than we might possibly have to pay for individual pieces of equipment due to the fact that I as an individual or my neighbor, Chief Gratz on my left, or any other fire chief, has a tendency to build in those things which are nice to have but that are not necessary to have.

And I think that our individual communities are paying the cost of this determination. I think standardization would be beneficial.

Senator CANNON. Of course, the communities have frequently been subjected to the charge that the specifications set up and the standards required for that particular community were tailored to a particular piece of equipment, too. With 20 years experience I recognize that.

Chief Gratz, we would be glad to hear from you.

Chief GRATZ. Thank you, Mr. Chairman. My name is Chief David B. Gratz, of Silver Spring, Md. I am chairman of the Board of Trustees of the International Fire Administration Institute. The Fire Administration Institute is chartered by the regions in the State of New York, and is affiliated with New York State University. We are of course vitally concerned in the educational aspects and have played a vital role I believe throughout the country in the establishment of a great number of educational programs.

You might be interested, Mr. Chairman, the comment was made a moment ago regarding engineering curricula which is available. We have between 75 and 100 academic programs in administration and technical areas throughout the junior colleges of the United States and an enrollment of about 15,000 students at the present time.

The International Fire Administration Institute concurs and supports S. 1124 wholeheartedly. We strongly hope that the committee and the Congress will accept the proposal for the amendment of the commission which we feel is essential if we are going to make the forward progress which is so necessary.

Chief Schick has identified the broad spectrum of things which need to be investigated and we feel that while the immediate impetus of S. 1124 is important, that marrying this with a commission would be a very helpful step.

Thank you.

Senator CANNON. Thank you Chief Gratz.

On behalf of the Senate Commerce Committee, and on behalf of myself as a former member of a volunteer firefighting organization, and an engineer, I want to express our appreciation for your presentation this morning.

The groups that you represent have long been instrumental in combating the hazards of fire. You can rest assured that this committee will give careful consideration to the amendment that you suggest. Thank you very much.

Mr. BUCK. Thank you, Mr. Chairman.

Senator CANNON. Our next witness is Mr. Percy Bugbee, Boston, Mass.

STATEMENT OF PERCY BUGBEE, GENERAL MANAGER, NATIONAL FIRE PROTECTION ASSOCIATION, BOSTON, MASS.

Mr. BUGBEE. Mr. Chairman, my name is Percy Bugbee. I have been connected with the National Fire Protection Association for 46 years this week.

I would like first to make the observation, Mr. Chairman, that this proposal, or one very similar to it, was before the Congress 4 years ago and was rejected by the Congress at that time.

The second observation I would like to make is that, while I would be the last one to say that our present fire loss situation is good, I think it is only fair to say that the implication that has been made here that no progress, or little progress, in combating fires is being made, is an unfair statement. Because if you measure the fire loss, not by the dollars, but if you take the deflated dollar, and you take the very rapid increase in gross national product, it can be demonstrated that fire losses are less; we are burning less physical property today than we did 10 or 20 years ago.

The loss-of-life figure remains relatively constant over the years, and I submit, with a rapidly increasing population, that just keeping this constant is not an indication of lack of interest or support.

I would like to read my statement that has been presented to you.

We have given careful study to S. 1124 which proposes a comprehensive program for the purpose of reducing loss of life and destruction of property by fire and the establishment of a National Fire Research and Safety Center to be operated by the National Bureau of Standards "to provide a central focus for management of the national fire safety program."

President Johnson, in his message calling for a fire safety act, said, "The Federal Government must also begin to support and supplement private research efforts in firefighting and fire prevention."

In our opinion, S. 1124 goes far beyond this and gives to a single Federal agency the power to supplant the present public and private efforts in this area. The authority proposed to be granted appears to be all-inclusive.

The National Fire Protection Association is strongly in favor of programs and activities which will contribute to a reduction of fire losses. The existing programs of many Federal departments and agencies are now making substantial contributions; the same is true of programs of hundreds of State and local governmental agencies.

There are scores of privately supported organizations doing effective work at national, regional, and local levels. Takeover or duplication of these programs by the Department of Commerce would not serve the public interest.

We believe that basic fire research is a proper and logical function of the National Bureau of Standards and that an appropriate program for such research should be developed and supported.

It appears to us that a careful delineation of areas of activity and responsibility is needed prior to taking action on S. 1124.

Following is a description of the National Fire Protection Association and an analysis of the various proposals in S. 1124.

The National Fire Protection Association is a nonprofit, technical and educational organization solely devoted to the reduction of loss of life and destruction of property by fire. It was organized in 1896. Membership in the association is open to any organization or individual interested in fire waste control. There are two classes of membership, organization and associate. Present organization membership includes 215 national and regional associations representing many segments of business and industry, Government at Federal and State levels, professional groups, and public service organizations. We have presently nine Federal Departments as organization members of our association. Associate membership is made up of more than 20,000 companies and individuals from a wide range of business and industry, from Federal, State, and local officials, and many other interested groups such as universities, hospitals, libraries, architects, and engineers. Membership fees—currently $150 annually for organization members and $20 for associate members—are kept deliberately low to encourage the widest possible participation in and use of association services.

The influence of the association is worldwide and it has members from more than 70 countries. However, its activities are directed primarily to the United States and, to a lesser extent, to Canada.

One of the association's fundamentally important activities is the development and issuance of standards and recommended practices for fire waste control, with life safety the paramount consideration. These standards originate in technical committees balanced to represent all interests affected, and go through a quasi-legislative process before adoption and issuance. Some 1,700 fire protection experts serve on these committees without pay; there are now more than 130 technical and sectional committees, each responsible for a particular subject area. To date, 188 standards have been issued. They are updated frequently and published annually in the "National Fire Codes," consisting of more than 6,600 pages in 10 volumes. Subjects range from aircraft rescue and firefighting techniques, flammable liquids handling, and fire apparatus specifications, to life safety provisions in buildings, hospital operating room safety, and flammability of wearing apparel. NFPA standards, such as the "National Electrical Code," are widely used by Federal, State, and local governments as the basis for legislation and regulation, by insurance organizations, and by general industry.

The association maintains a fire record department which reports on all fires resulting in large loss of property, fires involving multiple fatalities, and other fires carrying important lessons, makes annual estimates of the distribution of fires by cause and occupancy, and publishes special studies of fires for the benefit of its members and the public.

An extensive educational effort to reach all segments of the public is carried on by the association, working directly and through many State and local agencies. NFPA has over 600 current publications, of which some 13 million copies were distributed last year. It publishes three periodicals: the bimonthly Fire Journal, of general interest to all concerned with fire problems; the quarterly Fire Technology, reporting on research and technical developments; the monthly Firemen magazine, serving fire departments.

The association sponsors the Fire Marshals Association of North America, which is made up of the State, Provincial, county, and municipal fire marshals and fire prevention officers of the United States and Canada.

The Society of Fire Protection Engineers, the professional, technical society in this field, is sponsored by the association.

Over the years, the association has become a worldwide clearinghouse for information on fires, fire protection methods, and fire prevention measures. Its 2,200-page Fire Protection Handbook is recognized as the most comprehensive reference and textbook on the subject of fire in the world. In general, NFPA is considered the central organization in the field of fire safety in this country, and, because of the wide range of its membership, an organization which serves the public interest rather than any special interests.

The following is an analysis of the various proposals in the Fire Research and Safety Act, and our views with respect to each one.

The Fire Research and Safety Act proposes:

1. Investigations of fires to determine their causes, frequency of occurrence, severity, and other pertinent factors.

As indicated in the description of our association, we have carried on this type of activity for many years. At present, the NFPA's Fire Reporting Committee (composed of qualified personnel knowledgeable on this subject) is working on a uniform fire reporting system that can be adopted by States and local communities.

It should also be mentioned that the Organization for Economic Cooperation and Development of the Federal Government has appointed a U.S. representative on an international Committee on Harmonization of Fire Statistics and, for effective U.S. liaison, has appointed NFPA's director of technical services to serve in a personal capacity on this Committee. Additional effort and financial support for statistical evaluation of fire loss experience would obviously be desirable.

We would observe, however, that the causes of fires are pretty well known and understood at the present time and that what is really needed is more intelligent use and dissemination of the knowledge already available. Clearly, more complete investigation and study of more fires would add to the science of fire protection. The basic problem is the quality of local investigations. If the Federal Government took steps to encourage and support the establishment of technically qualified State, county, and municipal fire marshals, a great deal could be accomplished. We suggest, therefore, that the program be so directed along this line of approach with assistance from the Fire Marshals Association of North America.

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The Fire Research and Safety Act proposes:

> 2. Research into the causes and nature of fires, and the development of improved methods and techniques for fire prevention, fire control, and reduction of death, personal injury, and property damage.

The research needed to achieve the desired goals falls basically into two categories: (1) basic or fundamental research, and (2) solving current practical problems.

The National Bureau of Standards could do much to fill the voids in our current knowledge. The National Academy of Sciences-National Research Council has a Fire Research Committee, and Dr. Astin has outlined a program for Federal action, including the establishing of an Interdepartmental Committee on Fire Research. He has done this at the request of the Federal Council for Science and Technology.

This Committee should guide the Bureau in its planned program of fire research and the Congress is urged to support such activity when a definitive program is offered. It should be pointed out that millions are now being spent today by Federal agencies in fire research on practical problems and for nuclear fire defense needs. Any new program should be carefully integrated with existing activity.

The Fire Research and Safety Act calls for:

> 3. Educational programs to inform the public of fire hazards and fire safety techniques and to encourage avoidance of such hazards and use of such techniques.

There is little question that more effort and more money spent in this area would be productive. There is no lack of knowledge to foster such an educational campaign. NFPA activity in this field is, frankly, restricted by budget problems. The advertising council's support of a general program of fire prevention education was withdrawn in favor of their support of forest fire prevention. Federal support of a fire prevention educational campaign via television and other media would undoubtedly aid and abet the existing programs of the NFPA and other fire service agencies.

The Fire Research and Safety Act proposes:

> 4. Fire information reference services including the collection, analysis, and dissemination of data, research results, and other information derived from this program or from other sources and related to fire protection; fire control; and reduction of death, personal injury, and property damage.

We would observe that our association has been carrying on this activity for 27 years. We believe that our library is potentially the best fire reference library in the world today. This is not to imply that more effort and more money would not provide better collection and dissemination of data, although any effort along this line should be closely integrated with the engineering information retrieval system now being developed with the help of the Engineers Joint Council and the Society of Fire Protection Engineers.

The Fire Research and Safety Act calls for—

> 5. Educational and training programs to improve, among other things, the efficiency, operation, and organization of fire services and the capability of controlling unusual fire-related hazards and fire disasters.

Again, a very large amount of information is available in this area.

Our association maintains a fire services department that provides information to all of the 20,000 or more fire departments in the United States. Most of our States and cities operate fire training programs. Many municipal fire departments like the idea of a Federal Fire Academy for fire administrative training of officers. We favor use of Federal funds for this purpose. Grants to State training programs would help.

The Fire Research and Safety Act calls for—

> 6. Projects demonstrating improved or experimental programs of fire prevention, fire control, and reduction of death, personal injury, and property damage, and application of fire safety principles in construction and improvement of the efficiency, operation, or organization of the fire services.

We are not clear as to what this proposal intends, but we will readily agree that improvement in any of these areas might produce fruitful results.

The Fire Research and Safety Act suggests more fire protection engineering in colleges and universities. There is little question about the desirability of such courses. Architectural courses certainly need more fire protection information.

Finally, the act proposes:

> 7. A national research and safety center to carry on certain kinds of research not presently being conducted by other Government or private facilities.

There is certainly an opportunity for more fundamental research on the phenomena of fire as against the large amounts of applied research that is now being carried on by various agencies and organizations.

The act suggests that this center would provide a central focus for management of the national fire safety program. We question whether one Federal agency can, or should, effectively manage the entire program of fire protection and prevention. Can this not be better done by the cooperation of various Federal, State, and local fire agencies, industry and others concerned working together as is presently being done through the National Fire Protection Association?

Thank you very much, Mr. Chairman.

Senator CANNON. Thank you, Mr. Bugbee. Would you say that your position is consistent with that outlined by the panel which you have just heard? I am not quite clear in my own mind.

Mr. BUGBEE. I think it is consistent in that they suggest that prior to carrying through this very massive and complete program of study, the Commission would be desirable. I would go along with that idea.

Senator CANNON. But they suggested an amendment to the act, to be carried out concurrently with the operation outlined in the act.

Mr. BUGBEE. It would be my opinion that it would be better to make the study first.

Senator CANNON. In other words, you would favor the commission idea first rather than proceeding with the provisions of the act here.

Mr. BUGBEE. Yes, sir.

Senator CANNON. Thank you for your thoughtful statement. I am aware of the great contribution made by the National Fire Protection Association to fire safety. I am sure it would not be the purpose of any member of this committee to enact legislation intended to take over or duplicate efforts already being carried out by private industry, private fire safety organizations, but rather to complement and assist these programs, because we all would agree that there is certainly some need for help in that direction.

Mr. BUGBEE. Thank you, sir.

Senator CANNON. Thank you very much for your statement, Mr. Bugbee.

The next witness is Mr. Ambrose Kelly, general counsel, Factory Mutual Fire Insurance Cos., Providence, R.I., accompanied by Dr. John A. Rockett.

STATEMENT OF AMBROSE B. KELLY, GENERAL COUNSEL, FACTORY MUTUAL FIRE INSURANCE COS., PROVIDENCE, R.I.; ACCOMPANIED BY DR. JOHN A. ROCKETT, DIRECTOR OF BASIC RESEARCH, AND JAMES B. SMITH, CHIEF ENGINEER.

Mr. KELLY. I am Ambrose B. Kelly, general counsel of the Factory Mutual System, appearing at the direction of the joint affairs executive committee of these companies. I am accompanied by Dr. John A. Rockett, our director of basic research, and Mr. James B. Smith, our chief engineer, who is thoroughly familiar with our applied research program.

My purpose is to recommend that your committee give favorable consideration to Senate bill 1124, under which the Organic Act of the National Bureau of Standards would be amended to authorize a fire research and safety program to be conducted by the Secretary of Commerce.

Our organization is extremely well qualified to discuss the program of research and education to be carried out under the bill, since we have for many years been one of the leading organizations in the world in this field. We have, for almost 100 years, carried on a research program whose principal thrust was in the direction of preventing loss from fire and explosion through the development and testing of devices and equipment which would be effective for this purpose

From the very organization of our companies over 130 years ago, we have had a program of education to assist industry in its effort to prevent fire loss. Attached to this statement is a copy of our booklet titled "Loss Prevention in Print," which lists the handbooks, manuals, booklets, circulars, posters, placards, and film which have already been prepared and are currently being used in our own educational efforts. The "Handbook of Industrial Loss Prevention," prepared by the staff of the Factory Mutual Engineering Division and published by McGraw-Hill, is universally regarded as the authoritative work in this field.[1]

The members of the committee have received copies of our property conservation program kit, which has been prepared to assist management in any insured plant in establishing fire safety as a smooth functioning part of plant operations. Here are folders and handbooks to help with the instruction of protection maintenance men and members of the emergency force, and here is help in gaining the knowledgeable cooperation of supervisory personnel in bringing all employees into the program. We feel that these materials amply demonstrate the fact that the Factory Mutual system is now and has for some

[1] Document referred to is incorporated by reference and placed in Subcommittee files.

time carried on a major educational effort in the area of fire and loss prevention.

Our performance in the field of research is even more impressive. The first Factory Mutual Test Center was established at Everett, Mass., in 1922, but this was preceded by research carried on at Massachusetts Institute of Technology which began about 1875. For many years, the Factory Mutual Test Center at Norwood, Mass., has been a mecca for scientists interested in fire and loss prevention from all over the world.

In June of this year, we will open at Glocester, R.I., a new fire test center, which is the largest and finest facility so far constructed for holding full-scale fire tests in a building fully instrumented to extract the maximum in information. Through the Factory Mutual Research Corp., a not-for-profit corporation, which was established in 1941 to aid in the war effort, we are already handling contract research for industry and government, using our unique facilities and our trained staff for this purpose.

Within the last 3 years, Factory Mutual companies have recognized the need for basic as well as applied research. We have, therefore, put together a team of topnotch scientists, headed by Dr. Rockett, which is currently working at the National Bureau of Standards in the development of basic scientific data pertinent to the phenomenon of fire. We hope their work will lead to a better understanding of the mechanism through which fire is spread and propagated. As we go further, we expect to delve deeply into the physics and chemistry of the combustion process. This basic research team, now working at the Bureau of Standards, will soon be moved to our New England headquarters.

As the simplest way of giving you the whole story of Factory Mutual research and some understanding of the new test center, I have attached to this statement, a copy of an article on our research program and the new test center, which will appear in the next issue of the Factory Mutual Record.[2]

We feel that this record demonstrates the awareness of the Factory Mutual System to the importance of research and education in fire prevention. We have, however, been very conscious of the fact that our resources are not adequate to explore all of the avenues which cry out for scientific investigation. Of necessity, we limit our work in the field of applied research primarily to the problems of the industrial and commercial risk.

At the request of our policyholders, we prepared a booklet on "Home Fire Safety." Over a half million of these booklets have been distributed to their employees to assist in protecting their homes. We have not given attention to the establishment of building codes, the development and promotion of improved techniques on the part of public fire departments, and the improvement of the services for the collection and dissemination of statistical data with reference to general fire experience. In our own area, we think we have accomplished much, but we realize that even more could be done if money were available.

We realize that S. 1124 calls for the expenditure of $10 million annually for the next 5 years, but we feel that this is an investment which will yield substantial returns in property loss reduction alone.

[2] Ibid.

It is through research and education that we will ultimately be able to control fire loss. Only a 10-percent reduction in the annual fire loss to property in the United States would cover the amount appropriated by this bill many times over and it would also enable us to reduce the terrible annual toll in dead and injured as the result of fire here in the United States.

Mr. Chairman, we urge that your committee give favorable consideration to this bill.

We, I think, have probably done as much as any private group in the United States over the years in the field of research and education, in an effort to reduce the total fire loss. It is true, of course, that the bulk of our effort has been concentrated in the industrial field in which we have always specialized, but in recent years, we have expanded our activities and our research program into the field of both residential and mercantile properties. We are also, for example, major insurers of educational institutions, and we feel that in this area, we have been helpful in reducing the total of the fire loss.

The point has been made in the discussions earlier today, that the total of fire in the United States in loss of life, and in per capita loss of property destroyed, is the highest in the world. I think it is interesting, that in the field of industrial risks, this is not true.

You state as a result of the efforts that have been made by our organization and similar organizations that have been set up by the stock companies, we have produced results which are better than those that you find in the industrial countries of the world.

In other words, our loss experience in the field of large major industrial risk is better than it is in such countries as Germany, France, and England. And, we feel that this is true because in this area, the United States has not only developed the industrial product which is the envy of the rest of the world, but has also at the same time, through research and engineering, paid attention to those things which can be done to reduce the amount of fire loss which is suffered. I think this is an important point, because it is a concrete demonstration of the fact that research and engineering will pay off, that they will pay off here in the United States, and that a more comprehensive program would inevitably be successful in reducing the present total of fire.

Let me, for a moment, outline the qualifications of the Factory Mutual System to comment in this area. From our very beginnings in 1835, we were set up by industry because of its concern over the need for better construction and better protection against fire loss. We have been among the very first to voice the need for engineering. The Factory Mutual Companies, Inc., were the first group to employ graduate engineers to give full time to what could be done, through the application of engineering knowledge, to reduce loss.

We, at the moment, are about to dedicate—and Undersecretary Hollomon, who was your first witness today, is going to be the speaker at the dedication—the Factory Mutual Research Center. I have supplied to the counsel for the committee, a pamphlet which will give you the complete story of the new research center, which will be dedicated in June.

I mention this because this is the finest facility of its kind in the world today.

Senator CANNON. Where is that to be located?

Mr. Kelly. In Rhode Island. It will be in western Rhode Island. We have a tract of 1,500 acres. We have our own small pond with 28 million gallons of water, so that we will have adequate water for full-scale fire tests. Here we are going to be able to carry on the type of full-scale experimentation which we think is essential to get the concrete information which can be then applied by our engineers across the United States, Canada, and throughout the world in the protection of American enterprise to reduce fire loss.

Senator Cannon. Your research program will still be directed toward the industrial loss area?

Mr. Kelly. Our research program has been primarily directed toward the industrial loss area. Our insurance is, for the most part, of the larger corporations.

It is interesting, knowing our expertness in the field of loss prevention, we were asked by our policyholders to develop a booklet on home fire safety. We did so, and 500,000 copies of this booklet have been distributed by the people we insure, the major corporations of the United States, to their own employees. So, we could make some contribution to the field of home fire safety, because we feel here the safety of life is so important, despite the fact that we are not insuring the houses themselves.

Throughout, we have found that there are so many aspects of this problem which are essential in our judgement, which duplicate the fields of activity that are outlined in this bill.

For example, we have discovered that the human element cannot be ignored. You have, of course, the need for research in building materials, you have the need for research in the development of better protective devices. And for example, the standard sprinkler head, which is now used by industry throughout the United States, was the product of the Factory Mutual Research. We turned it over to the sprinkler manufacturers on common date, so that no one would have an advantage, with the thought that this was a contribution we could make to the reduction of fire loss here in the United States.

Senator Cannon. What is the monetary extent of your R. & D. program that you will have underway at the new center?

Mr. Kelly. At the new center we anticipate—and I would like Mr. Smith, who is very familiar with this—I anticipate that the first year's activities there will involve about a half million dollars a year.

Is this correct?

Mr. Smith. Yes.

Mr. Kelly. Besides that we have developed, we felt as I think anyone must who studies this, that you need a basic research program, and the bill sets out this need. Applied research isn't enough. We came to the conclusion that no one was digging deeply enough. So 2 years ago we set up our own basic research program, and I have also supplied the members of the committee with a short statement on one sheet of 8.5 by 11 paper. We now have a team of scientists, headed by Dr. Rockett, whose job is not to discover what can be done to handle a particular problem, but to do the necessary digging into the fundamentals of the fire problem—such problems as the convection of air currents in a closed room which we think we all understand but which have not been studied scientifically; to study flame spread, for example; to dig into the physics and chemistry, to all of the fundamental aspects of the fire problem, without feeling that they must turn up a concrete result.

For example, we have definite work in the field of applied research where we know what the problem is. It can be recovery boilers which are giving us concern, or the high piling of storage materials because our new change in materials handling procedures have made it possible for us to go much higher into the air efficiently.

We have discovered that this creates problems. We see that these are two separate problems and that you must on the one hand try to have a good team working in the field of applied research and you have to have a basic research team such as that headed by Dr. Rockett whose objective is not to find an answer to a particular problem, but to find out what the fundamental mechanisms are that are involved whenever you have a fire, as to why it spreads, as to how it can be controlled.

So that we are working in both areas.

We are very conscious of the fact—and anyone who goes deeply into the fire problem must be—that the human element cannot be ignored.

We have developed an entire program which we call our property conservation program, which starts with the top management of industrial concerns, or any other institution, and attempts to convince them of the need for loss prevention and then provides them all of the basic data for carrying that data down through their own organizations.

We are really consultants to industry in the field of fire prevention. We feel being consultants isn't enough. You have to lay out a program which people can follow which results in reducing the total fire loss.

We have discovered that you can have two identical plants from a physical standpoint, both well constructed and well protected. One will have a good experience, one a bad experience. What is the difference? The people.

For example, there are always references to the fact that the Japanese have an excellent experience in the fire field. Why? Because the Japanese traditionally have been scared to death of fire. They have burned up their cities. In the feudal times in Japan they were so conscious of this that if a man had a fire started on his property and it was his fault, he was crucified together with his whole family. This kind of left a dent on the Japanese psychology and they are careful in the handling of fire.

From a physical standpoint—and we have looked at their plants—they are not as good as ours. But from the standpoint of the attitude of the people, they are better. They are not as careless and, therefore, their losses are less.

We feel that in this area, going back to our beginning—as I say we were started by industry to help it in its work in 1835. Zachary Allen, who set up the first Factory Mutual Co., did so because he built a textile mill which he attempted to protect in every way he could, and he felt that the traditional insurance companies of that time did not recognize the work he had done in fire protection. So he joined with others who had the same approach in an effort to set up an insurance company of his own.

So we have always had this impetus toward fire prevention, toward research, toward education.

We are very aware of the fact that our resources, substantial as they are, and on top of the half million dollars we are spending in applied research at the test center, we have a very substantial expenditure for Dr. Rockett's program which is working in association now with the National Bureau of Standards.

We ultimately will move this to New England. But right now we find this need for correlation between what Dr. Rockett is doing and what the National Bureau of Standards is doing—and they have facilities which we do not have yet which we are using in his test work—we feel this need, but we are very aware that our resources are not adequate for the problem.

We feel that the opportunity for benefit to the country through an expenditure of the type that will be authorized under this bill is one of the best investments that can be made by the United States and that in time it will return manyfold in benefits to our citizens the amount that has been expended.

Thank you, Senator. My two experts will be glad to field the real technical questions.

Senator CANNON. Do either of you have any comments you would wish to add to Mr. Kelly's statement?

Mr. SMITH. No; thank you, Senator.

Dr. ROCKETT. No; thank you, Senator.

Senator CANNON. Thank you very much. I certainly appreciate your appearance here. I want to thank you for the material which you left available for each member of the committee.

Incidentally, I am informed that Senator Pastore is a personal friend of Mr. Kelly's, and I want you to know that he would be here except for the fact that he is in executive session with the Joint Committee on Atomic Energy this morning.

Mr. KELLY. Thank you, Senator. I have always enjoyed working with Senator Pastore. I won't give you one of the campaign speeches I would give for him if he were running for election. We all know him and know of his capabilities and his services to the country.

Senator CANNON. We know him very well. We are appreciative of your having sent him down here to work with us.

The next witness is Prof. H. W. Emmons, Harvard University.

STATEMENT OF HOWARD W. EMMONS, PROFESSOR, HARVARD UNIVERSITY, CAMBRIDGE, MASS.

Mr. EMMONS. I should perhaps first explain why it is that I as an individual have requested the opportunity to make a statement before your committee.

The efforts that I have made in the past have been in technical matters in engineering. This has been my basic interest. I have worked in engineering all my life. I have been a member of the Fire Research Committee of the National Academy of Science since the beginning.

In the work of that committee I have become acquainted with the nature of the problem, the degree to which modern science and technology is applied to that problem, and have been able to form a view as to what the potential is for the application of modern science and modern technology to the fire problem.

I have also become acquainted with the people who are now working in the fire area, and the great load of work which they have to carry in their day-to-day operations.

I would like in addition to say that I am a member of the National Academy of Sciences, the National Academy of Engineering, and a member of the Committee on Space Science and Technology.

I mention this latter—a subcommittee of the President's Science Advisory Committee—merely to indicate that I do have a background in technology which I believe is adequate to make a judgment on what could be accomplished if we in the fire area were to apply the same methods of approach with respect to modern engineering and modern science as is done in the space field.

I filed a statement with you on the Fire Research and Safety Act of 1967 and I will not read it, but will comment on some of the various items.

(The statement referred to follows:)

STATEMENT ON FIRE RESEARCH AND SAFETY ACT OF 1967, S1124 H.R. 6637—H. W. EMMONS, HARVARD UNIVERSITY

On the basis of 8 months of intensive study of the Fire Problem around the world, I wish to make the following statement.

The losses from the unwanted fire are of universal concern and grow with the affluence of society. In almost every phase of this problem the effort to understand and control has fallen far short of what modern technology makes possible.

To begin with, even the magnitude of the losses is uncertain since nowhere is sufficient and sufficiently accurate loss data collected. Nowhere is this data sufficiently detailed to make possible the kind of analysis needed to answer cost effectiveness questions with respect to either fire prevention nor fire control. The NFPA does an excellent job to the extent that their voluntary approach makes possible. They should receive encouragement and where useful help.

The simple but critical question "what is a minute worth?" i.e. what additional destruction of property value and loss of life would result from a one minute additional delay in fire department response, gets only the answer "We don't know." And yet the answer to this question is essential if modern operational research techniques are to be used to help with fire house location, fire equipment requirements, fire fighting techniques, etc. In fact only once has any attempt been made to use operational techniques on fire department operations and that was last year at the large British fire research station at Borehamwood just north of London. This analysis in spite of the serious limitations of the basic data was so successful that this technique has been taken over by the Home Office.

Under the term "prevention" one thinks first of personal habits of the home owner—how clean is his attic, does he smoke in bed? This phase of the fire problem comes under the heading of fire education. The present limitation to our educational effort is financial. As much is being done as various private profit and voluntary enterprises can muster. But education is a never ending problem—one in which qualitative thoughts of cost effectiveness must set the financial limits of our support. It is generally agreed that our society's efforts to date fall far short of the most efficient cost. If some additional money were spent on fire prevention education it would be returned with interest in the decrease in losses.

World wide the best financed part of fire study is the testing of materials—best financed since private materials and construction industry must show that their product satisfies fire parts of building codes. But do the codes accomplish their purpose? The answer is NO! Let me cite just two of the glaring deficiencies.

1. Floor slabs in a building are required to pass a fire endurance test. This test does not at present specify the degree of constraint on the slab and standard tests are now performed in different countries which make a 4 to 1 difference in endurance. A given slab lasting 4 hours in one test only lasts 1 hour in another. This is now a clearly recognized deficiency and is receiving much concern and some attention in a number of laboratories. However, as if this were not enough, the code requirement itself is nonsense. What we really want is that the building *as built* have adequate fire endurance. Today no one can predict the performance of the building as built from any of the test results and *nowhere is there any research program to find out how to do it.* Today we would have to build the building and test burn it if we really insisted on knowing its fire endurance. This is in fact what the Russians do.

2. Architects should specify the use of less combustible materials to make buildings more safe. Yet how do we find out what is less combustible? There

are many tests, one in each country used as a standard in the respective country. 24 materials tested by 6 different "standard" methods could not agree. In fact disagreed *so badly* that one material was the most combustible on one test and the least combustible on another. This means that as you cross the border from Denmark into Germany the poorest material has suddenly become the best.

I could cite many more deficiencies in our knowledge and procedures but these are sufficient to show that at the present time we do not understand the fire problem well enough to write the proper fire codes. Basic research on these and many other points is urgent but at present cannot be done for the sole reason that the required sustained financing is not available.

A key problem is fire detection—every minute counts even if we don't know how much. Here detector and automatic sprinkler manufacturers have done considerable work but various basic details are missing. Sprinklers distribute their water well *when there is no fire.* A few tests with fires show that fire convection is so strong that a sprinkler does not put significant water on the fire, it merely wets everything else so that the fire cannot spread and hence burns itself out. In the meantime so many heads have opened in a fire that water damage generally exceeds fire damage and overloads the water supply. No careful study has ever been made on the water droplet size distribution required to cure both of these problems.

Warning detectors have for many purposes reached a satisfactory state of development and yet one of the most progressive manufacturers had not noticed the fact that their radiation detector can be fooled by multiple fires and their smoke detector is more sensitive than desirable to the size of smoke particle. And no one is attempting to do the research required to eventually rival the detection capabilities of the human nose. Why not an automatic smeller?

And now for the poor fireman—Who tries to help him? Almost no one! And yet his job is a difficult and dangerous one. He needs the kind of help our technology has given the airplane pilot and the astronaut. Again take just one example. Let us look at a brand new pumper. There are many screw couplings for different hose sizes and valves to regulate the pressure shown on an array of a dozen pressure gauges. A fireman is stationed at the pumper to control the pressures required on the different size hose lines of different length with different size nozzles. This fireman must make hydraulic calculations to know what pressure to set. But in 1967 this is a ridiculous requirement. The valve settings should correspond to the nozzle size in use and the pumper should automatically set the *flow* up to a maximum safe pressure.

No modern man-machine study has ever been made of the fireman's equipment. No modern analysis has been made of his operations so as to simplify them where possible and so as to detect the subtle deficiencies in his equipment or to devise entirely new approaches to his equipment needs.

Even obvious deficiencies are not attacked with vigor. For example, over many years Breathing Apparatus of a kind has been developed. And yet, it is heavy, it does not provide obvious electronic aids to communication—i.e., he now can't hear nor talk to his buddy—and almost nothing has been done to make "seeing" through the smoke possible by use of infrared or microwaves.

Again I could go on and on to spell out those problems of the fireman which modern technology and research techniques could attack but in which essentially nothing is being done.

To take one more illustrative example, consider the fire safety problem. Most victims are asphixiated, not burned to death. What components of the decomposition products of wood are responsible for the death? CO perhaps, but we don't know. And what about plastics and all of the other modern building materials—which ones give off really dangerous fumes? Again we don't know. Furthermore given a production of toxic products by an accidental fire how should the building ventilation system respond so as to maximize the safety of the inhabitants? A little work has been done and is being done here and there, but it is grossly inadequate in range of designs, in number of tests, in instrumentation, in engineering and mathematical analysis, and in availability of computer time to get the needed answers in the shortest time. High rise and totally weather controlled buildings are here now but the answers are not. We can't wait.

These problems selected from here and there over the broad range presented by society's fire troubles illustrate the enormous need to provide a mechanism by which modern science and technology can be brought to bear on the control of the unwanted fire just as it has been brought to bear on the problem of putting a man on the moon. The American way is to provide the incentives for private enterprise to spearhead our progress. But in the fire problem, as in many other safety and prevention problems, the possible profit is too small and too remote to provide the required incentive. *If the profit motive was sufficient it would already have provided answers for many of these problems.* But, as with safety in automobiles, we need the technologically easy answers now and the bill now under hearings is an essential step in promoting the solution of these problems by use of all the forces society possesses. The passage of such a bill has already been delayed too long.

FIRE RESEARCH ABOARD

Abstract

Between September 6, 1966 and January 11, 1967, one-day visits were made to 42 organizations in 11 countries. These organizations are engaged in all phases of the fire problem: fire protection, fire fighting, fire testing, fire equipment manufacturing, fire training, and fire research. This report summarizes the findings and discusses the strengths and weaknesses of the fire effort abroad.

Introduction

The enormous waste occasioned by the unwanted fire falls into two broad classes—urban and forest. Although my study abroad included both types, my report here will be confined to the problems of the city fire. Even this part of the problem is too broad for more than a brief treatment, in view of the wide range of materials and processes in use in a modern society. I will attempt to paint a general picture of the present state of fire research abroad, discuss several specific illustrative examples, and state my general conclusions.

Nature of the Fire Problem

One cannot evaluate research in a vacuum. Its importance can only be judged relative to the problem to which it is addressed. Let me first lay out the fire problem in a way which will disclose its full nature and permit us to see what fire research is and is not doing, can and cannot do. Table I looks at an unwanted fire from initiation to clean-up and tries to recognize in separate columns the nature of:

A The Practical Problem as encountered by the citizen, the fireman, the architect, the business man.

B The Basic Processes that occur during the course of the fire which by their effects produce the Practical Fire Problem.

C The Fundamental Phenomena in the sense of classical physics which occur in the Basic Processes and determine their quantitative and qualitative nature.

D The antics of Electrons, Atoms, Moledules, and Quanta for want of a better name. It is the various atomic events which cause the macroscopic phenomena called "Fundamental" to occur as they do.

Table I is not complete. Many more items can be added in each column. I have tried to put in sufficient material to make clear the meaning of the 4 levels of technical problem identification. Each level is subject to research potentially leading to solutions of some part of the practical problem. Each level is a more obvious and practical effect of the level in the column to the right, and through its effects produces the still more obvious and practical effects in the column to the left.

TABLE I—*A classification of the urban fire problem*

Stage of fire development	(A) Practical problem	(B) Basic processes	(C) Fundamental properties and phenomena	(D) Electrons, atoms, molecules, and quanta
Initiation.	Prevention. Rating appliances. Materials selection.	Growth of hot spot. Decomposition processes. Spontaneous combustion.	Decomposition and combustion reactions and products. Properties and chemistry of inhibitors.	Atomic and molecular organization in materials. Cyrstal structure, wood atomic structure.
Initial growth.	Detection. Suppression by novice. The fire department.	Combustion process. Fire spread process by glowing, by flaming.	Thermodynamic properties.	Energy levels, atom and electron mobility.
Spread in enclosure.	Ventilation for safety, suppression (automatic).	Smoke production. Natural convection. Effect of fuel geometry.	Transport properties.	Production and absorption of phonons and photons.
Flash over.	Rate of value. Destruction. Suppression by experts. Ventilation (fire safety).	Radiation heat transfer. Model laws for fire tests.	Heat and Mass transfer by conduction. Diffusion. Convection.	Detail reaction. Mechanisms with and without 0_2, with and without inhibitors.
Spread to other rooms.	Fire stops. Life safety. Prevention by design.	Forced and natural convection in ventilation systems and stair wells. Extinguishment by water. Fire spread through walls. Natural convection through openings.	Emission, transmission. Absorption and scattering of radiation for both heat transfer and communication.	Nucleation of phase change.
Spread to other buildings.	City planning. Ventilation (fire spread). Explosion hazard.	Toxic effects of gases. Radiation production. Radiation ignition. Thermal and decomposition.		
Rapid combustion.	Strength of structures. Safety of structures. Conflagration control.	Distortion of structures. Air flow through opening. Heating of structure. Spauling.	Surface tension effects drop formation, jet spread, foam formation, aglomeration.	Dislocation formation and movement.
Burnout.	Let it burn?	Model laws for heated structures. Discoloration by smoke. Sound transmission in damaged structures.	Strength of structural materials at high temperature. The dynamics of collapse by heating, by explosion.	
Cleanup.	Loss evaluation. Evidence of cause. Salvage.	Distortaion by explosion.		

The Visits

During the second six months of 1966, 42 laboratories were visited in 11 countries of Asia and Europe. To state even briefly all that they are doing makes a big report. The Appendix lists the laboratories.* These include a few fire departments, a few equipment manufacturers, a couple of fire colleges, various kinds of testing laboratories, and a few research laboratories. The universities visited were those at which colleagues or my former students now work and were not necessarily doing fire oriented work. The visits included large and small laboratories, and institutions supported by private industry, or government, or both.

Figure (1) shows approximately how current efforts are distributed over the 4 levels A, B, C, D of Table I. The shaded area shows the distribution of man hours, while the cross-hatched area shows the distribution of laboratories. Each laboratory was listed in each column in which it was working; some laboratories were listed 4 times, others only once.

*No laboratories in Russia were visited because they did not answer their mail.

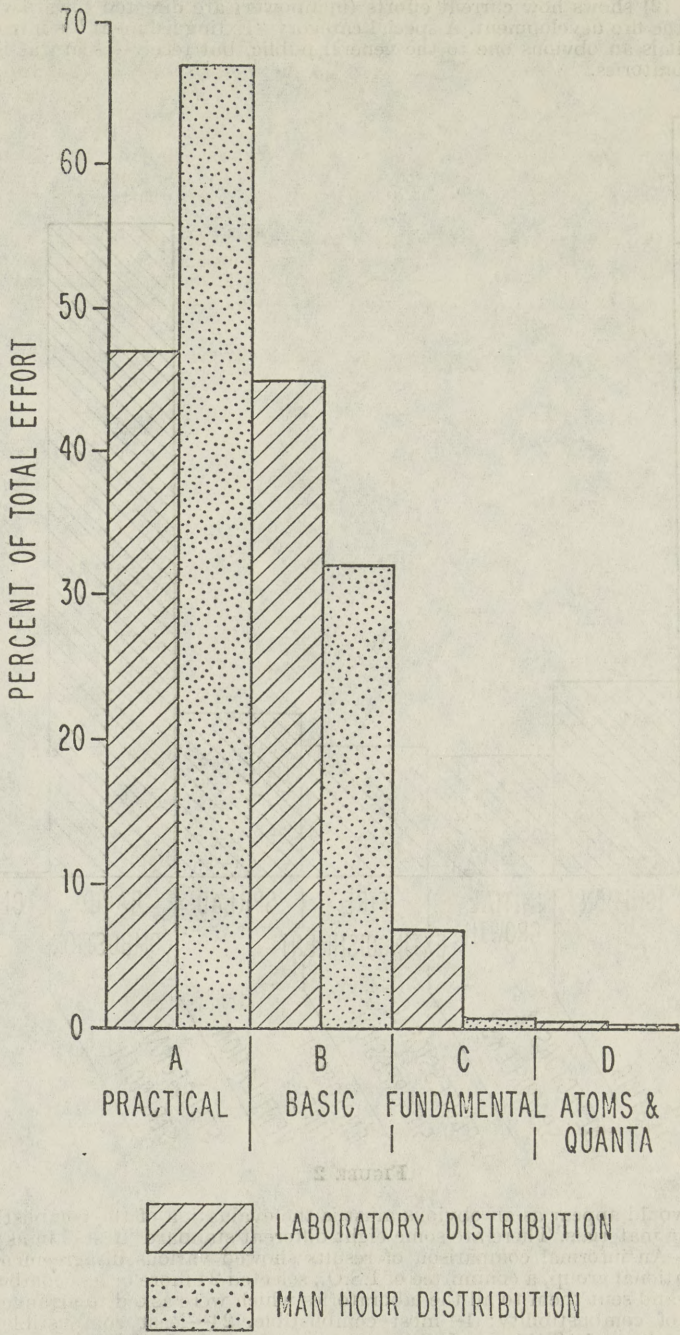
PERCENT OF TOTAL EFFORT
70
60
50
40
30
20
10
0
A
PRACTICAL
B
BASIC
C
FUNDAMENTAL
D
ATOMS &
QUANTA
LABORATORY DISTRIBUTION
MAN HOUR DISTRIBUTION

FIGURE 1

Figure (2) shows how current efforts (manpower) are directed toward various parts of the fire development. A special category "Extinguishment" is introduced because it is an obvious one to the general public, but receives scant assistance from laboratories.

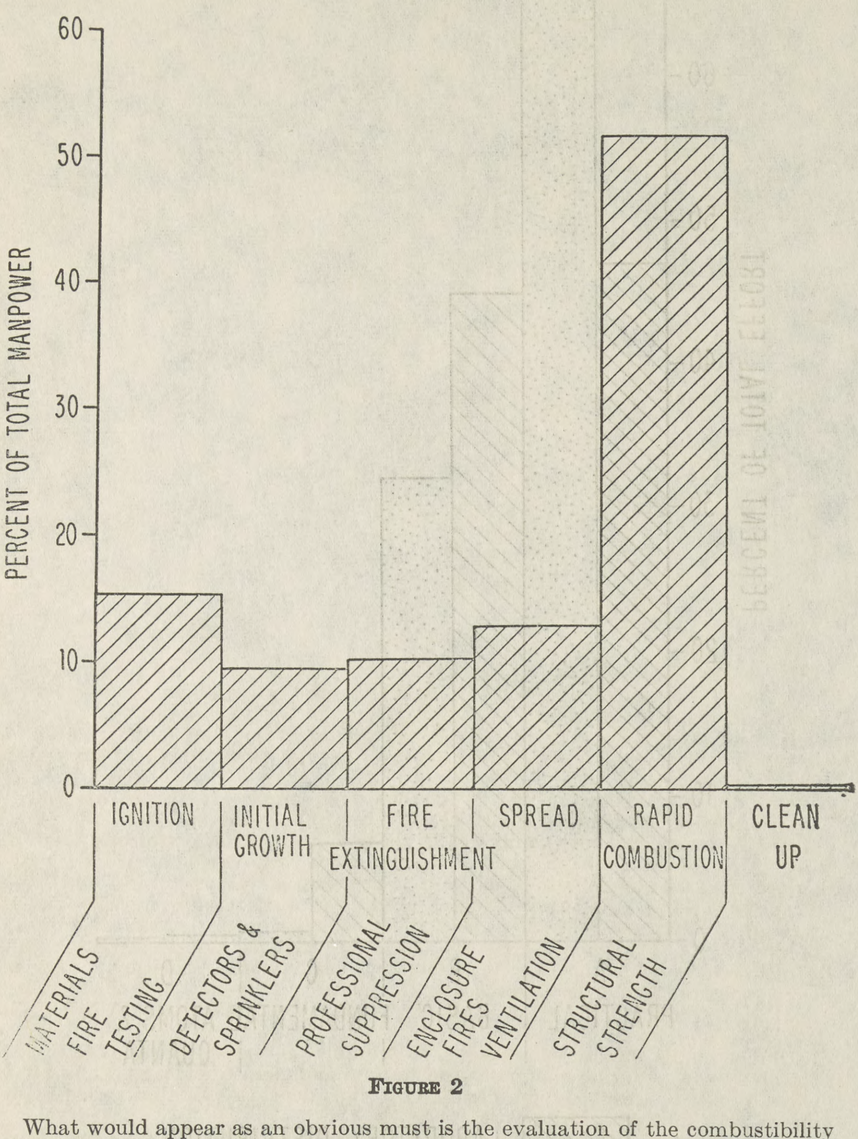

FIGURE 2

What would appear as an obvious must is the evaluation of the combustibility of building materials. There are some eight different standard "tests" in as many countries. An informal comparison of results showed various disagreements, so an international group, a committee of I.S.O., selected 24 more or less combustible materials and sent them to all the laboratories which were asked to arrange them in order of combustibility; 1—most combustible, 24—least combustible. The results are shown in Table II. Just casual inspection reveals the poor agreement. In fact, the two tests of Denmark and Germany moves #16, phenolic foam an inch thick, from most to least combustible, while the same two tests move material #13, acrylic sheet, from near the bottom to near the top in the *opposite direction*.

A statistical analysis of results shows the mean binary correlation coefficient to be only .44.

TABLE II.—*Relative rating of 24 materials by 6 different national standard fire rating tests*

No.	Material	Thickness m.m.	Treatment	Germany	Belgium	Denmark	France	Netherlands	England	Average position
1	Flexboard	25.0	No	9	7.0	9	10	9	10	5
2	do	25.0	Yes	20	19.0	21	20	17	12	20
3	Hard-board	4.0	Yes	7	13.0	14	18	15	16	14
4	do	4.0	No	16	20.5	8	2	4	13	12
5	Plywood	6.0	Yes	10	15.0	19	9	10	17	15
6	do	20.0	Yes	14	16.0	17	13	16	18	17
7	do	6.0	No	5	6.0	10	3	8	8	4
8	do	20.0	Yes	8	10.0	12	11	11	7	9
9	Particle board	20.0	No	12	12.0	13	8	5	3	13
10	Expanded polystyrene.	20.0	No	15	1.0	4	17	21	1	8
11	do	20.0	Yes	23	5.0	5	16	23	23	19
12	Phenolic paper laminate.	1.5	No	6	9.0	16	5	12	6	6
12a	do	15.0	Yes	19	22.0	15	22	22	14	21
13	Acrylic sheet	3.0		3	2.0	22	1	7	22	7
14	Particle board	25.0	Yes	13	14.0	11	7	6	9	10
15	Wood wool/cement slab.	25.0	Yes	18	23.5	23	24	24	24	24
16	Phenolic foam	25.0	No	24	23.5	1	21	19	19	18
20	P.V.C. sheet	1.5		21	18.0	10	19	18	21	22
21	Hard-board	12.0	Yes	22	20.5	24	23	20	15	23
22	Particle board	3.5	No	4	11.0	2	4	2	2	1
23	do	5.0	Yes	17	17.0	3	15	13	20	16
24	Flexboard	10.0	No	11	3.0	6	6	3	4	2
25	Polyester/glass laminate.	1.5	No	1	8.0	7	12	1	5	3
26	do	1.5	Yes	2	4.0	18	14	14	11	11

The results

One might suppose from Figs. (1) and (2) that the practical problem of the collapse of structures was THE most important fire problem in view of the attention it receives. There is no denying its importance. However, it would seem even more important to discover how fires start and how to design buildings to prevent their growth and spread. Let me mention a few of these ignition and growth problems.

Spontaneous combustion by the oily rag has almost passed into history now that saturated petroleum products have, for many purposes, replaced unsaturated oils. However, it is not commonly known that wood can spontaneously ignite in air. A two-inch diameter sphere of solid wood is covered all around with 2 inches of mineral wool insulation and is put into a furnace at 180° C (355° F) as shown in Fig. (3). The wood temperature rises rapidly to the furnace temperature, then very slowly for 5–8 days and then goes on up to rapid combustion temperature. This means that wood oxidizes rapidly enough at just a little above the water boiling point to accumulate heat if some insulation is provided. Occasional fires have been traced to this cause. It would seem important to relate these tests to the known data on wood decomposition, but this step has not yet been taken.

Only a small amount of work has been done on the spontaneous ignition of the many new materials coming on the market, and almost nothing is known of the effect of oxygen enriched (space craft) or oxygen deficient (vitiated air extinguishment) atmospheres. More work is needed.

To show graphically just how bad the present agreement is, the test data is plotted in Fig. (4). Here, for each material, an average relative rating was calculated and used for the "combustibility" order of the materials tested i.e. the independent variable. If all tests agreed on the relative fire danger of these materials, all points would lie on the 45° line. Even perfect agreement in this figure would not be impressive, since Fig. (4) considers relative rating only and not any absolute scale. But as you see, the test results fall far from the 45° line.

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To see just how bad this agreement really is I show Fig. (5) constructed in *exactly the same way* except that the "test data" on relative rating of 24 fictitious materials by six fictitious laboratories was obtained by drawing 24 numbers from a hat. Fig. (5) is pure random data with *no* significance. It is a little worse than the real data of Fig. (4), but not much.

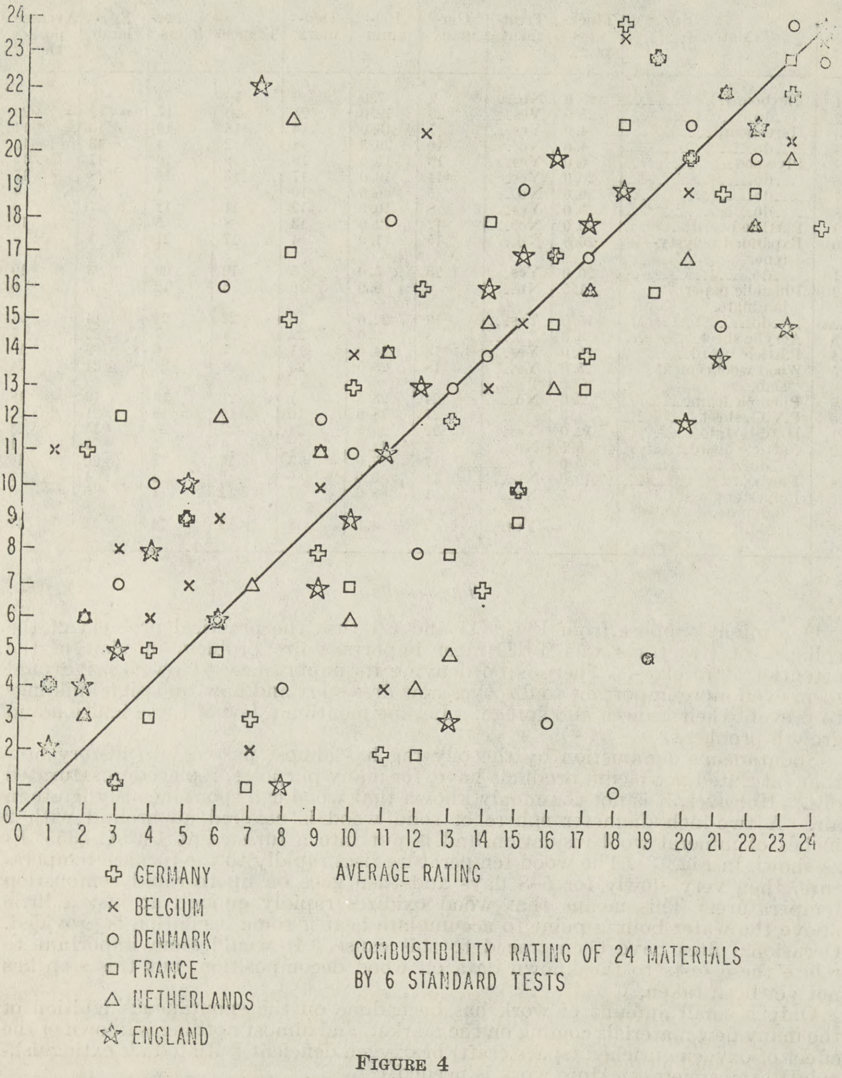

FIGURE 4

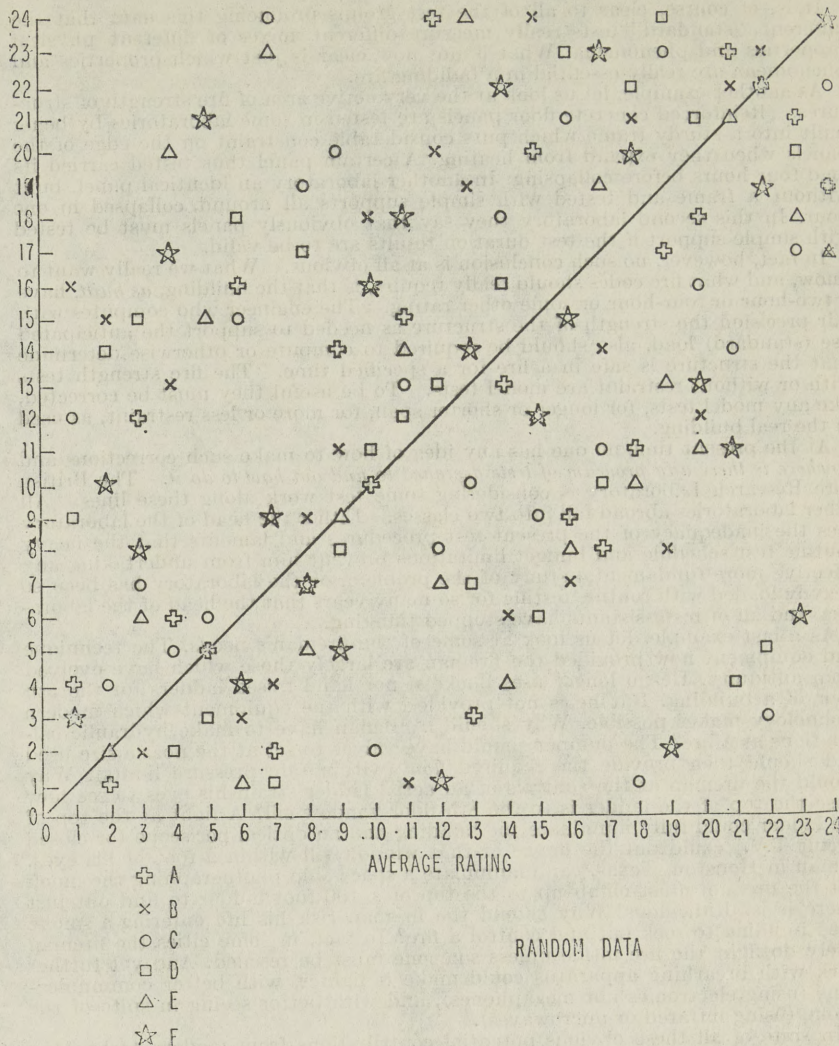

FIGURE 5

Such profound disagreement between serious attempts to measure combustibility points out better than any argument that we really don't know what we are talking about when we say "this is more combustible than that"; "this is a more safe building material than that." It is not clear that the many factors that may be important: ease of ignition, rate of burning, smoke production, transmission of heat, etc., can in any practical way be expressed as a single number, whether we like it or not.

What we need at the present time is a considerable research program at the practical, basic, and fundamental levels, in order to find out what we really do want to know. After this is done it will be easy to devise one (or a series) of internationally agreed upon tests. To devise any test before we know what we want is to risk making, with much test effort, a handbook for material's combustibility which must be thrown away when future studies show the tests to be inadequate or worthless.

It is, of course, clear to all of the test groups producing this data that the different "standard" tests really measure different mixes of different physical properties and phenomena. What is not now clear is just which properties and phenomena are really essential in a building fire.

As another example, let us look at the very active area of fire strength of structures. Reinforced concrete floor panels are tested in some laboratories by being built into a sturdy frame which puts considerable constraint on the edge of the panels when they expand from heating. A certain panel thus tested carried its load four hours before collapsing. In another laboratory an identical panel, built without a frame and tested with simple supports all around, collapsed in one hour. In this second laboratory they say that obviously panels must be tested with simple support if the test duration results are to be valid.

In fact, however, no such conclusion is at all obvious. What we really want to know, and what fire codes should really require, is that the building, *as built*, have a two-hour or four-hour or some other rating. The engineer who computes with fair precision the strength of the structure as needed to support the anticipated use (standard) load, also should be required to compute or otherwise determine that the structure is safe in a fire for a specified time. The fire strength tests with or without restraint are model tests. To be useful they must be corrected, like any model tests, for longer or shorter span, for more or less restraint, as used in the real building.

At the present time no one has any idea of how to make such corrections and *nowhere is there any program of tests designed to find out how to do it.* The British Fire Research Laboratory is considering some test work along these lines. All other laboratories abroad fall into two classes. Either the head of the laboratory sees the inadequacy of the present test procedures and laments that the heavy routine test schedule and budget limitations prevent him from undertaking any effective more fundamental study of the problem, or the laboratory has been so heavily loaded with routine testing for so many years that the head of the laboratory and all of his assistants have stopped thinking.

As a last example, let us look at some of the fireman's needs. The technique and equipment now provided the fireman are largely those which have evolved from antiquity. He no longer uses buckets, nor hand raised ladders for the 5th floor of a building. But he is not provided with the equipment which modern technology makes possible. Why should a fireman have to make hydraulic calculations at a fire? The pumper should have valves to set at the nozzle size used and should then provide the required *flow* (within safe pressure limits). Why should the fireman at the controls of an aerial ladder strain his eyes to see how close the top of the ladder is to the 8th floor window sill? A light at the top of the ladder could fully illuminate the building and an optical periscope (or closed circuit T.V.) could put the image of that window sill within a foot of his eyes. A man in Houston, Texas, can manipulate a space ship photographing the moon but the fireman must climb up to the top of a 100 foot ladder to find out just where it is. Ridiculous! Why should the fireman risk his life entering a smoke filled building to seek out and control a fire? In fact, in some cities the fireman rarely do fight the fire inside unless someone must be rescued. And yet further work with breathing apparatus could make it lighter, with better communications (using electronics not megaphones), and with better seeing in spite of the smoke (using infrared or microwaves).

In spite of all these obvious potential contributions from modern technology who is working on them! In first approximation *No One*. Actually a little work along these lines is done as always by various firemen. But their business is fighting fires not the science and engineering of modern technology. We don't ask the pilots to design their new supersonic aircraft and we don't expect the astronauts to design the space ships. The fireman is just as important to our society and deserves the same assistance. A little work is done now and again by equipment manufacturers but here the market is so limited and the competition so keen that more often he resists the expense implied by the urgent demands of firemen for modifications of his new equipment. Finally I should mention the fact that in both England and Japan the support of fire studies is sufficiently great and sufficiently broad that some work on the fireman's problems is possible and is being done.

Conclusions

Almost everywhere the proper application of modern technology to the fire problem is hampered by grossly inadequate budgets. As a consequence only in very limited areas has enough practical and basic work been done to provide a reasonable foundation for present-day practices and even in these areas many important basic ideas remain unexamined. In most areas, such glaring uncertainties remain, that present practices may be worse than useless, since a routine satisfying of incorrect requirements gives one a false impression of security.

Acknowledgments

This work was supported in part by the National Science Foundation under Grant GK–771, and by the Division of Engineering and Applied Physics, Harvard University.

Mr. EMMONS. One additional item I should mention. I am currently on sabbatical from Harvard and have spent the last 6 months traveling around the world visiting fire research stations, fire stations, fire training institutes, college programs which are fire connected.

I have visited some 52 laboratories in 11 countries. I think I have a fairly broad background and picture of what is currently being done, how it is being done, and the point of view from which it is being done.

I would like to make my statement as follows:

The basic thought which I would like to leave with the committee is that in spite of occasional statements to the contrary, modern science and technology which has produced for us our unmatched affluent society has not been fully brought to bear on the fire problem.

Affluence does bring with it additional risks, many additional risks. However, the same technology that has produced these riches has not been brought to bear on our preservation of those riches from the scourge of fire.

Let me give you a few specific examples. Let us first take the most active field around the world—the most active field into fire research is in matters of structural safety of buildings. There are many, many test laboratories making standard tests of such methods, methods of construction for producing buildings safe from fire.

These are done in accordance with standard tests so that the manufacturer—and it is done at the manufacturer's expense, and quite properly so—will pass the codes required for fire safety. There is no mechanism anywhere in the world to decide whether or not the codes are indeed adequate—and in fact they are disgraceful.

Let me be quite specific. A specific construction of floor panel tested on a standard fire, on a standard furnace, lasts 4 hours if tested in one test setup. The item lasts 1 hour if tested in another one. These are the two kinds of tests accepted in their respective countries.

This difference is of great worry to those who are now making tests and there is work in progress attempting to correct this difference.

However, whether or not a standard, internationally standard test, is acceptable, is beside the point. What I want to know, and what the citizen has a right to know, is how long that floor panel [indicating] will stay there if we have a fire. And it is impossible at the present time to answer that question without building it and building a fire under it.

We do not know enough of the science of the scaling of model tests up to full size to be able to predict what this one will do.

Those who run tests in furnaces don't regard these as model tests. After all, it is the full-sized construction. It is not made smaller. Yes, it is full-size construction but not in span, not in dimension, not in its association with the surrounding building.

These questions are essential to be able to answer the question of how long will this floor panel last. And it is the only thing that is really important. We don't know.

Let me take another item. There are combustible tests. Dr. Astin earlier mentioned that one of the things that the Bureau of Standards has been working on for many years is the combustibility of materials. Many different countries have worried about this problem. In fact, all of them worried about the fire problem at all have done so. And in each case a test has been devised by which you can rate combustibility of materials. There is a French test and a German test and a Danish test and a British test. There is no U.S. test, as such, but there is the standard tunnel test that is used here.

These tests were not agreeing with each other very well. And so a committee of the ISO—International Standards Organization—got together, selected 24 more or less combustible materials and sent them to everybody, all the laboratories, and said, "Rate these materials." Six laboratories did so. The ratings are in. And the agreement is abominable. It is so bad in fact that an acrylic is the worst material in one test, and the best material in another test.

I suppose one should draw the conclusion from that that these tests are stupid. Not at all. What is the matter with the Bureau of Standards? They have been working on this problem for years. Haven't they been able to straighten it out? No, it is a tough problem.

And what work is being done to try to straighten out this? Precious little. There is some, as much as the budget of these various laboratories can afford. But they can't afford much.

How long can we wait to tell what is safe to use as a building material? We have waited too long already. Is enough research being done? By no means.

Let us look at a couple of other items. Ventilation systems. We are building high-rise buildings rapidly. We are building completely weather-controlled buildings. It is quite clear and well recognized that if we have a fire in one room in this building and do nothing about it, the ventilation system will proceed to asphyxiate everyone in the building by proper direction distribution of the smoke everywhere.

There is some work in progress attempting to correct this. But it is very small.

Fire departments run such tests in this country. The fire department of a city may take over an abandoned building and run some tests. I have looked at the results of such tests. Those tests were very informative in the case that I saw, with respect to that particular building. But a fireman is not a research man and we don't expect him to be. He has enough problems, as have been pointed out by other witnesses, without trying to be an expert in technical matters.

These tests were excellent so far as they went. And in the building that is now burned to the ground, we do know how the gases would be distributed in them and what to do to fix it. But the technical level of that study was not adequate to permit you to design this building, or the one that we are building today or tomorrow. This kind of work needs to be done.

Who is doing it? Well, the Italians have a considerable-sized high-rise building made of reinforced concrete for studying such problems.

The French have such a building. Perhaps in a few of the labs that I haven't yet visited in the United States, I will discover such. But so far I don't know of anywhere in the United States where there is a concerted attack on this problem.

I do know that the programs that are being done in Europe, that I just mentioned, are nothing like adequate to answer the technical questions involved, so that the architect, the engineer, when he designs a building, can take these fire matters into account in the same way that now he guarantees us a structure that will stay in place when we load it.

Let's take just one more item. How about the fireman? It has been noted already that the fireman would rather like some help in some of these questions. Yes, indeed. He needs help, and who now gives it to him? Over the world something like 10 percent of the total effort goes into trying to help the fireman. In one country a fire chief who has attempted to run such a program cried on my shoulder because he couldn't get sufficient financial assistance. And yet in the same university in another section there is a beautiful test lab. When is the fireman going to get the help he needs?

We don't ask the astronaut to design his spaceship. Why should we ask the fireman to try to design the things which modern technology could provide him? He can provide the problems all right, and must, and does, but it is up to our science and technology and those trained in this area to make the developments that will supply new methods and improve old ones.

And let's be quite specific. We expect a fireman to be a minor sort of hydraulic engineer. He hooks up to a pumper 2,000 feet of two and a half inch hose and puts an inch and a half nozzle on it. He has to calculate what pressure to supply to that nozzle. What for? How ridiculous. He has other things to do with his time at a moment like this. Why can't that fire engine set the flow required, and supply its own pressure as needed? Why does the fireman have to stand there and juggle the valves. This is foolishness in a modern period.

Why is it necessary for a man who sits at the base of the ladder to wonder where that window sill is that he is trying to get the ladder against so that he can rescue people? There is a man sitting in Houston, Tex., who is juggling a spaceship on the moon, taking pictures, and yet the man sitting at the base of the ladder has to send his buddy to the top if he really wants to know where the top is. Can't we supply him with a closed circuit TV? Can't we supply him with a simple optical periscope?

These questions are not being studied. And a bill of the kind that you are proposing is, I think, an essential first step in making it possible to attack some of these questions.

I fully realize as a technical man that one doesn't necessarily answer all these questions easily. Some of them are very tough questions. But at the moment we don't even have a mechanism which we can get started with.

Senator CANNON. Thank you, Dr. Emmons, for a very fine presentation.

I want to express the appreciation of the committee for your coming down from Harvard to testify on this bill.

You heard the panel state earlier that greater work must be done at our universities in fire technology. I am very happy to hear that you are devoting yourself and your efforts to that field.

The committee will now stand in recess until 10 tomorrow morning.

(Whereupon, at 11:52 a.m., the hearing was adjourned until 10 a.m., April 5, 1967.)

FIRE RESEARCH AND SAFETY ACT OF 1967

WEDNESDAY, APRIL 5, 1967

U.S. SENATE,
COMMITTEE ON COMMERCE, CONSUMER SUBCOMMITTEE,
Washington, D.C.

The subcommittee met at 10:17 a.m. in room 5110, New Senate Office Building, the Honorable Howard W. Cannon presiding.

Senator CANNON. The hearing will come to order.

This morning we will resume hearings on S. 1124, the Fire Research and Safety Act. Mr. Myron Solter, general counsel, Imported Hardwood Products Association, San Francisco, Calif., will be our first witness.

Mr. Solter.

STATEMENT OF MYRON SOLTER, GENERAL COUNSEL, IMPORTED HARDWOOD PRODUCTS ASSOCIATION, SAN FRANCISCO, CALIF.

Mr. SOLTER. Good morning, Mr. Chairman. First, I must apologize. My voice leaves quite a bit to be desired this morning. If the committee pleases, I would summarize my prepared statement, if the statement as a whole can be incorporated into the record.

Senator CANNON. The statement will be made a part of the record. You may summarize, if you so desire.

(Prepared text follows.)

IMPORTED HARDWOOD PRODUCTS ASSOCIATION, INC. (IHPA)

Mr. Chairman, Gentlemen of the Committee. My name is Myron Solter, and it is my pleasure to appear before you today as General Counsel to the Imported Hardwood Products Association, Inc. (IHPA), World Trade Center, Ferry Building, San Francisco, California.

The IHPA is a trade association embracing 54 regular member firms concerned with the importation of hardwood products such as plywood, lumber, hardboard, and particleboard into the United States, and 57 associate members which are concerned either with the processing or remanufacture of such products in the United States or are firms engaged in servicing the industry.

The IHPA supports S. 1124.

We think there is urgent need for the development of objective, scientifically derived data on causes of fires in residential structures, the behavior of such fires, the principal factors directly responsible for causing death, injury, and property damage, the formulation of architectural principles designed to minimize the fire hazard, improvement of fire fighting techniques, and general education of the public.

Some public authorities and some industry elements urge that the true path to fire safety lies in the severe restriction or exclusion of combustible materials. Actually, an easy solution to the problem would be to build a completely fire safe home. Such a structure would be made of stone, bricks, cement, and other earthy materials, its interior furnishings would be entirely of mineral materials and metals and there would be no heat or light appliances to make flames or sparks. Such would be truly a fireproof home—if its occupants could be prohibited from bringing in any combustible matter of animal or vegetable origin, such as clothing, carpets, furniture, drapes, etc. But obviously it would also be forever a vacant house because no one would live in such a structure.

In the final analysis, fire safety must be a judicious and practical compromise between the economic and aesthetic necessity of using combustible materials and furnishings in residential housing, on the one hand, and, on the other, the use of such materials and furnishings in ways realistically calculated to reduce the hazard of fire to the lowest practical minimum.

S. 1124 could contribute very substantially in elucidating the ways of attaining that optimum compromise. Among its various features, we believe, most important would be the provisions for investigations of fires to ascertain causes, results, and so on, and systematically to develop such data; and, the conduct of experimental programs and stimulating the application of fire safety principles to design and construction.

The members of IHPA are vitally concerned that the programs contemplated by S. 1124 be conducted in an objective, emotion-free context. The building products handled by its members—hardboard, lumber, and most especially decorative plywood panelling—have on several occasions been subjected to difficult and unwarranted limitations in unscientific attempts to solve fire safety problems through the vehicle of building codes. It is that segment of the fire safety problem complex which stands most in need of objective, scientific experimental work, for it has been precisely this area where emotional public reaction to fire tragedies has made objectivity most difficult to attain.

One example of the problem would be appropriate. In 1964 the local government of San Francisco city and county adopted an ordinance amending their building code to require that combustible interior finish materials with a surface flame spread rating of between 75 and 225 (which includes virtually all plywood, printed hardboard, and lumber panelling) could be used in residential housing construction only if such materials were either more than one-half inch thick or were backed by gypsum wallboard at least one-half inch thick. The effect of this building code requirement has been to so increase cost as to virtually eliminate the use of decorative plywood panelling in low and medium-priced housing construction in that area.

The San Francisco city fathers had been prompted by public outcry to take this action after several dramatic and tragic fires in houses containing plywood panelling. One of these fires was reported by a local newspaper, in part, as follows:

"MOTHER, 3 SONS DIE IN S.F. HOME BLAZE—TRAPPED IN BEDROOMS"

"San Francisco codes should be changed to prohibit plywood veneer panelling in home construction, Assistant Fire Chief Albert Hayes said yesterday after inspecting the charred ruins of a Geneva Terrace 'rowhouse' in which 3 children and their mother perished . . . Referring to the highly flammable plywood panelling [Chief Hayes said] . . . 'You can light this stuff with a match.' "

The Assistant Fire Chief's comments concerning the flammability of plywood and its supposed contribution to that particular tragedy were considerably less than correct. Subsequent testing of identical plywood panelling by Underwriters Laboratories at Santa Clara, California, confirmed that the plywood had a surface flame spread rating of 158 in unfinished condition and 173 in finished condition—both ratings well within the specified code limits and impossible to ignite by striking matches.

However, so often children are the tragic victims of such fires, and it was the understandable emotional reaction of the citizenry to this and similar fires which was the principal factor in the code change in San Francisco.

Probably San Francisco's attempt to eliminate the effect pursues completely the wrong cause. What relatively limited objective and scientifically acceptable data as are available on this subject indicate that several factors, none of which is directly concerned with surface flame spread, play the major roles in fire fatalities:

The generation of carbon monoxide and other toxic airborne products, together with concomitant anoxia, is most often the real cause of death.

The generation and fluing upward of superheated combustible gases and their explosive ignition when they come in contact with oxygen in combustible mixture appear to be the most frequent cause of entrapment of victims in upper levels of houses.

Once trapped, lack of alternative means of escape from upper floors most often seals the doom of the victims.

Underlying these conclusions and illustrating the kind of objective, emotion-free study and investigation which is required, is a series of experimental dwelling-room fires conducted by the Forest Products Laboratory and reported in USDA Report No. 1941, April, 1959. In that series, a variety of combustible interior finish materials were applied to the walls and ceiling of a test burn out-room. The fires were commenced by igniting standard room furnishings from a crib of wood kindling. As the fires progressed, temperatures and air pressures were measured and flue gases were sampled and analyzed, in addition to which the time sequence of fire development was observed visually and photographed.

These tests generally indicated that three stages may be expected in dwelling fires, assuming the presence of sufficient oxygen to support combustion: an initial stage of burning of materials with relatively slow development of temperatures and toxic products, followed by a period of rapid acceleration of burning action, which appeared to commence at an average flue gas temperature of 249° F. and average wall temperature of 149° F., succeeded by the third, "flash-over" stage when temperatures reached levels high enough to cause materials, including wall and ceiling finishes, to emanate combustible gases. *The interior became untenable for human life during the first stage. The combustible interior finish materials did not develop surface flame spread action until the third, flash-over stage was reached, considerably after human occupants would have died.*

Several of the conclusions reached by the Forest Products Laboratory after these tests are most significant.

"6. The nature of the walls, whether plaster, fiber insulation board, or plywood, had little or no effect on the time or temperature of the critical [life safety] point and only small effect on the flash-over. Regardless of the type of wall material or the rate of temperature rise in the early stages, fires of conflagration proportions eventually developed. The flashover occurred in all cases at a wall temperature too high for human life."

"8. Carbon monoxide was produced in toxic concentrations in these test fires, both with plaster and fiber insulation board as the wall and ceiling materials, although the concentration of this gas varied considerably depending on the supply of air to the fire and its path through the room. The intense heat would have made the burning room unbearable by a human occupant before the carbon monoxide. An upstairs room, however, into which fumes from the fire might have been rising, would probably have been made unbearable first by smoke and toxic gases.

"9. *It can be concluded from these test fires that the customary furnishings of most dwelling rooms provide enough fuel to create a serious fire regardless of whether the walls and ceilings are combustible or noncombustible.* Once a fire is started, it spreads not only by direct contact of the flames and by movement of hot air and combustible gases through channels not provided with fire stops, but also by elevating the surface temperature of combustible materials to their ignition point by direct radiation." [Emphasis added.]

Accordingly, when scientifically-based information is brought to bear on the problem witnessed in the San Francisco area, it would appear that the remedy adopted by San Francisco is ineffective to reduce the incidence of fatal or injurious fires and serves but to deprive numerous new homeowners of useful and attractive interior decorations. The noncombustible backing requirement in San Francisco could conceivably prolong the period required for a wall burn-through, but as is indicated by the Forest Products Laboratory data, when a fire reaches the proportions and heat generation capability required to burn through a wall, the point at which life could no longer be sustained would have long since been passed.

Our experience suggests that two paramount principles of fire safety should be applied in housing design and construction:

1. Provision of safe means of emergency egress from all floors of a residential structure.

Typically, a home of more than one floor will have a central stairwell and, typically, with fire commencing on the first floor or basement, smoke and superheated gases very quickly make the stairwell impassable. Houses should be designed to provide safe means of emergency egress from all rooms on the upper floors so that victims entrapped by impassable stairwells may escape without injury. A great many houses being erected at the present time do not apply this elemental principle.

2. The development of an efficient, fool-proof, economic fire detection alarm system for use in residential houses.

Available information is inconclusive but appears to indicate that fatal fires with children and adults trapped in bedrooms frequently occur at night. It is obvious that the victims awaken only after their path of escape has been closed off by the advancing fire or are suffocated or intoxicated by smoke before they can awaken. Obviously, such tragedies could in most instances be averted if the victims could have been awakened and warned of the fire before it reached such proportions. It is technically quite possible to manufacture alarm devices which would do this, either smoke or heat actuated, or both. At the present time, however, I am not aware of any efficient and dependable device which is within the economics permitted to low and medium cost housing.

I do not wish to imply that the IHPA opposes reasonable limits on the extent and manner of using building materials. We do believe that most of the prohibitions that have so far been proposed or put into effect are not based on adequate objective evidence of necessity and that careful, well-conceived, disinterested study and experimentation is necessary in order to accomplish the optimum compromise between the achievement of fire safety objectives and the necessity of using combustible building and finishing materials.

To this objective, if administered disinterestedly, S. 1124 would contribute much.

Mr. SOLTER. It is my pleasure to appear before the committee as general counsel for the Imported Hardwood Products Association, which is a trade association embracing 54 regular members engaged in the importation and distribution of hardware products, and most especially hardwood plywood, lumber, and hardwood, and 57 associate members, concerned with either processing these products in the United States, or serving the trade in some manner.

The IHPA, as the association name is abbreviated, supports S. 1124.

We support it because we believe there is urgent need for a program to develop objective and scientifically acceptable data on the causes of fires in residential structures, the behavior of such fires, the principal factors concerned, and loss of life and injury to fire victims, and techniques to minimize the fire hazard.

The lack of such adequately scientific and technical knowledge has, we believe, in some cases led to erroneous and incomplete attempts to solve fire safety problems.

Some public authorities and some industry elements would urge and have urged that firesafety, the solution to these problems, lies in complete firesafe homes. That could be one easy solution. A complete firesafe home would be constructed of noncombustible materials, stone, cement, bricks, and so on. It would be furnished with noncombustible materials such as cement, bricks, and stone. It would have no heating or lighting elements to make sparks or flame, and that would be completely firesafe, if you could keep the occupants from bringing in combustible materials, such as clothing, draperies, blankets, et cetera.

Obviously, such a house would also be a vacant house, because no one would live in such a structure.

In the final analysis, we believe that fire safety must always compromise between the economic and esthetic necessity of using combustible materials and furnishings in homes on the one hand, and the use of those materials in such a way, on the other hand, as to minimize to the absolute acceptable minimum, the fire hazard.

S. 1124 could contribute very substantially to accomplishing that compromise. We believe the two most important features of the bill in this direction, are the study of fires, the development of data, and the generalization of conclusions from that data. And secondly, the concurrent conduct of a program of experimental fires to test the conclusions thus reached, and to evolve a scientifically acceptable program.

We have experienced from time to time, unscientific attempts to solve firesafety problems through exclusion of combustible materials from housing construction by the vehicle of building codes and local ordinances. One example of the problem it poses is in 1967, at San Francisco, the city and county government adopted an ordinance which would prohibit the use of plywood paneling in residential houses one-or two-unit residential structures, unless that plywood paneling was one-half-inch thick or unless it was applied over gypsum board one-half-inch thick. The effect of this regulation has been virtually to eliminate the use of hardwood plywood in such residential housing in that area.

The San Francisco local authorities were prompted to take this action by the public outcry arising from several dramatic and tragic fires, which had occurred shortly before that time in San Francisco. One example is sufficient. One such fire was reported by a local newspaper in the following terms, and I quote.

> Mother, three sons die in San Francisco home blaze.
> The text:
> "The San Francisco codes should be changed to prohibit plywood veneer paneling in home construction," Assistant Fire Chief Albert Hayes said yesterday, after inspecting the charred ruins—

Of the fire, et cetera—

> Referring to the highly flammable plywood paneling Chief Hayes said, "You can light this stuff with a match."

The fire chief's comments about the flammability of the plywood, and its contribution to the tragedy of that fire, was considerably less than correct. Identical plywood was subsequently tested for surface flame spread at the Underwriters Laboratories at Santa Clara, and it was found that the surface flame spread rating of the plywood was between 185 unfinished, and 173 finished, which was well within the specified rating limits of the code, at the time the buildings were put up.

The chief could have struck matches to the plywood all day, without ever succeeding in igniting it.

However, it is so often children and mothers who are victims of these tragic fires, and the public reaction is understandable.

Understandable though the public reaction may be, there is a serious question of whether such attempts to accomplish fire safety are effective.

Requiring one-half-inch-thick plywood or gypsum board, might very well slow down the rate of burnthrough or the propagation of fire within the wall. However, what limited scientifically acceptable data are available, would indicate that the major factor in fire fatalities have nothing to do with walls burning through, and really not very much, if anything, to do with the rate of surface flame spread that propagates across the face of combustible finished material.

Indicated by these data, are the three behavioral factors:

When a fire starts in a swelling structure, there is generated carbon monoxide, and other toxic airborne products, the poisonous effect of which combined with anoxia, deprivation of oxygen by the fire, is most often the real cause of death of the victims.

The generation and flueing upward of superheated combustible gases, and their explosive ignition when they come in contact with oxygen at upper levels of homes, is most frequently the cause of entrapment of victims in a burning house on the upper levels. And then, once trapped, lack of alternative means of escape from the upper floors of homes, most often seems to seal the doom of the victims.

Underlying those conclusions, and illustrating the kind of objective and emotion-free treatment which is necessary to this problem, is the statement cited in a series of experiments, the report of which is cited in my statement, which was conducted by the Forest Products Laboratory, some year ago, in conjunction, I believe, with the University of Wisconsin. These were a series of experimental dwelling room fires. They were conducted in such a way that the parameters and various aspects of the fires were measured, observed, and photographed.

Generally speaking, these experiments showed that typically, a dwelling room fire went through an initial stage of burning of materials and relatively slow development of temperatures and toxic products, followed by a second stage, a rapid acceleration of the burning action, and then third, a flashover stage, when temperatures reached levels high enough to cause materials—furnishings, wall, and ceiling to emanate combustible gases.

In these experiments, the conclusion was reached that—

> The interior became untenable for human life during the first stage. The combustible interior finish materials did not develop surface flame spread action until the third, flashover stage was reached, considerably after human occupants would have died.

These conclusions are set out at some length in my statement. I commend them to the committee's consideration.

We believe on the basis of this, and similar, though scant data, our own experience and commonsense, that two paramount principles of fire safety should be given more consideration, and that experimentation and study should be directed toward it, and these are:

One, the provision in design of a safe means of emergency egress from all floors of residential structures. Typically, a home with more than one floor will have a central stair well, and typically with a fire commencing on the first floor or in the basement of the house, it is the stair well which becomes involved first, by the upward movement of superheated gases, and becomes impassable.

Houses should be designed to provide safe means of emergency egress from all rooms on the upper floors, so that victims trapped in such structures could escape. A great many houses being erected at the present time, do not apply this elementary principle.

Secondly, we believe most effective would be the development of efficient, fool-proof, economic fire detection alarm system for use in residential houses. Technically, this could be done. It is done in commercial structures. It is done in multifamily units. Technically, there is no problem to developing an efficient such unit. The problem seems to be an economic unit for use in medium- and low-cost housing. This, we commend to the committee's attention as an objective.

To conclude, we support this proposed legislation. But, we think that its effectiveness will be determined, to a great extent, by the objectivity with which the legislation is administered. And above all, to develop scientifically acceptable information concerning the causes and effects of residential fires outside the emotional context which so frequently surrounds these fires locally.

Thank you.

Senator CANNON. We appreciate your statement, Mr. Solter.

Were you in attendance yesterday at the hearing?

Mr. SOLTER. I regret I was not, Senator.

Senator CANNON. Yesterday we had considerable discussion about another bill that is before Congress, providing for a Presidential Commission. I am wondering if you are familiar with that?

Mr. SOLTER. I read that resolution.

Senator CANNON. Do you wish to comment on it?

The suggestions we had from several of the witnesses yesterday, were that the Commission approach should be tied in with this bill, and proceed concurrently on two bases: one, with the Commission studying the entire matter, and secondly, to proceed with the provisions of this bill as it is suggested.

Do you have any comments on that particular phase?

Mr. SOLTER. I presume that it would be expected that the Commission would ultimately develop recommendations out of its studies, and that the recommendations would be expected to be carried forward by various executive agencies, Federal and local.

I should think that if this is to be the case, it is necessary, however, always to entrust the development of, again, scientifically acceptable information on these problems through the agency best equipped for that.

The bill in question here, would provide that this be handled principally by the Bureau of Standards, which has the scientific personnel best equipped to devise and conduct such programs.

If the function of the Commission would be related to the development of the information on the basis of a scientifically devised and administered program, then, I think that would work out quite well.

Senator CANNON. From what you say, I take it that your organization has just about been put out of business in San Francisco, as a result of the code requirements.

Mr. SOLTER. Hardwood plywood has a considerable number of uses other than paneling on the walls, such as the paneling in this committee room. To the extent, however, that the plywood in the area have previously been used in medium- and low-cost housing construction, that usage has been greatly curtailed by this regulation.

Senator CANNON. We are certainly gratified to know that the manufacturers of building materials are deeply concerned about the dangers, and that you, too, are interested in trying to find an approach to this problem, whereby we can reduce these hazards, and still utilize the materials that are available for proper construction.

Mr. SOLTER. I might comment, Mr. Chairman, that another desirable feature of this bill would be that the financing of this kind of study would be borne by the public. One of the problems hitherto, has been that so many organizations, ours most especially, has not had the funds available to conduct any large-scale scientific work in this area. It is expensive, and it is a burden.

Senator CANNON. I was going to ask whether or not your organization, as such, has had any research and development program in this area?

Mr. Solter. We have not, unfortunately, because of lack of funds.

Senator Cannon. Thank you very much for appearing here and sharing your views with us.

Mr. Solter. Thank you.

Senator Cannon. Our next witness is Dr. Hoyt Hottel, director, Fuels Research Laboratory, MIT, Cambridge, Mass.

STATEMENT OF DR. HOYT HOTTEL, DIRECTOR, FUELS RESEARCH LABORATORY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, CAMBRIDGE, MASS.

Dr. Hottel. Mr. Chairman, it is a pleasure to have the opportunity to present my views on this bill. Let me first identify myself as to background in relation to the bill in question.

I am a professor of chemical engineering and director of the Fuels Research Laboratory at the Massachusetts Institute of Technology, and a consultant on combustion and transport processes, primarily in the oil and chemical industries. During the Second World War, I was in the National Defense Research Committee as section chief on fire warfare, the section responsible for research and development on incendiary bombs and other fire weapons and fuels.

After the war I was for about 10 years Chairman of the Thermal Panel of AFSWP—the predecessor of DASA—concerned with Government research on defense against the thermal and fire effects of nuclear weapons. I have been Chairman of the NA–NRC Committee on Fire Research since its organization, of the American Committee on Flame Research, an industry group supporting an international cooperative research effort on flames in furnaces. I am a member of the NA–NRC Advisory Panel 421 to the Bureau of Standards' Building Research Division, where federally supported research on fire is conducted. I have been involved in investigating various fires and explosion disasters, including the 600-death Coconut Grove fire in Boston, two aircraft carrier fires, and, most recently, the Cambridge electron accelerator fire and explosion of 1965.

I am here because I believe in the economic soundness of increased effort, federally sponsored, to understand, control, and prevent fire, and I want to give my reasons for that view.

Three years in charge of intensive wartime research effort—and I mean lying awake nights trying to figure out how to stop more fires—an effort costing many millions of dollars, this effort on how to start fires convinced me of the inadequacy of our knowledge of building-fire hazards. We are today still without the knowledge of how to assess the hazard of a particular juxtaposition, in building construction, of two elements which separately are without significant fire hazard but which interact with one another to raise the hazard—we are today still without the knowledge of how to assess the hazard of a particular industrial storage problem—we still can't assess such situations except by full-scale experiment. And full-scale experiments are so expensive we don't appraise as many systems or combinations as we should.

As an example, a million-dollar fire in a sprinklered storage warehouse several years ago containing stacked rolls of newsprint paper led to a test series initially estimated to cost about $12,000. Some 1,000 tons of paper was bought to make full-scale tests, the appropriation to cover costs was raised, and the expenditure on testing grew finally to $300,000. The testing has been completed, but there are still unanswered problems of water and sprinkler needs, and more tests are planned.

Senator CANNON. Was this series of tests conducted by an individual company, or was the Bureau of Standards involved?

Dr. HOTTEL. It was conducted at the expense of the Factory Mutual Laboratories in their Norwood plant as a result of a fire in a paper storage warehouse in Norwood.

A recent test on styrofoam as a fire hazard involved burning scrap styrofoam in a single test costing $17,000, and the vagaries of fire forces multiplying tests in order to get a valid statistic. Obviously, experiences like these underline the need for enough better understanding of the processes of ignition and growth of fire to permit an estimation of fire hazard without such extensive full-scale tests. The explosive growth of our technology is subjecting us to new hazards, and is daily producing new materials of construction and new systems or combinations of old materials—subunits of building construction. The customers of the U.S. building industry—you and me—cannot be expected to demand more fireproof construction if it is too much more costly. Progress in this area is related to fire codes and standards. Fire codes can be economically restrictive; they can be more restrictive, and unnecessarily restrictive—and this has been well emphasized by the preceding witness—if they are not backed up by sufficient understanding of the phenomenon the code controls, the hazard it attempts to reduce.

Consider the problem of a new building design coupled with the statement of an owner-occupant, "What will it cost to reduce the fire risk one-half?" I could expand on that at some length. I will summarize it by saying that a thoughtful consideration of the question of where to spend the next thousand dollars to get maximum risk reduction leads to the conclusion that it is today naive to expect an answer, but it is not naive to ask the question. We need a vigorous continuing effort to understand ignition and fire growth in old and new materials and systems, an understanding which supplies to industry a background for the development of new materials and systems at the same time that it encourages innovation in construction without adding to hazard. This is not long-haired research for its own sake; it is a judicious mixture of ad hoc research to satisfy the direct, pressing needs of our cities, our fire departments, and our building industry, plus a backup operation of basic research on the understanding of fire growth and fire spread.

A second area which has my enthusiastic support is the gathering of better statistics on fires and the continuous interaction—using the methods of operations analysis—between the data-gathering and interpreting group on the one hand and the workers at the fire front on the other—those responsible for fire department operations, for city ordinances, for codes and standards, for drives to reduce a spotted fire hazard.

Intelligent action in all these areas must rest on a firm foundation of statistical knowledge of what is going on in the area of fires.

Operations research is a phrase describing a method of systems analysis which came to fruition in the Second World War. It depends on having a mathematical model of a system of interest, a big fire, a

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fire department operation, or what have you, and on the feed into that model after it is set up on a computer, of statistical data from past experience or physical data from the laboratory. The success of the model hinges on the availability of large computers necessary, but so much of the input information is in the form of probabilities rather than numbers.

Operations research on city fire problems, bolstered by a backlog of statistical data from the data-collecting activity proposed under S 1124 holds promise of significan measurement of the efficiency of our fire services, by replacing the present methods of choosing where and what new equipment is needed, whether merging or relocation of stations would be advantageous, how much fire loss could be expected by saving 2 minutes from arrival time of the fire, and what that saving would cost in facilities or perhaps redesign of the city in some areas.

It is to me revealing and very reassuring that the new fire chief of the city of Los Angeles has a master's degree in operations analysis from UCLA. He was encouraged to do it evenings during his service in the fire department. I feel strongly that we should respond to the testimony from the fire chiefs to the effect that they want to make more sophisticated the actions and functions of the fire departments of our large cities.

In summary, with an annual U.S. outlay of the order of $6 billion associated with fires—this includes the direct loss of $1.8 billion plus the many other costs associated with fire—the activities sponsored under the Fire Research and Safety Act need to reduce our costs of fire only 10 percent to pay a sixtyfold return on our investment.

Senator CANNON. Thank you, Doctor, for that very fine statement. You mention that you were involved in the investigation of the Cocoanut Grove fire, which certainly was one of the big disasters of our era. I wonder if you would comment briefly on this tragedy.

Dr. HOTTEL. I would be happy to. There were several independent investigations. Mine was made jointly with Mr. Arthur Brown. We two reported to the fire commissioner of Boston. Ours was the report to Boston. We were critical of the situation, but took the view that hindsight was so much easier than foresight that there was no basis for judgment of past actions. There certainly was a basis for holding the city responsible for changes that would not see a repetition of that disaster, and Boston is today a leader in its demands on places of public gathering for safe lighting, a major cause of the enormous deaths.

That fire started in a basement room. The Cocoanut Grove was a night spot, and a rabbit warren of cocktail lounges and more lounges and more lounges, and built into highly combustible buildings, and decorated in a tragic fashion with flammable materials on the walls—one staircase wall, quilted with imitation leather that would not pass standards today; the other side of the same stairwell with cane rattan. That was the stairwell up which the fire spread. In wading through some thousand pages of testimony, I found that there was on record the fact that people who moved toward an exit several hundred feet away, starting well ahead of the fire that was moving along the ceiling, arrived at the outlet after the fire did that swept over their heads. Most of the trouble was associated with the loss of illumination that stopped egress on the part of most of the people.

Senator CANNON. What specific, or what major action did the city take to eliminate this sort of hazard?

Dr. HOTTEL. Primarily the requirement of automatic lighting for every place of public gathering, lighting that was independent of continuity of the city's electrical supply.

Senator CANNON. That was the major item?

Dr. HOTTEL. That was the major item.

Senator CANNON. Do you have any comments on the Presidential Commission?

Dr. HOTTEL. Yes. Studies are always worthwhile. I think this one is not necessary. I think we have a good picture of what needs to be done. Many in this room know of a study at Woods Hole some years ago of some 25 engineers and scientists with no ax to grind, on the fire problem, leading to recommendations which are identifiably similar to those in this S. 1124, although I think S. 1124 is a very marked improvement over the recommendations of that old report.

That group did include a fire chief, fire protection engineers, it included combustion scientists, it was briefed by 30 or 40 people from all over the country in the fire area. I believe it is time for action instead of more study.

Senator CANNON. Thank you very much, Dr. Hottel. If we are to make substantial progress in reducing the hazards of fire, certainly increased efforts and resources have to be devoted to fire research, as has been indicated. It is certainly a pleasure to learn that you have devoted a lot of time to this problem.

Hopefully, this bill we are now considering will stimulate greater research efforts in the United States as well as outside of the United States. Thank you very much for appearing.

Dr. HOTTEL. Thank you.

Senator CANNON. The next witness is Dr. Edward A. Campbell, research associate, the Pennsylvania State University, University Park, Pa.

Doctor, we are happy to have you here today. You may proceed as you see fit.

STATEMENT OF DR. EDWARD A. CAMPBELL, RESEARCH ASSOCIATE, COLLEGE OF EDUCATION, THE PENNSYLVANIA STATE UNIVERSITY, UNIVERSITY PARK, PA.

Dr. CAMPBELL. Mr. Chairman, I welcome the opportunity to appear before the committee, to urge the passing of the Fire Research and Safety Act of 1967, S. 1124, as well as I would like to make several recommendations to the committee.

I would like to cite several things in the prepared statement that I have submitted. I am turning to page 4, and would like to read briefly several of the items on this page.

Senator CANNON. The statement will be submitted for the record in its entirety. You may comment on it as you desire.

(The statement follows:)

STATEMENT BY EDWARD A. CAMPBELL, ED.D., RESEARCH ASSOCIATE, COLLEGE OF EDUCATION, THE PENNSYLVANIA STATE UNIVERSITY

Every day during the school year approximately 50,000,000 children and youth in our nation are forced to attend the school that they are assigned regardless of its condition. A school is the only agency, other than a penal institution or insane asylum, where attendance is mandatory. For example, if one does not wish to patronize a store or a shopping center, attend a church, go to a theater or night club, work in a particular place, attend a sporting event, etc., he does not have to. Therefore, if educators, legislators, and public officials are to fulfill their legal, as well as moral responsibilities to the children and youth housed in the schools of our nation, these schools must be made as safe as possible.

Today, the fire losses in our schools are increasing at an alarming rate. Since 1959, there has been about 140% increase in school fires, and only a 7% increase in residential fires. Colleges are even in worse shape. Since 1959 there has been a 145% increase in fires, a 208% increase in the average loss per fire, and a 510% increase in the yearly fire loss. Yet, with these losses, little research (if any) is being done on school fire safety, data is nil, and insufficient evidence is available to support statements regarding the adequacy of our fire codes and their ability to reasonably protect life and property in our schools and colleges. Furthermore, there has been a sharp increase in the number of school and college fires, we do not even know how many schools have been evacuated under fire conditions.

Today, there are many limitations to school fire safety technology. For example, there is no valid predictor or instrument available that will tell if a building or school will ever catch fire, let alone kill or injure anyone. Of course, we have fire codes, standards, and regulations and laws governing hazards; we know what will and what will not burn; but there is no way to concretely state that a fire is imminent, or if one occurs the extent of damage or the reaction of the building occupants.

In a school fire a fire department can be effective if it institutes rescue operations within three minutes after the school fire alarm sounds. After three minutes the death and injury potential increases rapidly. If several classes are trapped, even the best equipped fire department could be taxed beyond its capabilities in rescue operations—providing it could get its equipment to the fire in time to save lives.

The blunt undeniable fact is that a school must be prepared to handle its own evacuation in the event of a fire, and be able to safely evacuate its students in two minutes or less regardless of resulting fire conditions.

When I studied the School Fire Laws and Codes of the Fifty States in 1963, it was found that only ten states had fire safety regulations commensurate to the *Building Exits Code, 1961* (no attempt was made to evaluate municipal codes that applied to schools). These ten states were the states that had adopted the *Building Exits Code* in its entirety for all their schools. All the other states did not have commensurate regulations.

At the conclusion of this study, I recommended that "a concerted effort must be made by the Federal Government, state government, national organizations with interest in schoolhouse fire safety . . . and institutions of high education to present, stimulate, develop and sophisticate fire safety technology."

In studying the school fire laws of the 50 states, as well as in other fire safety research, I have found that although the schools hold our children captive, they are the only social agency adequately structured to train our youth in fire safety. Thirty-seven states in 1963 required varied degrees of instruction in fire safety. This instruction ranged from 20 minutes per week to the holding of fire exit drills as deemed necessary by the school administration. With fire exit drills as a recognized school procedure, it possibly can be stated that every school district in our nation is structured to give some degree of fire safety instruction.

Therefore, inasmuch as the children and youth of our nation are forced to attend school, the schools are structured to train in fire safety, and one of the aims of American education is to train for living in a democracy, I should like to make the following recommendations:

1. Possibly an addition to the Act is in order so that research in school fire safety will be a basic part of the research supported by the Act.
2. Inasmuch as nothing is stated regarding the use of the research data and findings resulting from the Act, I feel that possibly something should be added to the legislation urging that the research supported by the Act be used by those responsible for the fire and life safety in our nation.

It is further felt that, since these recommendations are basically purpose and intent, perhaps these recommendations might possibly lead themselves for inclusion in the Preamble of the proposed legislation.

Finally, it is my opinion that the Fire Research and Safety Act of 1967 (S. 1124) should be passed as quickly as possible and monies appropriated so that needed research and development can be started to cut needless death, injury, and property damage from fire.

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Dr. CAMPBELL. I would like to recommend that possibly an addition to the act is in order so that research in school fire safety will be a basic part of the research supported by this act.

I would also like to recommend that inasmuch as nothing is stated regarding the use of the research data and findings resulting from the act, I feel that probably something should be added to the legislation, urging that the research supported by the act be used by those responsible for fire and life safety in our Nation.

I would like to go on and further state, referring to my statement, that approximately 50 million children and youth in our Nation are forced to attend the school that they are assigned, regardless of its condition.

I would also like to make an additional statement that had been called to my attention this morning, and that is essentially that today, with the rising enrollments of our colleges and universities, it is getting increasingly difficult to get in.

In addition to the youngsters in our public, private, and parochial schools, we now have parents entrusting their college-aged youth to the safety of our colleges.

I would like to refer to the disaster that has befallen Cornell University, the Ithaca campus, this morning at 4 o'clock. It seems there was a two-story brick and frame residence hall. The best information that I have been able to receive up to now is that we have had nine college-aged youngsters killed in this fire, six of these being girls, three of them being fellows. This was the second report as of the 8:30 news this morning.

I have nothing further on that.

I would like to call this to your attention also because we as parents entrust our youth to the colleges and expect them to reciprocate with some degree of safety in the residence halls as well as in the fraternities, sorority houses, and so on, on campus. Therefore, I would like to add this grim tragedy of today as part of the proceedings in order to exemplify my testimony urging that this legislation be passed, as well as the fact that additional attention be paid to the schools and colleges of our Nation, due to the fact that the youngsters are forced to attend, as well as the fact that even if they were permitted voluntary egress, they would be immature enough not to realize the hazards involved in many instances.

Therefore I would like to state that if educators, legislators, and public officials are to fulfill their legal as well as moral responsibilities to the children and youth housed in the schools and colleges of our Nation, these schools must be made as safe as possible.

I would like to add that although we have had a sharp increase in the number of school and college fires—and there is some data in the prepared statement regarding this—we today do not even know how many schools have been evacuated under fire conditions. Research data is not available regarding this item. We only have estimated data regarding the number of fires; nothing regarding evacuation under fire conditions.

Also, we find that the schools in our Nation, inasmuch as they require our youth to attend, our schools are also structured to train in fire safety. Also one of the aims of American education is to train for living in a democracy. Therefore it is my opinion that the Fire Research and Safety Act of 1967, S. 1124, should be passed as quickly as possible and moneys appropriated so that needed research and development can be started to cut needless death, injury, and property damage from fire.

I have just been handed some up-to-date information regarding this disaster at Cornell on the Ithaca campus. It seems the fire started at approximately 4:45 this morning. Eight students died; one faculty adviser also was killed. Ten were injured, one serious—smoke inhalation. We also had scores of others who jumped through windows and climbed sheet ladders, ladders made of sheets.

This was a relatively new building, as college residence halls go. It was a two-story brick building, 15 years old. The police were quoted as "no fire was visible outside, but the people were hanging out the windows. The building housed 70 topflight students. Freshmen were enrolled in accelerated Ph. D. programs."

This is a very tragic loss to our Nation and youth, and I would like to add this to my testimony at the present time.

I would also like to follow through with this fire problem that we have had in the State of New York by stating the fact——

Senator CANNON. Doctor, if I may just interrupt you at that point to add: I heard on the way in this morning the news account from one of the boys involved in that fire. And it gets back to the point that Dr. Hollomon mentioned earlier. This boy said he would never have gotten out alive if it had not been that another boy had a very strong flashlight and he was able to shine it ahead, and he saw his direction toward the exit. So it indicated that the lack of lighting might have been a very serious problem in this fire, as it was in the fire that Dr. Hottel testified about earlier. This boy, as a matter of fact, had a broken leg, so he was handicapped and couldn't even find his crutches. But he was able to find his way out by reason of the highpowered flashlight that pointed the direction toward the exit.

I thought that might be an interesting note to add at this point.

Dr. CAMPBELL. It is. News has been fragmented this morning. I left Pennsylvania State University quite early, and was unaware of this until I arrived in Washington. This would bear out the study that I did in 1963, when I studied the fire codes and laws for school life safety of the 50 States, and found quite an alarming situation in the fact that only 20 percent of our States in the Union adopted the standards promulgated by the National Fire Protection Association, the Building Exit Code 101.

At this particular time the edition used was the 1951 edition. At that time I felt there was much to be desired regarding the laws and code covering schools in our Nation. This is one of the reasons I am here, to urge the passage of this legislation, because we do not have today sufficient data to determine if our codes are good.

We do not have sufficient data to know the reaction of people being evacuated under fire conditions.

I might add that my feeling for the last several years, since I have been in the school business, I am an educator actually by professional training. I have been a teacher and administrator, and industrial research administrator. I have been a college professor.

I have been working on school fire safety for the last 6 or 7 years. I did the study of the laws and codes of the 50 States, and I have been very concerned about this. I have authored numerous articles and have found in studying school fire safety that you will find that most fire departments in the country—and I would even suspect to say the best equipped fire department in our Nation—would have difficulty in rescuing children trapped in several rooms in any school in their jurisdiction unless the school happened to be across the street from the firehouse, because of the fact there are problems in getting equipment to the fire.

I have also found that the little research we have available today, a school must be completely evacuated in 2 minutes or less. A fire department must institute effective rescue within 3 minutes after the school fire alarm has sounded. And this is very difficult when one has to move equipment, get men to the fire, as well as get this equipment into place and mobilize the firefighters.

I have also found that in studying the codes and the recommended standards, one private organization has recommended for years that we equip our fire engines—this would be the pumper with the two-section 22-foot ladder. As a matter of information, this ladder would not reach the second floor of a schoolhouse, and it was proven in 1958 in Chicago, at the Chicago school fire. The ladders wouldn't reach the second story.

So we find that the fire department actually, in many instances, would be ineffective in rescuing children. Therefore schools themselves will have to conduct their own evacuations and get their own children out in case of fire.

This puts quite a responsibility on educators, because we as educators do not have that much data available. We are not fighting fires. We are trying to get the kids out safely because of our responsibility as teachers, administrators, and so on.

So I would like to urge the passage of this legislation and would like to summarize my formal remarks.

It is my opinion that we should pass this law so that we can have the needed research and development moneys in order to immediately, or as soon as possible, start and curtail the needless death, injury, and property damage from fire.

Mr. Chairman, if you have any questions, I would be happy to answer these or further elaborate on my testimony at this time.

Senator CANNON. Thank you, Doctor. You made a very helpful statement.

I think one of the things that has been pointed up in the hearings so far is the lack of valid data from a research standpoint, or lack of just plain simple reporting from which statistical information could be developed to get at a good bit of the problem.

I was also impressed by your statement where you indicated in your written statement that since 1959 there has been a 140-percent increase in school fires. This is quite a staggering factor when you look at the overall picture nationwide.

Dr. CAMPBELL. This is why I have indicated we have only had a 7-percent increase in residential fires. Although the death rate has been higher in residential fires, the school fire losses have been actually, in a sense, staggering. Strange as it seems, since the study that I did of the laws and codes of the 50 States, after the study was done, our highest fire losses have occurred. They have skyrocketed actually since the study was done, in schools and colleges. We do have problems of reporting because we have had to rely upon the data that has been given us by the National Fire Protection Association. These data that we have received are estimated when a fire occurs in a school; naturally it will make the local papers. It may not make the first page, but it will be listed in the papers. With the reporting system that we have, it has been very difficult for anyone to get data because as a rule it is buried. Unless the association has the data available, and they have been remiss in not publishing it, we have no way of knowing this. We as educators have to rely on published data of this sort because we haven't had the money available to dig it out ourselves.

We have no data of this sort, nor do we have any data regarding the reaction of the teachers, the reaction of the children, the reaction of the fire departments in their response when they get to the school fire. We have no real data regarding the hysterics of teachers under fire conditions. We only have fragmented bits of information regarding teacher reaction. And after all, the teacher is the one who is going to see to it that his or her children escape.

Because actually the teacher is the one who is in charge of the class. And there have been instances where the teacher has told the youngsters, "Stay in your seats," and they have died.

So the reaction of these teachers is actually paramount. Many times we have found in the little data we have available that teachers many times are reluctant to turn the fire alarm in. In fact, when I train teachers, I tell them, "If you are in doubt about turning the fire alarm in, ask the children to do it, and tell them to keep on going out the door and it will be done."

This is the feeling.

I would also like to call the committee's attention to the type of thing that is available for educators. I would like to refer to an article that I have written, that has just come out as of last Friday in Catholic Market. This is a periodical that is designed and published for Catholic diocesan business managers, diocesan officials and school children. I would like to point it out. I would be happy to furnish copies of this to the committee if they care to read it. I feel that it presents about the most up-to-date information that educators can have, and it is so current, I just received my copy this morning on the way to the hearings.

Senator CANNON. I think it would be helpful if you submitted a copy to the staff to be filed for reference.

Dr. CAMPBELL. I would be happy to do this.

Senator CANNON. Thank you very much for your fine statement. Senator Hartke, do you have any questions?

Senator HARTKE. I have no questions.

Senator CANNON. Senator Moss?

Senator MOSS. No questions, Mr. Chairman.

Senator CANNON. I thank you again, Doctor.

Dr. CAMPBELL. Thank you, sir.

Senator CANNON. Our next witness is Mr. John Lindsay of New York, and Robert O. Lowery, fire commissioner, city of New York. Mr. Mayor, we are happy to have you before us today, and we will be happy to hear from you on this important subject.

STATEMENT OF MAYOR JOHN LINDSAY, NEW YORK, N.Y., ACCOMPANIED BY ROBERT O. LOWERY, FIRE COMMISSIONER, CITY OF NEW YORK, AND JOHN T. O'HAGAN, CHIEF, FIRE DEPARTMENT, CITY OF NEW YORK

Mr. LINDSAY. Senator Cannon, members of the committee. I am privileged to be here, and I thank you for your kind invitation to be here on Capitol Hill.

I have with me and I should like to introduce them to you, the fire commissioner of the city of New York, commissioner Robert O. Lowery, sitting on my right.

Senator CANNON. We are glad to have you hear.

Mr. LINDSAY. Mr. Lowery has been a professional firefighter for 26 years, a member of the uniformed forces of our fire department, and also a member of the civilian ranks, and in the police end of it as well, the fire marshal's office. He is a man of rounded experience in the business of fire safety.

And, Mr. John T. O'Hagan, who is the chief of department, the highest uniformed ranking officer of the fire department of the city of New York.

I shall be very brief. And, with your permission, and the subcommittee's permission, Mr. Chairman, the fire commissioner will have a slightly lengthier statement, not overly lengthy, I assure you. At that point, I should like to be excused, because the House Judiciary Committee is waiting for me to testify on the President's Crime Control Law.

Senator CANNON. You may proceed as you see fit, mayor. We are happy to have you back here. We see that even though you have left

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the Congress, your problems have not necessarily diminished. We wish you good luck. You may certainly be excused when you have reached that point in your presentation.

Mr. LINDSAY. Thank you very much. You have a continuing most cordial invitation to come visit us in New York City, and examine what we are doing in the world of firefighting, or on any other subject. We would be delighted to have you and escort you around the city, and show you firsthand what the fire problem is, and any other matter you would like to examine.

I appear before you today in support of the Fire Research and Safety Act of 1967, on behalf of the city of New York, and also as the representative of the members of the U.S. Conference of Mayors, and also the National League of Cities.

I want to make it clear at the outset, Mr. Chairman, and members of the committee, that neither the Conference of Mayors, nor the National League of Cities, has yet to give formal endorsement to this bill involving Federal aid to undertake fire research, training, education, or demonstrations of new methods of prevention or control. However, I am confident that I speak for the majority of the Nation's mayors, those who bear the direct responsibility for protecting the lives and property of our citizens from the ravages of fire, when I say that we can utilize all of the Federal assistance, both technical and financial, that Congress may elect to provide.

The fire commissioner, Robert Lowery, as I mentioned, will testify on some of the specifics supporting that statement. And, I should like to restrict these brief remarks that I am going to make to the fundamentals involved, of this legislation. That is to say, to try to substantiate the Federal interest in helping cities and towns to fight fires.

In the past, fire prevention and control has been regarded as a local matter, solely within the jurisdiction of the Nation's thousands of individual fire departments.

The bill before you today is designed to change that outlook drastically, and in my judgment, the cities will cheer this development. Systematic research on a national scale on causes, prevention and control of fires, makes a great deal of sense. No local group, or group of local governments can afford the resources, or even command the skills needed to mount such a program effectively. Federal leadership, technical and financial assistance, can make a great contribution to marshaling all available resources to help meet the problem.

The chairman at the introduction of his bill, noted that the problem of firesafety was difficult and complex. But, one which can best be resolved through the cooperative efforts of public and private organizations, and through a working partnership of governments at all levels, Federal, State and local. I fully agree with that statement.

Over the past decade, particularly during the past few years, the Congress has enacted an entire range of programs to help the cities. Many of these programs ranging from Operation Headstart to model cities, have been addressed to the problems of troubled by-passed neighborhoods of the cities. The Federal Government's public housing program was initiated primarily to lift people out of the slums. The Federal sponsorship of local welfare programs also was concentrated in poorer neighborhoods. Many of the beneficiaries of medicare, medicaid, and other health programs financed by the Federal Government are residents of the Nation's ghettos. I submit that this bill, representing a forceful Federal interest in minimizing the threat of fire to the cities, is entirely consistent with the emerging Federal concern, and an entirely proper one, I might add, with the slums.

It is consistent, because the problem of fire is to a great extent, the problem arising from the slums.

To support that thesis, the New York City Fire Department reviewed the records of 11 battalions headquartered in slum neighborhoods during the year ended October 31, 1966. The areas covered by these battalions, representing 23 percent of all the city's battalions, accounted for 47 percent of all malicious false alarms, and more than 35 percent of all of the structural fires in the city.

The actual figures, the number of fires involving the buildings in these areas, was 13,378. The citywide figure was 91,882.

I want to point out that although the battalions, all 11 of them that are headquartered in these disadvantaged neighborhoods, that these figures reflect, however, the entire range of those battalions' coverage, and not all of that range, the districts within their responsibility qualify as disadvantaged. Therefore, some of the fires that are in these statistics were in neighborhoods far removed from slum status. Were it possible by statistics to isolate fires precisely by slum areas, the percentages that I just gave you attributable to their areas, would be far higher, indeed.

The fact of the matter is, that the highest hazard areas for fire in this country today, the high-hazard areas, are the slum areas of these cities of the country.

The fire problems in the disadvantaged areas of the city are increasing every year, as some of these problems are. The old buildings making up the slums, particularly dwelling units, generally are constructed of nonfireproof materials, with heavy emphasis on frame construction and its inherent hazards.

Absentee ownership is more prevalent in depressed areas. When this type of ownership exists, janitorial services are poor or even nonexistent. Poor maintenance of these properties results in their gradual deterioration. Because of lack of proper janitorial help, fire breeding conditions often arise as a result of rubbish accumulation in cellars, halls, stairways, and dumbwaiter shafts.

The heating plants in these buildings are often very old, and frequently in disrepair. These heating plants have to supply heat to buildings which have many sources of heat loss—broken or loose windows and open entrance doors. Overcoming these heat losses often results in a breakdown or fire, because of the combination of age, overwork, and poor maintenance.

Since a great majority of the electrical installations in slum buildings are more than 30 years old, they obviously were not made to serve today's appliances. A combination of oversized fuses, and electrical overload from too many appliances often results in an electrical wiring fire.

Overcrowding presents additional problems of firefighting, for the means of egress from these buildings which were adequate for the original number of people contemplated, are inadequate when most sorely needed in the time of fire.

Finally, buildings which became vacant or partially vacant because of a previous fire, urban renewal programs, or for some other reason, are a source of attraction to youngsters, delinquents, and derelicts.

Each uses the building for different reasons, but all add to the fire hazards, and fire potential of these buildings.

Legislation to provide Federal resources to assist in solving our national fire problem is being considered at a time when the need is the greatest. Frequency, severity, and the consequences of fire in terms of life lost and property destroyed are increasing in the country at rather alarming rates. In New York City, maybe an increase of 40 percent in the number of fires during the period covered by Senator Magnuson's study of the number of fires per capita. Close analysis shows that the prospects for a leveling off of fire incident cannot be projected. During 1966, within New York City, there was a 25-percent increase in the loss of life by fire, not including 16 firefighters, who gave their lives in the line of duty.

Multiple alarms, false alarms, and injuries to civilians due to fire, also have increased. The destruction by fire of our resources, our people, and large segments of our cities, is appalling. It must be arrested. Our determination can be expressed, I believe, through passage of the Fire Research and Safety Act of 1967, and I urge favorable consideration of the bill.

Thank you very much.

Senator CANNON. Thank you, Mayor Lindsay, for appearing here today as mayor of the largest city in our country. You certainly are aware of the myriads of problems in connection with fire loss and fire fighting. I think it is particularly interesting in view of your former experience in Congress. You are well aware of the fact that Congress sometimes gets criticized for stepping into some of these areas, rather than letting the cities or States or counties solve the problems themselves. I think it is quite evident here, from the witnesses that have testified, that this is a problem of Federal concern, that the Federal Government should assist, because no one organization is able to solve the research and development problems required to get at the root of this very serious problem.

I was also interested in noting, yesterday, in our hearings from one of the witnesses pointing out that our fire loss rate is six and a half times that of Japan. Normally we think of Tokyo in comparable terms with New York, as being a tinderbox. This is frequently mentioned or has been mentioned many times. Yet, the fire loss in the United State is six and a half times that of Japan, and it is certainly the highest rate of any major country.

Mr. LINDSAY. That is a most interesting point. Without having statistics at my fingertips, I think I can back that up from my own visit to Japan, and a discussion of their urban problems, a few years back. Commissioner Lowery was in Tokyo not long ago, as my own representative, because Tokyo and New York City are "twin cities" under the twin-cities program. He was there in connection with the inauguration of the opening up of the direct airlines route between Tokyo and New York, nonstop. While there, he examined their fire prevention techniques. Your statement is undoubtedly a correct one.

May I say, Mr. Chairman, we of the cities of the U.S. Conference of Mayors, and the National League of Cities, and the mayors in general, find it very heartening and encouraging that the Congress is even now considering crime control legislation, fire control legislation, and environmental control studies, which lead us in the area of sanitation as well, because air pollution and sanitation and the cleanliness of the cities, both on the ground and above the ground, are inseparable. These three areas of recent national and congressional interest, are very encouraging to the firefighters on the front ranks of the streets of these cities. We feel that for the first time the Federal Government, in a specific way in these areas, has become an ally in the fight.

Senator CANNON. Thank you very much.

Senator Hartke?

Senator HARTKE. Mayor, it is a real pleasure to see you here again. As a former mayor, I understand some of the trials and tribulations that some of the people running cities have. I have always said, it is the most difficult political job that I know of.

While I congratulate you on the work you are doing, I also think I have a little bit of an understanding of some of the problems you have.

I understand you are in the process at the present time of revising your building code, is that correct?

Mr. LINDSAY. Yes, we are.

Senator HARTKE. What is the status of that revision?

Mr. LINDSAY. It is in the city council. It is quite revolutionary. The city council is under a great deal of pressure. As you know, there are interests that push on both sides of that question.

Senator HARTKE. It is my understanding that there is a drive on to weaken what I would consider, weaken that code considerably, is that true, in your opinion?

Mr. LINDSAY. That is true, and we are resisting that drive as best as we can. I am sure that an expression by this committee, or Members of the Senate, such as the distinguished Senator such as yourself, who has been an excellent mayor, would assist us in that regard.

Senator HARTKE. What is the nub of the resistance, and especially does it deal with the fact that there are certain interests which feel that it would require them to expend amounts of moneys which they feel they do not want to spend?

Mr. LINDSAY. That is part of it.

Senator HARTKE. Is that the heart of it?

Mr. LINDSAY. Definitely a part of it. A collection of interests in the industry, and those who serve the industry are part of it.

Senator HARTKE. I am hopeful that you will continue to make that fight, because it is very important that you have building codes, which are at least as modern as they can be. They seem to go out of date very rapidly anyway, without any assistance from those who have primarily their own financial interests to look to, without regard to the overall community interest. I think that this even reacts unfavorably toward them because it increases the fire rates, and ultimately the undesirability of even continuing to remain in the city, or for other people to be attracted to a city.

Mr. LINDSAY. You are absolutely correct. And, I appreciate your statement. We find it a helpful one.

Senator CANNON. Senator Moss?

Senator MOSS. I have no questions, Mr. Chairman. I am glad to see the mayor.

Mr. LINDSAY. Thank you, sir.

Senator CANNON. Thank you very much, Mayor. If you desire to be excused now, you may be. I understand you have other duties, as you stated.

We will be very glad to hear from Commissioner Lowery, as the next witness.

Mr. LINDSAY. Thank you very much, Mr. Chairman.

STATEMENT OF ROBERT O. LOWERY, FIRE COMMISSIONER, CITY OF NEW YORK

Mr. LOWERY. Senator Cannon, Senator Hartke, Senator Moss, first, may I say that I consider this an honor and privilege to be afforded an opportunity to testify on the bill before your committee.

I spent approximately half my life as a member of the New York Fire Department. We feel very strongly in the fire service for the need of a national purpose, a national effort of this nature. It may be a long time coming into fruition.

I would like to state that, as commissioner of our Nation's largest fire department, and as head of a modern and efficient organization of fire units and personnel, I believe I can testify with many statistics that the fire problem facing out Nation merits grave concern.

The figures are these: in 1966, the New York Fire Department responded to 155,000 alarms and extinguished 90,000 fires; 243 civilians died from fire injuries in our city during the same period.

In view of these facts, you may ask what the cities have done to control the problem. First, in New York City we have inaugurated an annual inspection program covering all commercial, public, and multiple-dwelling occupancies within our city. In 1965, this amounted to over 1.5 million inspections which resulted in the issuance of 0.5 million corrective orders under the authority of the Fire Prevention Code.

Second, we have embarked on a sprinkler program which has resulted in the installation of over 3,500 sprinkler systems. Installations of alarm systems have reduced undetected fires. Hundreds of unusual hazards have either been controlled or the premises vacated.

In addition to our normal capital expenditures for apparatus, we have invested $1 million in a superpumper which gives us a greater flexibility and striking power at fires. I have photographs of our superpumper system here that I will make available to the committee. This piece of equipment has enabled us to reduce the exposure to injury potential for the firemen and permits a controlling of fires in a more efficient manner.

We have conceived a new elevated platform, or tower ladder, to increase our firefighting effectiveness and have evaluated every new approach to control fire that has been devised and marketed. When feasible, these approaches have been integrated into our firefighting tactics and strategies. We have over 13,000 firefighters committed to the battle against fire, with an operating budget of nearly $200 million.

What I have been trying to convey, gentlemen, is that we have made a full commitment to the solution of the fire problem within our city; any further allocation of resources is beyond our capability unless it is done at the expense of service in the fields of health, welfare, education, and police. If we are to more effectively employ the resources already committed toward a successful attack on the problem of fire control, the extraordinary costs for research, planning, and development must be assisted or borne by the Federal Government.

The problems I have described, the efforts to solve them, and the disheartening results are not exclusive to New York City. They are shared by all large urban centers. Thus the research, experimentation, and demonstration projects required to solve this dilemma should not be carried on separately in each city or metropolitan area.

Common solutions developed by a central agency is the logical approach; it would permit an economical and effective implementation of projects in a single city with the results shared in all sections of the country. While the fire problem is not exclusive to large cities, it is concentrated there, and it has been traditional that improvements in fire techniques developed in our cities have been shared by all of the communities in our country.

To control the escalating fire problem, we must have men with high levels of education and training. Local governments have basic training schools and have made significant advances in providing college-level programs in fire science.

However, there is a vital need for centers for continuing studies where middle and upper managers of the fire service can be periodically exposed to the latest techniques in management, the social and behavioral sciences, technological developments, improved suppression and control mechanisms, and other areas of interest to a progressive fire administrator. Centers for continuing study are rapidly growing across the country, supported by private funds and serving the private sector of the economy.

Centers designed to provide the public services with necessary skilled managerial personnel should be supported by public funds. The average local government already is committed to provide the basic essential service for fire protection to its fullest limits. Consequently, the requirements over and above those basic requirements must be provided by a higher level of government with the necessary resources.

There is a need for command schools where officers or potential officers can be trained in fire ground strategy and tactics, communication and command procedures, the latest techniques in fire suppression, the characteristics of newly developed hazardous materials, and other required disciplines necessary for a fire officer to function effectively in this space age. The resources to support a program of this magnitude and to insure an up-to-date curriculum with the latest in equipment and teaching tools is only available at the Federal level.

I might say this is my particular view. Maybe someone might dispute it. But, based on our experience, we have to make this observation.

Fire administration can no longer afford to remain in the horse and buggy era. Multimillion-dollar budgets require the most sophisticated approaches to the organization and management of every department. Systems analyses to determine the proper spacing and location of companies are beyond the capability and resources of even the largest municipalities.

The work that has been done in this area has been in subsystems, such as the extinguishment system, the inspection system, and the inventory system. But they are neither complete nor were they directed at the overall problem. A look at the fire department as a system will allow the development of standards more realistic and valid than those used in the grading system.

As a byproduct, I am certain that a computer program for building inspections, response to alarms, coverage during periods of unusual fire activity, and other procedures for the more efficient use of our resources will develop. The costs of the "software" for this program—which would take a period of years to properly conduct and test—would require Federal participation. The results in terms of increased efficiency and safety are staggering.

There are communities where a substantial commitment in terms of money is not being translated into effective fire protection because of poor organization and management. In other areas, fire protection is below reasonable levels because the limited commitment is not being properly deployed. These conditions could be corrected and the increasing costs of fire protection could be greatly modified through a Federal demonstration project in this regard.

On October 17, 1966, 12 members of the New York City Fire Department lost their lives when a floor collapsed in a building adjacent to the original fire building. The tragedy was caused by the fact that the buildings involved had been extended, interconnected, and altered. Also, the floor loading had increased.

None of this information was available to the chief in command of the fire. As a direct result he lost his life, along with the lives of 11 of his comrades, when the first floor of the building changed from a well-lighted, clear atmosphere to a raging inferno in a matter of seconds.

If the chiefs who are responsible for the control of fires of this magnitude could call on a central data bank which could provide them with the vital information concerning the date and type of construction, the floor loading, the alterations, the exits, shafts, occupancy, and other factors which contribute to the hazards to the operating force, these tragic losses of life could be reduced.

The acquisition of the information, its processing, and the programing of the computer could be costly, and the project is not likely to receive high priority consideration for budget allocation unless it is susidized in whole or in part by the Federal Government. The returns in the number of firemen's lives saved, the increased efficiency in the control of fires, the savings in terms of business losses, salaries, and jobs, would more than repay the investment.

Fire departments are noted for their detailed recording of activities; the amount of statistics available in the fire service is overwhelming. But the manner in which they are assembled and arranged is so varied that the data is of very little use in evaluating past performance and planning for the future.

A standard system for recording experiences, properly programed for the effective use in planning for the future, is a project the Federal Government could initiate or support with great productivity. The participation by fire departments, which has been a problem in the past in programs of this nature, would be increased if the sponsor had the support of the U.S. Government. As a result, the definition of the fire problem would be much clearer and our planning more effective.

Senator Magnuson has described a tragic multiple-death fire that occurred in his State during 1966 that took the lives of the parents and three children in one family. This tragedy occurs with alarming frequency throughout the country. During 1966, in New York City, we experienced 33 similar multiple-death fires that claimed two or more lives. The most discouraging part of these tragedies is the limited public concern shown for the losses. One headline in the press, a dramatic report on television or radio, and oblivion—nothing approaching the horror or sustained interest that exists when a crime claims five lives.

Because of the lack of interest and attention, there has been little action to correct the conditions that cause the loss. The Federal Government would provide a great service to the Nation and also strike a blow in behalf of orderly urban growth and development by supporting a study of the behavioral patterns that influence fire incidence and spread. The study could be used as a basis for more effective programs in the field of education and prevention.

If research connected with the development of alarm devices or sprinkler protection for the home could produce equipment at reasonable cost, a vital and sorely needed weapon against fire would be provided. The most feasible areas for the introduction of these concepts are in new construction and rehabilitated multiple dwellings.

Other fertile areas for fire research are the development of a less hazardous cigarette and more fire-resistive mattress or sofa coverings. These are areas of investigation which seem logical, but which are left unexplored at the local community level under the pressures of day-to-day problems.

The research and development in equipment and materials that has soared in this space age in both the public and private sectors has left the fire service undisturbed and unaffected. In many areas, the punch and chisel are still being used to penetrate concrete walls and floors. Hand axes are used to cut floors and roofs when every extra minute means increased risk to the men so employed from the fires raging below. This backwardness could be blamed on lack of vision, limited funds, reluctance to do the required research, inability to influence the fiscal authorities, or inaccessibility to government developments.

Fixing the blame, however, does not solve the problem; we should concern ourselves with how we become aware of, and gain access to, the heat-resistant materials, compact breathing equipment, lightweight air cylinders, improved cutting tools, more powerful compressors, and other items which are available or could be made available if a central office with the authority and resources to do so could identify them, test them, and make them available. Could the authority we have been waiting for come from the Federal Government? I think so.

To attack the problems described above, I believe the approach outlined in the bill (S. 1124) authorizing the establishment of a fire research program within the Bureau of Commerce is a sound one. I strongly recommend its passage.

I also recommend for your consideration an amendment proposed by the International Association of Fire Chiefs and the International Association of Fire Fighters to establish a Presidential Commission to study the fire problem within the framework of this bill. To insure that this program in fire safety and research has the proper direction a group of the leading members from the various sectors of the fire protection field should be assembled to define the problem and make the necessary recommendations.

I further add that I think it is incumbent upon us, as we move into this area of fire safety and research, that the professional firefighters be permitted to make a contribution. These are the people who deal with the fire problem daily, and their experience definitely should be a major resource on any commission or in any committee or effort made to design and structure a program. Thank you.

Senator CANNON. Thank you very much for your statement, which will be very helpful to the committee in considering this legislation. Do you have anything to add, sir?

Mr. O'HAGAN. As the professional firefighter in the New York City Fire Department, and as the chairman of the Metropolitan Committee of the International Association of Fire Chiefs, which represents the chiefs from the large urban centers, I would like to add emphasis to the Commissioner's last point.

The fire chief is the man who is most directly involved in the handling of the fire problem. He is called on to rectify the mistake of the architect or the engineer or the increased hazard through industrial development. In the past, he has not participated in the decision-making level in the studies that have been undertaken involving the fire problem. He is called in for a day or two as an adviser, and then his name is listed as a participating member of the committee for the study, when in fact he did not participate, he was not given the opportunity to participate.

This may be due to many reasons. The professional fire chief, through his own fault, has not taken the interest to participate. In this area, there has been a lack of formal education on his part which has handicapped him. These disadvantages or excuses in the past no longer pertain. The chief is most interested in participating and he feels that if the program is to have meaning and be successful in attacking the fire problem in the Nation, he must be allowed to participate at the highest level.

Senator CANNON. Thank you very much for your statement. Thank you both for appearing here today.

The hearings will now be adjourned. The record will be kept open for the submission in the appendix of additional statements that are being requested.

(Whereupon, at 11:45 a.m., the hearings were adjourned.)

APPENDIX

Statement of American Insurance Association With Respect to Proposed Fire Research and Safety Act of 1967 (S. 1124)

We have reviewed with interest the Fire Research and Safety Act of 1967 introduced as S. 1124, noting that its proposals would expand the Federal government activity in fire prevention and control, an area in which the American Insurance Association and its predecessor organizations have been active for the past one hundred years. Our companies have recognized fire prevention and improved programs of fire protection and control as properly the interest of everyone so that their interest in this area is definitely parallel to the public interest. We have also recognized that participation in fire prevention efforts by any other agencies able and willing to assist is equally proper, and welcome all such efforts, including that of the Federal government.

The total contribution of the insurance industry per year in efforts related to fire prevention and control has been estimated at not less than $74,000,000. The American Insurance Association has a broad and continuing activity in this area which we briefly describe for the benefit of the committee, but first a word about our Association.

American Insurance Association is an association of 168 capital stock fire and casualty insurance companies. It started operations January 1, 1965 as a combination of the former American Insurance Association, the Association of Casualty and Surety Companies and the National Board of Fire Underwriters. The American Insurance Association carries on the fire prevention, protection and research activities of its predecessor, the National Board of Fire Underwriters.

Association representatives serve on a large number of committees of the USA Standards Institute, the National Fire Protection Association, the American Water Works Association and other organizations.

MUNICIPAL PROTECTION

The American Insurance Association through its predecessor organization, the National Board of Fire Underwriters, has been involved in municipal fire protection work since 1889. In 1904, after a series of disastrous conflagrations, a program of municipal fire protection surveys was initiated by the National Board of Fire Underwriters to evaluate the conflagration potential of cities and to provide the municipal officials with recommendations to improve the effectiveness of public fire protection. This work has been continued and expanded over the years so that at present 465 of our larger cities are periodically surveyed by the Association engineers. In addition to providing each city with a fire protection report with map, and recommended improvement program at the conclusion of each survey, the Association furnishes city officials advice upon request on various fire protection problems pertaining to fire departments, fire communications systems, water supply, fire prevention and building codes.

As part of this work the Association developed a set of municipal fire protection standards published in its "Standard Schedule for Grading Cities and Towns of the United States with Reference to their Fire Defenses and Physical Conditions" that is used to evaluate municipalities and determine their relative fire protection classification.

The National Board of Fire Underwriters was long a leader in the program for standardization of fire hose threads, working with local communities to ꟾake conversions of existing hose threads to national standard.

The high degree to which municipal fire defenses have been developed is in a large measure due to the technical advice and assistance rendered to city officials as part of our municipal survey program. The close working relationship between our engineers and the city officials responsible for water supply, fire department, fire alarm systems, fire prevention and building construction has done much to produce many of the good features of municipal fire protection tha texist in our cities today.

CODES AND STANDARDS

In an effort to influence and encourage the introduction of improved and safe methods of building construction, the National Board of Fire Underwriters and its successor, the American Insurance Association, have published a recommended building code continusously since 1905, when the first edition appeared. Staff members, working closely with responsible municipal officials interested in providing safety to life and property, have attended numerous meetings with planning committee study groups, and governing boards in an effort to promote the adoption of adequate laws and ordinances governing construction. This effort has resulted in the acceptance, by law, of the provisions of the National Building Code in over 1,700 communities of the United States. The Code is also used by many architects and engineers as a general reference book and by architectural schools as a text.

The Fire Prevention Code recommended by the American Insurance Association has gained wide national acceptance since first introduced in 1930. This Code, prescribing regulations governing conditions hazardous to life and property from fire, has been adopted as law in over 2,800 communities.

By serving on many and varied technical committees and in other ways, the staff keeps pace with changing technological conditions. Changes in building and fire protection standards are effected, where necessary, by amendments to our recommended Codes. Where a detailed explanation of a topic is indicated, our Special Interest Bulletin series, with a distribution of 30,000, is used to advise those interested in building and fire safety.

A number of booklets and standards designed for professional as well as lay use are published to fill the need for better understanding of the cause and prevention of fire. To keep abreast of the ever-changing problem, our staff reviews hundreds of fire reports in order to detect trends leading to serious fire losses.

RESEARCH

Assistance with practical fire research problems has been an active part of the program. A number of major fire test projects have been sponsored at Underwriters' Laboratories, Inc. These have included research on sprinkler protection for high piled stock and a variety of other projects. Underwriters' Laboratories was organized and sponsored by the National Board of Fire Underwriters. It is now sponsored by the American Insurance Association.

Realizing the need for keeping our insurance people and municipal fire services properly posted on developments presenting increased fire and explosion hazards, research reports on a variety of technical subjects have been published. These were developed through extensive studies, conferences and meetings with specialists in the fields under consideration. The reports have received wide distribution and have been trail blazers in the consideration of high hazard subjects. Typical subjects included are plastics, molten salt baths and organic peroxides.

Many of the most useful lessons learned in studies of fires have come from analysis of major fire and explosion losses approaching catastrophe proportions. Special reports on occurrences of this kind have been published for the purpose of focusing public attention on the situations which lead to the catastrophes. Reports included in this series are reports on the Texas City Disaster, the Holland Tunnel Fire and the Roseburg Explosion.

Comprehensive reports covering fire and explosion problems in industry have been prepared to assist in obtaining industry-wide attention and stimulate effective action in safeguarding hazards. Survey reports of this type have dealt with warehouses and metal working industries.

Major fires and explosions involving highway transportation of extra-hazardous commodities have received attention. Research was conducted on the causes and the necessary steps to minimize such accidents. A suggested guide for state legislation on the subject was issued and highway emergency training bulletins were issued to police and fire department training groups.

Bulletins covering many special hazard items have been prepared and distributed to member companies, the benefit of which filters down through company personnel and agents to commercial and industrial firms generally.

FIRE PREVENTION EDUCATION

The American Insurance Association (successor to the National Board of Fire Underwriters) is recognized as a leader in the field of fire prevention and in initiating fire prevention education programs. Coordinated programs of fire prevention have been introduced and carried out under its leadership.

A variety of fire prevention literature, posters and other instructional material for use at the grass roots level is prepared. Programs stress fire prevention and fire safety in the home, on the farm, in commerce and in industry. Seasonal fire prevention campaigns are conducted during the spring, fall and winter.

The implementation of the programs has been carried on by many and diverse groups in their own communities. These activities enlist the support of federal, state and municipal agencies of government; the support of fire chiefs, safety organizations, business and civic groups, and the fire insurance business in a cooperative effort toward preservation of lives and property.

The American Insurance Association is a sponsor of Fire Prevention Week; traditionally established each year by proclamation of the President of the United States, State Governors and Insurance Commissioners. To highlight this occasion, we prepare a poster calling attention to the need to "Stop Fire—Save Lives." Last year, more than 1,800,000 such posters were distributed during Fire Prevention Week. In addition, some 22 million pieces of fire prevention literature were distributed for use by organizations and individuals who are directly concerned with local programs.

To heighten the impact of Fire Prevention Week and cooperate with mass media facilities, 5,000 kits of spot announcements are sent out to radio and television stations. A minute movie is also prepared for use by TV and motion picture theatres. In addition, fact sheets containing information and feature stories on fire prevention are prepared for use by the press.

Folders are printed for distribution during the Holiday Season and for the Clean-up Week observances in the spring. A minute movie is produced for television use at Christmas time and spot announcement kits prepared and distributed. This year-round activity increased the total distribution of literature to more than 26 million pamphlets and folders.

A film library of over 29 different subjects is a vital part of the contact with the public. These films dramatize the story of fire prevention and are a potent force in fire prevention education. These films are distributed through five film libraries in strategic locations around the country and reach an audience of over 2 million people. There are normally over 38,000 showings of films before varied groups which include the young and the old, students, householders and civic, business and industrial audiences.

The American Insurance Association welcomes assistance from the Federal government in this fight against fire. The Federal government can be helpful in those areas which are beyond the control of private business. A good example of this is the training of fire fighters. The American Insurance Association holds itself ready to assist and cooperate in any Federal Study Commission effort.

A number of the publications referred to in this statement are being furnished separately as exhibits.

Statement of the American Mutual Insurance Alliance on Proposed Fire Research and Safety Act of 1967

The American Mutual Insurance Alliance is a trade association of 121 mutual fire and casualty insurers, with principal office in Chicago, Illinois, and Mid-Atlantic office in Washington, D.C.

The Alliance and The Federation of Mutual Fire Insurance Companies (a former sister association since merged into the Alliance) have long been organization members of the National Fire Protection Association. We are aware of the statement presented to your Subcommittee on April 4, 1967, by Percy Bugbee, General Manager of NFPA. In principle, we subscribe to the views expressed by Mr. Bugbee.

There seems no question that there is need for additional basic research in the area of fire safety which can likely be accomplished only with governmental assistance or by direct government performance. On the other hand, much applied research has been done and is underway by privtae organizations such as NFPA.

While the Alliance supports the need at the Federal level for basic research in the fire safety field, it would be our hope that there would be no overlap between governmental research and private research. Not only would any such overlap be wasteful of manpower resources and involve costly duplication of effort, it could well act to reduce incentive for the private sector to continue its many activities in the fire safety field. Therefore, while we support the basic objectives of this legislation, we are of the opinion that an amendment to S. 1124, creating a commission to contemporaneously study the many aspects of the fire problem, would manifestly increase the effectiveness of the bill. While we have no preference as to how such a commission should be established, we draw your attention to S.J. Res. 46, introduced by Senator Sparkman on February 27, 1967, and referred to the Committee on Banking and Currency. It may be that the National Advisory Commission on Fire Prevention and Control proposed by such Resolution would be an appropriate means of accomplishing such studies.

Serious examination should be given to the provision of the bill which calls for central management by the Bureau of Standards of the fire safety program throughout the entire United States. Without careful consideration, such centralization could very well retard, restrict, or confuse the present cooperative accomplishments between the private sector and Government. The necessity for central management of the nation's fire safety programs and the means by which they might be accomplished is a proper subject for study by the commission as recommended above. In any event, we urge that there be a thorough examination of the private and public fire safety activities now in existence in order that S. 1124 and its important work be concentrated in those fields beyond the capacity of existing facilities.

STATEMENT BY JOSEPH ROMM, ACTING DIRECTOR OF CIVIL DEFENSE, OFFICE OF THE SECRETARY OF THE ARMY, ON THE FIRE RESEARCH AND SAFETY ACT OF 1967

The Office of Civil Defense is fully aware of the importance of fire as a potential threat to the safety of the population of the United States in the event of nuclear attack on the United States. We put this problem in proper perspective during various hearings in 1961 and 1962. At that time we stated that the primary threat was fallout, a problem that could be greatly mitigated by use of existing buildings as shelter. Nonetheless, we also recognized the potential threat of fire and this we outlined in a 1964 OCD technical report titled "Fire Aspects of Civil Defense."

Underlying this report is a considerable research effort in the Office of Civil Defense, complemented by projects in the Defense Atomic Support Agency. Since the early days of civil defense, we have consistently looked to the National Bureau of Standards for a stronger program in the peacetime fire area. For example, in August 1964, we supported the National Bureau of Standards "Outline of a Proposed Fire Research Program," and in fact, suggested they strengthen and broaden certain areas of study. We recognized then, and now, that to be in a position to deal with the civil defense fire problem, we need a firm foundation of peacetime fire data. This is especially true in the area of fire service direction and control, communications, and operations.

Over the past four years we have explored the general boundaries of the fire problem. We have an understanding of where one can most profitably conduct research to mitigate the problem and where there is only a marginal benefit to be gained.

Further, with guidance from personnel of the fire services, supporting organizations, fire education organizations, and various Federal Government offices, the National Fire Coordination Study of 1966 outlined what could be done now to aid the fire services in a program of fire defense. This has set in perspective the civil defense fire problem and outlined what needs to be done. Many of the problems and needs apply to peacetime fire aspects as well. That is, there is a pay-off in peacetime for studies of fires in nuclear war, and vice versa. And, not of least importance, there is now an excellent research capability in the universities, nonprofit institutions, and in the fire protection industry; all these groups are quite familiar with fire problems. With this background, an action program as proposed in the "Fire Research and Safety Act of 1967" can, and should, be undertaken now. It would permit us to concentrate on the civil defense aspects of fire with full confidence that our program would be supported by a firm peacetime foundation.

The Office of Civil Defense is strongly in favor of the "Fire Research and Safety Act of 1967."

TOLEDO, OHIO.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
New Senate Office Building, Washington, D.C.:

Senate bill 1124, "Fire Research and Safety Act of 1967" has been reviewed by the city administration including the fire prevention bureau of the fire department, and, therefore, endorse the necessity for local governments to conduct research and education campaigns, to improve the efficiency of the fire fighting profession.

FRANK H. BACKSTROM, *City Manager.*

THE CITY OF FORT WORTH, TEX.,
March 24, 1967.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
New Senate Office Building, Washington, D.C.

DEAR SENATOR MAGNUSON: I would like to express my approval and support of Senate Bill 1124, the "Fire Research and Safety Act of 1967." We hope that the Senate Committee on Commerce will consider the legislation favorably at its hearings in early April.

The City of Fort Worth encourages the cooperation and support of government at all levels to provide for necessary research and education campaigns to encourage fire safety to the maximum extent possible. Fire safety is certainly one of the most important objectives of municipal government, and the availability of Federal funds for pilot projects to improve and upgrade the efficiency of the firefighting and prevention profession, such as provided in the proposed legislation, will be most helpful.

Please let us know if specific information can be provided which would be of benefit to the Committee in determining how this legislation would be useful to the City of Fort Worth.

Sincerely yours,

WILLARD BARR, *Mayor.*

DETROIT, MICH.,
April 5 1967.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
New Senate Office Building, Washington, D.C.

Senate bill No. 1124—The Fire Research and Safety Act of 1967—is a long overdue, vital piece of legislation. The thousands of lives lost annually in this country plus the property damage of nearly two billion dollars due to fires points out the urgent need for an act such as this. I hope your committee reports favorably on this bill.

JEROME P. CAVANAGH,
Mayor, City of Detroit.

CITY OF BOSTON,
City Hall, Boston, April 5, 1967.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
New Senate Office Building,
Washington, D.C.

DEAR SENATOR MAGNUSON: I received a memo from John Gunther, Executive Director of the United States Conference of Mayors, regarding the Fire Research and Safety Act of 1967.

I requested the Fire Commissioner, William J. Fitzgerald, to consult with members of his Department regarding this Act, and his letter to me is enclosed herewith.

I believe that the City of Boston Fire Department has always been known for its leadership in Fire Research and Safety. I trust that Commissioner Fitzgerald's letter, which I support, will be of assistance to you.

With kindest personal regards.

JOHN F. COLLINS, *Mayor.*

CITY OF BOSTON,
FIRE DEPARTMENT,
Boston, Mass., March 29, 1967.

Subject: Comments re fire research and safety program—act of 1967.

Hon. JOHN F. COLLINS,
Mayor of Boston, City Hall,
Boston, Mass.

DEAR MR. MAYOR: Bill S1124 and the accompanying literature has been reviewed by this office.

It is my opinion that the Bill should receive vigorous support for its objectives are to correct omissions that now exist in the fire safety efforts of our nation. The current approach to the problem on private and local levels as noted has failed by every standard to halt the ever-increasing waste of our resources by fire and has failed to measureably halt or reduce the loss of life from fire.

Fire Departments have, for reasons of economy and lack of proper facilities been hampered in their exploration of fire causes and the factors that could eliminate them. They have encountered indifference at the source of the problem. The manufacturers of materials, in general, are not behind movements to increase fire safety of their products because price differentials are created. There is a woeful lack of basic fire safety knowledge in the architectural and related professions. The public, despite huge sums expended annually to educate them, are indifferent and apathetic. The prevalent thinking seems to be, "It happens to others, but it wont happen to me."

The foregoing strengthens our convictions that legislation is necessary to procure the development of proper, reasonable standards for all in respect to fire safety. Our experience in the Boston Fire Department leads to the conclusion that the key to future fire safety is basically contained in research and development. We have been exposed to research as it exists in various organizations throughout the country, and there is no question that their contribution to fire prevention and protection is of tremendous value. We have also engaged in considerable research of our own. This you are familiar with, for our work in this area has received your approval and support. Below, as a reminder, I list the research of recent years by this Department:

1. Fire Characteristics of Burning Rugs.
   (a) Fire Characteristics of Initially-Developed Acrilan Rugs.
2. Home Fire Alarm Systems.
3. Fiberglass Ducts.
4. Foam Rubber Padding.
5. Interior Trim—Wall Covering and Ceiling Tiles.
6. Rubbish and Laundry Chute Protection.
7. Plastic Baskets, Barrels, and Liners.
8. Plastic Gasoline Containers.
9. Styrene Monomer.
10. Vapor Pressures in Closed Containers.
11. Oil-Fired Space Heaters.
12. Grease Flues and Ducts.[1]
13. Bed Clothing and Mattresses.[1]

I have found that practical fire research carried on by this Department at our Academy buildings has provided answers to fire safety that have eluded all other agencies for many years. Probably the outstanding example is the research on oil-fired space heaters.

These heaters have caused many fires in residences with a high fatality frequency. One winter season, we had a life loss in the City of Boston of 16—attributable to space heater fires alone. This occasioned our research, and the facts discovered provided information that prevented even a single loss of life from this cause the following year. This was followed up by legislation which outlawed oil-fired space heaters in Massachusetts residences. Many other states have, after inquiry, adopted similar legislation.

Although space heaters had taken many lives in this country over the years, proper information was not available until our Fire Department research came up with the inherent defects of such units and their use was restricted or halted.

Research is being conducted in similar fashion on bed clothing and mattresses. Smoking in bed has cuased the loss of many lives over the years, and we feel that in critical occupancies, such as hospitals and other institutions, hotels, and so forth, fire-retardant materials are essential.

Our Fire Prevention Code contains requirements for non-flammable or fire-retardant decorative materials in various occupancies where people reside or assemble in specified numbers. There is a decided need for manufacturing advancement in this area; a need for safe standardization of requirements; a need for education of all parties concerned.

To briefly summarize and to touch on some of the other items of the Senate Bill, I will list below the six provisions found in the enclosed "Fact Sheet":

1. Investigation of causes, frequency, severity, and other important factors

The weakness here lies in the failure in many cases to follow up on causes, failure to compile and investigate data re causes, and failure to establish mandatory standard requirements. These are due to the lack of an authoritative central-reporting agency and evaluation group having sufficient authority to promulgate

[1] Currently in progress.

requirements not only on new buildings, and so forth, but where warranted on existing buildings. Unification of legal interpretations would eliminate confusion and promote efficient correction methods.

2. Research on causes of fires, etc.

Greater use should be made of the practical approach of experienced Fire Department personnel. They have first-hand knowledge of fire behaviour under actual conditions. This provides them with an advantage over the personnel who research and test with a theoretical or laboratory approach. A combined approach can be the answer.

3. Educational programs of the public

Limited in effectiveness as previously noted. The importance of the subject matter may indicate its inclusion into the school curriculum at all grade levels. A format could be developed for our nation's schools and fire safety inculcated to the degree of an automatic response or proper reaction from individuals in matters of fire prevention and fire safety.

4. Educational and training programs to improve the fire service

Civil Defense planning is necessarily on a regional, state, and national level. The peculiarity of the fire problem in the various areas does call for some differences in equipment and operational procedures. However, insofar as is possible, standardization should be a goal of the fire service. Cities and towns now have Mutual Aid pacts, and a standardization of operational procedures and equipment permits greater flexibility and more efficient "team work." The Civil Defense problem will basically be best handled by an expansion of existing Mutual Aid procedures; there, the unification of education and training in the fire service should produce excellent results.

5. Information reference service

The establishment of such a service would create a central agency for the compilation of data pertinent to the fire service. It would assist greatly in circumventing delays encountered by local evaluations, many of which could be classified as a "trial and error" approach to a problem. We learn through experience, and a reference area of such experiences would be very helpful.

6. Projects demonstrating new approaches or improvements for fire prevention and control fire safety principles in construction, etc.

There is no question that fire-resistive construction is understood and accepted by all who enter into the field of building construction. There are improvements that will be arrived at, and a program such as this will advance the time for obtaining such improvements. Probably the one factor that won't receive sufficient attention is the provision for proper venting of various sections of fire-resistive buildings. We create a structure that will not burn, which we then load with combustible materials. If proper ventilation is not provided to release heat, smoke, and gases, and to control the direction of fire travel, we have for all practical purposes created an oven or incinerator. Many fires attest to this, and, probably the McCormack Palace fire in Chicago would come in this category.

I would like to conclude by thanking you for the opportunity afforded me to comment on this Senate Bill which has the potential of a full-pronged attack on the nation's fire problem. I regret my answer is so lengthy, but the importance of the subject matter to this and all fire departments cannot be too strongly stressed.

Respectfully,

WILLIAM J. FITZGERALD,
Fire Commissioner.

CITY AND COUNTY OF DENVER, COLO.,
April 6, 1967.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
New Senate Office Building,
Washington, D.C.

DEAR SENATOR MAGNUSON: I urge that your Committee give favorable recommendation to Senate Bill No. 1124, the "Fire Research and Safety Act of 1967".

We are proud of our Denver Fire Department but it is abundantly clear that more research and training must be done in this area. I am particularly en-

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couraged to see the emphasis on education for the higher level positions in the departments. I think this is very important. It is clear that as the size of the departments increase and the technical equipment gets more complex we must have more highly educated command personnel.

I have discussed the Fire Research and Safety Act of 1967 with my Manager of Safety and the Fire Chief and they both concur in my comments to you on it.

Sincerely yours,

TOM CURRIGAN, *Mayor.*

U R S CORP.,
San Mateo, Calif., March 31, 1967.

Senator WARREN MAGNUSON,
U.S. Senate, Washington, D.C.

DEAR SENATOR MAGNUSON: We wish to indicate to you our wholehearted support for the proposed Fire Research and Safety Act of 1967 (S–1124). We believe all aspects of the Act are important, but we will confine our comments to the collection of information and the research programs, areas with which we are closely associated.

URS has been conducting fire research and development work for about seven years under contract to the U.S. Forest Service, the Office of Civil Defense, and the U.S. Naval Radiological Defense Laborator. Although this work has been associated with the fire problems resulting from nuclear weapon thermal radiation, many of our findings are applicable to peacetime fire problems.

In particular, we have studied the ignition, buildup, and spread of fires in rural, industrial, and urban areas and have developed mathematical models to permit predictions of these phenomena; we are developing models to describe and evaluate the capabilities of municipal fire departments to cope with mass fire environments; and we have developed procedures to permit effective actions to be taken in case of fires in shelter buildings.

In all of this work we have attempted to use available fire records, data, and statistics as bases for our investigations. Unfortunately, most of the information is in the form of narrative historical descriptions of fires. The quantitative data available generally do not differentiate between estimates and measurements, and many quantities that are needed to improve our understanding of fire behavior are not reported. The limited amount of information resulting from past and current fire research efforts is related to isolated segments of the entire problem, thus preventing a clear understanding of the overall phenomena involved, as well as making it difficult to apply the results to building design and to fire control system design.

Our investigations of fire service operations have convinced us that great reductions in fire losses can be achieved in present cities and even greater improvements in cities of the future. However, such improvements must be based on research, development, and systems analysis that have not yet been done. This research effort must cover the interacting aspects of fire department equipment and tactics, the design of water supply systems, and the character of the urban areas to be protected.

We are most enthusiastic about the value of the Act. We believe that it will save for the American people many more dollars than it will cost, to say nothing of eliminating much anguish and suffering. We do not wish to cast any aspersions on fire service personnel. No group of civil employees receives greater (and better deserved) respect from the population for their dedication, integrity and heroism. However, they are forced to design their systems by rote and to conform to arbitrary requirements established by long-enduring precedence. Very few systems of any type in this country (except fire services) are expected to respond effectively to modern environments using concepts, tactics, and equipment inherited from their forefathers. Instead, modern systems are based on research, development, analysis, and engineering performed by trained scientists and engineers; and industry, government, and the military traditionally assign these functions to groups other than those responsible for operations. The same concept should apply to the problems of fire safety; the fire service operational forces cannot be expected to function effectively without the benefits of research or by using their own research or the research of groups without objective interests in certain aspects of the fire problem.

We believe that this Act will provide the means of developing the information necessary to achieve significant and vital improvements in fire safety. We believe also that the concentration of the program management in the National Bureau of Standards is most appropriate to achieving these results.

If we can be of assistance in demonstrating the requirement for the Act, please let us know.

Sincerely,

RICHARD DE LANCIE.

STATE OF WASHINGTON,
STATE BOARD FOR VOCATIONAL EDUCATION,
DIVISION OF VOCATIONAL EDUCATION,
Olympia, Wash., April 7, 1967.

Hon. WARREN G. MAGNUSON,
Old Senate House Building,
Washington, D.C.

DEAR SENATOR MAGNUSON: I have been reviewing the Fire Research and Safety Program Act S. 1124. I have discussed this Act with many of the fire chiefs in the State of Washington and anticipate discussing it with all the fire services in our State. I would like to assure you that we are in full support of this Act and believe it is a real step forward for the fire service.

For many years we have looked for cooperation with the office of civil defense on the national level hoping that they would be the cohesion unit to draw the fire services of the United States together towards some common objectives. Unfortunately this did not happen. In my opinion the reason it did not happen was that there were too many people who did not come from a fire fighting background heading up offices of civil defense on both the national and state levels. I believe this Bill will have some far reaching effects on fire protection in the United States, however, I think the Bill in some areas is too broad and that it might enable people who do not understand the philosophy and objectives of fire protection to get into the positions of leadership.

I concur with Chief Gordon Vickery in the establishment of a Fire Commission. I do think, however, that there should be representation from those people who are now responsible for Statewide fire education. In my opinion the Bill should be amended on Page 3, Line 16 and 17, Subsection 5. After (5), strike out "education and training programs to improve, among other things" and substitute "to assist in establishing State level fire service training programs and to support existing State level fire service training programs for the purpose of improving—

"(A) the efficiency, operation, and organization of fire services and

"(B) *the development of standards of training for established and new State training programs* and

"(C) the capability of controlling unusual fire-related hazards and fire disasters, and

I also believe that there should be an amendment on Page 4, Line 7. This would indicate to me that the Bill is aimed at establishing fire protection engineering curriculums in four year institutions. I am not opposed to fire protection engineering curriculums in four year institutions providing these fire protection engineering curriculums are designed for the development of chief fire fighting officers for the future. At the present time the fire protection curriculums are designed to train Fire Protection engineers for industry and the insurance business.

There is much research now being done by State-wide training programs and I think that those situation where education is involved, the State level training programs should be the ones that are supported. For your information, there are approximately fifteen thousand fire fighters in the State of Washington. There are 2,459 paid fire fighters and 12,600 volunteer fire fighters. Our state level training program manages to train in excess of 3,500 of the paid and volunteer fire fighters in our state each year.

We are recognized national leaders in training for the officer level through our yearly Command School program which is the first of its type. Besides this we have a preparatory program, for training young men for careers in the fire service, which is conducted at Tacoma Vocational-Technical Institute, Tacoma, Washington. This school is fully equipped, even to a 1967 Mack Diesel fire truck. We also have associate degree programs for the paid fire fighters in our community college system. We have approached the University of Washington in regard to a fire protection engineering curriculum leading to a Bachelor's Degree in fire protection but have found that they are not interested.

I realize, Senator, that I have written a lengthy letter, but I wanted to give you some idea of what is being done here in your own state in the area of fire protection and to alert you to our concern in certain sections of the Bill. I will be meeting with the committee of chiefs, and more than likely we will have more amendments to offer you. Regardless of how the bill is amended I can assure you that the fire fighters of our state are appreciative of your concern in regard to the fire protection of the citizens of this state.

If I can be of any assistance in regard to this legislation with any of the national organizations, please feel free to call upon me.

Yours for fire protection through knowledge,

LYLE GOODRICH,
Supervisor, Fire Service Training.

CITY OF PHOENIX, ARIZ., *March 30, 1967.*

Hon. WARREN G. MAGNUSON,
Chairman on Commerce,
New Senate Office Building, Washington, D.C.

DEAR SENATOR MAGNUSON: Mr. John Gunther, Exectuive Director of the U.S. Conference of Mayors, has brought to my attention the proposed Fire Research and Safety Act of 1967.

I have reviewed this proposed legislation with the Phoenix Fire Chief and both of us strongly endorse it.

As you probably know, Phoenix has grown rapidly. Because we open approximately two new fire stations each year, our resources do not allow adequate research and educational campaigns. We feel, therefore, that the Act would be of tremendous help to us in providing the level of fire fighting service we need.

If I can be of any help in obtaining support for the needed legislation, please let me know.

Very truly yours,

MILT GRAHAM, *Mayor.*

OAKLAND, CALIF., *March 28, 1967.*

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
New Senate Office Building, Washington, D.C.

DEAR SENATOR MAGNUSON: The chief officers of our Fire Department and members of our administrative staff have reviewed Senate Bill 1124, the Fire Research and Safety Act of 1967. They have reported through the City Manager that they concur with the objectives of this proposed legislation and have recommended that I correspond with you to indicate our support of the measure.

Sincerely,

JOHN H. READING, *Mayor.*

BLOOMINGTON, ILL., *April 10, 1967*

Senator WARREN G. MAGNUSON,
Chairman, Senate Interstate and Foreign Commerce Committee, Senate Office Building, Washington, D.C.:

As the largest writer in the United States of homeowners insurance we promote and encourage comprehensive fire research and safety programs to devise more effective means for protection against death, injuries, and property damage caused by fire. Respectfully request your support for S. 1124 to authorize a responsible fire research and safety program.

E. B. RUST,
President, State Farm Fire & Casualty Co.

CITY OF CINCINNATI DEPARTMENT OF SAFETY,
Cincinnati, Ohio, April 3, 1967.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
New Senate Office Building, Washington, D.C.

MY DEAR SENATOR: This is to inform you that the City of Cincinnati enthusiastically supports a bill, the "Fire Research and Safety Act of 1967," now pending in the Senate.

Fire Chief Bert A. Lugannani of the Cincinnati Division of Fire, aware of the great need for the passage of the bill, lends his personal support and urges favorable action.

The International Association of Fire Chiefs has long recognized the need for Federal assistance to the Fire Service. The mid-year Metropolitan Committee Conference of this Association, scheduled for April 27, 28 and 29 in Chicago, will devote three sessions on April 27 to this subject.

For several years, committees of the International Association of Fire Chiefs have endeavored to interest officials of the Federal Government in the need for and importance of Federal assistance for the Fire Service. Therefore, it is most gratifying to learn of your action in that direction.

The provisions outlined in the Fire Research and Safety Program Act of 1967 and Bill S.1124 would help immeasurably in reducing the tragic loss of life and property from fire in the United States each year.

The importance of this proposed legislation cannot be overemphasized. Frankly, we believe that it is long overdue and that the increasing annual fire losses—some of which affect our National Defense effort—indicate that Federal assistance for the Fire Service must eventually become a reality.

The International Association of Fire Chiefs envisions the establishment of a National Fire Academy, and possibly a Federal Fire Administrator, somewhat in the vein of the National Police Academy and the Director of the Federal Bureau of Investigation.

Federal assistance would in no way detract from the operation of local fire departments. They would function in much the same manner as police departments do, in cooperation with the Federal Bureau of Investigation.

One important area in which Federal assistance would be of inestimable value is the ability of the Federal Government to provide research, as outlined in Paragraph 2 of the Fire Research and Safety Program Act of 1967. A good example is Breathing Apparatus for Fire Fighters. It is believed that Federal research would discover ways to greatly improve the presently used types of Breathing Apparatus (Masks) now available to fire departments.

Fire fighting apparatus, tools and equipment are costly because of a limited market and private manufacturers must, in order to remain in business, add research cost to a marketable item. Federal research could provide manufacturers with important research data, enabling them to provide better equipment at lower cost because of the elimination of research expense.

We appreciate your efforts in this project, and trust it will be given the serious consideration that it deserves.

Sincerely,

HENRY J. SANDMAN,
Director of Public Safety.

CITY OF BUFFALO, *March 28, 1967.*

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
New Senate Office Building, Washington, D.C.

DEAR SENATOR MAGNUSON: At the suggestion of the United States Conference of Mayors, I had my Commissioner of Fire evaluate the Fire Research and Safety Act of 1967, which is pending in the Senate.

The Commissioner reports that this Act would help promote the saving of city lives, as well as the saving of millions of dollars in property values. The International Association of Fire Chiefs is working on a program which seeks Federal subsidy and which apparently would encompass the proposals included in the Act.

For these reasons, I wish to express, as a matter of record, my support of the Fire Research and Safety Act of 1967.

Very truly yours,

FRANK A. SEDITA, *Mayor.*

KENTUCKY INSPECTION BUREAU,
Louisville, Ky., April 3, 1967.

Re S. 1124; H.R. 6637; Senate Joint Resolution 46.

Hon. THRUSTON B. MORTON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR MORTON: No doubt you are familiar with the several Bills and Resolutions which have been recently introduced in the Congress, having to do with Fire Prevention and Control, and Fire Research and Safety.

Senate Joint Resolution No. 46 introduced by Senator Sparkman calls for a Commission to study the growing problem of the loss of life and property by fire. It would appear that the answer to this problem is the adoption and strict enforcement of well-recognized standards for the protection of the public in places where people may assemble or congregate.

I believe you are familiar with the progress made in the City of Louisville as well as throughout the Commonwealth, in connection with fire safety. Also, I am sure you know that better enforcement of existing Local and State Regulations would go a long way toward reducing the fire loss. Already, the knowledge and information needed for preventing recurrences of the instances mentioned in Senator Sparkman's Resolution are well known to regulatory authorities, and existing regulations in most Kentucky Cities require proper fire prevention and protection to prevent such occurrences. Enforcement and public acceptance would seem to be the answer.

I am more particularly concerned with the two other Bills, S–1124 and HR–6637, which have been introducted in the Senate and the House of Representatives, and are entitled "Fire Research and Safety Acts of 1967".

Having worked in the field of fire prevention and protection for the past forty years, I am fully cognizant of the great loss of life and property, annually, due to fire; and I am in accord with the efforts being made by private industries (both profit and nonprofit) to reduce this great loss. However, it is my personal feeling that already there is more information available on this subject than the public is willing to accept.

The programs already being conducted at the State and Local levels are not fully effective, for the simple reason that the public is not willing to accept, or will not listen to, the fire prevention message. As you well know, it is oftentimes necessary for regulatory authorities to resort to the courts in order to have properties occupied by the public made fire-safe, even though the owner himself may be personally liable.

As Chairman of the Kentucky Fire School Committee for the past fifteen years, which Committee sponsors the annual Kentucky Fire School conducted at the University of Kentucky (with an annual attendance of over 800 Firemen from over the Commonwealth—our Instructors numbering over 100), I feel that great strides have been made in improving the fire protection available to our Kentucky Cities. Tested training guides compiled on a nationwide basis are already available for these courses. This material is constantly being revised by a training committee consisting of recognized fire prevention and protection authorities selected from across the Country.

While the countrywide loss record has steadily increased over the past decade and may give the impression that nothing is being done to improve the fire protection situation, I should like to call to your attention the following facts.

The Countrywide Fire Losses over the period since these losses have been recorded by The National Board of Fire Underwriters (now the American Insurance Association) are of particular interest. In 1874, when our national population was about 45,000,000, our national fire loss amounted to about $78,000,000.00, which would give a per capita loss of $1.73 based on the 1875 value of the dollar. In 1926, when the population of the Nation had increased to 117,000,000, the annual fire loss was $562,000,000.00, with a per capita loss of $4.79. In 1963, the national fire loss was $1,405,558,000.00 when the national population was 190,000,000, with a per capita loss of $7.40.

In order to properly evaluate these figures, consideration must be given to the fluctuating value of the dollar and to our national wealth, for each individual year in question. As an example, using 1926 as a yardstick for comparative measurement of fire losses, if we would peg the value of the dollar in that year as $1.00 then in 1959 the value of the dollar went to approximately 50¢. In 1926 our per capita fire losses, at the dollar value of $1.00, amounted to $4.79. In 1959, when the dollar value had reached 50% of its 1926 value, the fire losses rose to $1,108,000,000.00, with a population of 180,000,000, resulting in a per capita loss of $6.13 but, since the dollar value had reduced to 50¢, our fire losses on a comparable basis had been reduced to $3.08 per capita.

When these figures are related to our national wealth, I believe you can quickly see how much our efforts over the past fifty years have "paid off". Related to our national wealth, our fire losses for the period from 1910 to 1920 amounted to approximately .4 of 1% of the national wealth lost annually. During the period from 1952 to 1962, the percentage of our national wealth lost annually had been reduced to .013%. In other words, over the past fifty years, the losses have risen only one-third as fast as the value of the property involved.

Likewise, the loss of life has been reduced. According to the best records available in 1910 to 1922, the loss of life was 9 persons to every 100,000 of our population. During the period of 1952 to 1962, the loss of life had been reduced to 3 persons for every 100,000 of our population which, again, shows a reduction of two-thirds of the number of people lost due to fires over the period of 50 years.

From the foregoing, I believe you will agree that definite strides have been made in our efforts to protect our citizens and our national wealth.

Furthermore, I am not in accord with Senator Magnuson's statement that industry and trade association research has not been effective and is only of a "product-oriented nature". I have been personally involved in numerous research programs for which considerable sums of money were provided, in order to study various fire-extinguishing methods. Also, the fundamental abstract research performed by the Committee on Fire Research of the National Research Council, National Academy of Sciences, has been and is of inestimable value. I question the actual value of any further abstract research.

Through Underwriters' Laboratories, Inc., Factory Mutual Research Corporation, American Gas Association Laboratories, and the Technical Committees of the American Insurance Association, as well as the over one hundred Technical Committees of the National Fire Protection Association, industry has contributed liberally to the study of both fire protection and fire prevention as it applies to all types of construction and hazardous operations which may result in loss of life and property by fire.

While it might be interesting to establish an understanding of the basic nature and behavior of fire in order to establish theories of extinguishment, in my judgment there are already more methods available for fighting fires than are being utilized by Fire Department personnel.

From my experience in this field, it is my opinion that a vast store of information is already available, and that widespread efforts are being made to educate the public in fire safety. I fail to see the need for a tremendous allocation of public funds to conduct a program which would merely duplicate the work of Underwriters' Laboratories, Inc., Factory Mutual Research Corporation, American Insurance Association, National Fire Protection Association, and National Academy of Sciences. In short, such a program is already being effectively carried on at both local and national levels, by private industry, and at an impetus greater than the public is inclined to accept and heed.

Yours sincerely,

JOHN L. THOMPSON, *Manager*.

CITY OF DETROIT BOARD OF FIRE COMMISSIONERS,
Detroit, Mich., April 3, 1967.

Hon. WARREN G. MAGNUSON,
Chairman, Committee on Commerce
New Senate Office Building, Washington, D.C.

DEAR SENATOR MAGNUSON: The Fire Commission of the City of Detroit wishes to place for the record our unqualified support and endorsement of Senate Bill No. 1124—The Fire Research and Safety Act of 1967.

Each year over 12,000 Americans perish in fires in our great country. Fire plays no favorites, from the unremembered habitants of skid row flop houses to the heralded and heroic astronauts. Fire can and often does reach out its unquenchable tongue—its kisses painful, often final.

As we read the bill, we find it a long overdue objective piece of vital legislation which can provide through federal grants the avenues of research, investigation, training and public educational programs sorely needed in our constant fight against man's oldest enemy.

I regret that the shortness of time does not allow us to expand our comments and arguments in favor of Senate Bill No. 1124.

However, if additional time is provided, we would be most happy to have an opportunity to respond in greater detail.

Very truly yours,

ROBERT E. TIGHE, *Secretary*.

CITY OF SEATTLE FIRE DEPARTMENT,
Seattle, Wash., April 5, 1967.

HON. WARREN G. MAGNUSON,
Old Senate Office Building,
Washington, D.C.

MY DEAR SENATOR MAGNUSON: A consensus of representative Washington State Fire Chiefs agrees that the Fire Research and Safety Program Act, S. 1124, which you introduced is urgently needed. You can be assured of our enthusiastic support for this legislation provided certain amendments are added.

Of principal concern is the addition of a provision in the bill for a Commission of professionals from the various specialized fields of fire prevention or suppression. We believe that the composition of the Commission should be spelled out in the bill and suggest the following representations:

Seven representatives of Federal government.

Three representatives from industry selected by the National Fire Protection Association.

Five representatives from the professional fire service in cities over 300,000 population selected by the Metropolitan Fire Chiefs' Section, International Association of Fire Chiefs

Five representatives of the professional fire services from areas other than cities over 300,000 population selected by the International Association of Fire Chiefs

One representative of the insurance industry selected by the American Insurance Association.

We feel that this Commission should have the responsibility and authority to review and approve all projects and grants under Section 16A 1, 2., 5., and 6. of the Act.

Other minor amendments have been proposed but the establishment of the Commission to direct the activities as outlined in the foregoing appears to us to be vital to the successful accomplishment of the purpose of the legislation.

Sincerely yours,

GORDON F. VICKERY,
Chief of Fire Department.

NEWINGTON VOLUNTEER FIRE DEPARTMENT,
Newington, N.H., April 11, 1967.

SENATOR WARREN G. MAGNUSON,
Chairman, Committee on Commerce,
New Senate Building,
Washington, D.C.

DEAR SENATOR MAGNUSON: In regards to Senate Bill S. 1124, "A Bill to amend the Organic Act of the National Bureau of Standards to authorize a fire research and safety program, and for other purposes", may I say that I have studied this bill carefully and heartily endorse it. My interest in this bill is due to the fact that I am not only the fire chief here in Newington, N.H., but am also Chairman of the New Hampshire State Firefighters' Training Program and Secretary of the Volunteer Committee of the International Association of Fire Chiefs. I am active in many other fire service organizations in the state and have held office in these, also.

I concur heartily with the Declaration of Policy, Section 2, "Congress finds that a comprehensive fire research and safety program is needed in this country to provide more effective measures of protection against the hazards of death, injury and damage to property . . ."

In this modern age the responsibility of the firefighter is great. We have made such strides in the field of science that the firefighter of today has been placed in an awkward position; he is being pushed beyond his capabilities to handle all the emergencies that could confront him. Even with the various training programs throughout the country we, on the local level, are only able to scratch the surface so far as properly acquainting the fire services as a whole with the complex problems they are facing today. The scope of their responsibility runs from the small home fire to large industrial complexes—to petroleum installations and even fires involving nuclear radiation problems. With our modern transportation methods each and every fire department may at one time or another be called upon to face any one of the hazards I have just mentioned. We not only have an outstanding complex of highways over which any type of product may be transported, but we also have the possibility of a plane crash to cope with.

Therefore, I feel that a concerted effort must be exerted to provide the necessary machinery so that these hazards may be pre-determined through research and proper laws, rules and regulations so that methods of fire prevention may be recommended and, in the last event, proper training be provided the fire services so they may cope with any emergency with efficiencies.

That section of the bill which would provide grants for various programs such as seminars, symposiums and training sessions is, in my mind, especially good. This would allow definite studies to be made of particular areas which have hazardous potentials. The approach to the problem from a national standpoint is only just, because many times it is a condition of the entire nation that has caused a particular fire problem to evolve upon a small community which may be unable to assume the financial burden necessary to properly appraise its problems and to prepare itself to combat them.

Fire prevention and firemens' training programs are most important to the fire services, for through such education some major fire occurrences can be averted and if a fire does occur properly trained firefighters would be able to keep life loss and property damage at a minimum. Also, we must be ever alert to the fact that we must provide for adequate training of fire department officers for the men of the fire services must have proper leadership. We must have the fire services trained and prepared to combat that major fire, even though such a conflagration may occur but once in the life of the average firefighter.

Reminding all that the life that is saved through fire services research, pre-planning and proper training may be that of someone dear to you or me, I am,

Respectfully yours,

William J. Young, *Fire Chief.*

Many of the witnesses before the Consumer Subcommittee urged that S. 1124 be amended to incorporate the provisions of Senate Joint Resolution 46, a bill to establish a National Commission on Fire Prevention and Control.

Senate Joint Resolution 46 was introduced by Senator Sparkman and referred to the Committee on Banking and Currency.

In a letter to Senator Magnuson, Senator Sparkman agreed to let the Commerce Committee consider his resolution as an amendment to S. 1124. Letters which Senator Sparkman received on Senate Joint Resolution 46 follow:

U.S. Senate,
Committee on Banking and Currency,
Subcommittee on Housing and Urban Affairs,
May 16, 1967.

Hon. Warren G. Magnuson,
U.S. Senator, Washington, D.C.

Dear Senator Magnuson: I am transmitting herewith for possible inclusion in the printed record of hearings before the Consumer Subcommittee of the Committee on Commerce of the Senate on S. 1124, copies of eleven letters that I have received in support of S.J. Res. 46, which I introduced in the Senate on February 27, 1967. I might add that I have received no communication opposing S.J. Res. 46, which would establish a Presidentially appointed commission to study in depth the problems of fire prevention and control.

This transmittal is made with the understanding that the Commerce Committee is considering amending S. 1124 to include the provisions of S.J. Res. 46 with certain minor necessary coordinating changes.

With best wishes, I am,

Sincerely,

John Sparkman.

Newington Volunteer Fire Department,
Newington, N.H., May 15, 1967.

Hon. Warren G. Magnuson,
U.S. Senator,
New Senate Building,
Washington, D.C.

Dear Senator Magnuson: At a recent meeting held by the Volunteer Committee of the International Association of Fire Chiefs in Chicago, Illinois, this committee made a careful study of three bills that are presently before the Senate. It was gratifying to note the interest of the Senate in the fire services in introducing these bills which could be so beneficial to us.

Pertaining to Resolution S.J. 46, To Establish a National Advisory Commission on Fire Prevention and Control and S-218, To Extend to Volunteer Fire Companies The Rates of Postage on Second-class and Third-class Bulk Mailings Applicable to Certain Non-profit Organizations, the committee concurred with the intent of the bills and urged early passage of same.

As to Senate Bill 1124, the volunteer committee was very favorably impressed with this and would very much like to see it passed providing an amendment recommended by the IAFC could be included in the bill. This amendment recommends that a 20 member commission be established to study all aspects of the national fire problem. (Please find enclosed a copy of minutes of meeting for your convenience.) We feel that a bill like this is long overdue and that it would tend to provide the necessary coordinating structure that will make the fire prevention and extinguishment programs operate much more efficiently throughout the United States and its possessions. Therefore we respectfully request that you give this bill and recommended amendment every possible consideration and expend every possible effort towards passage of all three bills.

Respectfully yours,

Chief William J. Young,
Secretary, Volunteer Committee, IAFC.

State of Alabama,
Department of Insurance,
Montgomery, Ala., April 3, 1967.

Re fire service.

Hon. John J. Sparkman,
U.S. Senator, Alabama,
Washington, D.C.

Dear Senator John: I noticed an article in the local paper this week where you asked that a committee be appointed to look into the fire service of the nation. I have been wondering for some time when this would happen, as you know I have been in the fire service all my life, from a rookie all the way up the line to now Deputy State Fire Marshal of which I have been for the past twelve years and I believe that I have seen it all. I would like to point up some areas in this field that may help you on your request, for a committee.

First thing please don't let a committee be appointed that will just consist of the larger towns fire department and State Fire Marshal's as it is of my opinion that they do not know the working's of the small department. We who are in the field every day deal with all of them and their problems.

We have good laws in the fire service but are unable to enforce them for a number of reasons—some political, some for the lack of money being appropriated.

The insurance industry in most cases pay a fee that would eliminate all of this if it was used for the purpose that it was intended but for some reasons the different state's governing bodies has seen fit to reroute it into other funds.

If you will take the Nation as a whole you will find that the cities and large towns of over 25,000 population has a good fire protection service but under that you will find that the rest has very little and most have to depend on old worn-out trucks and Volunteers for their service and the cost is exceedingly high for insurance in these areas.

If you will recall I wrote you a number of years ago concerning the surplus fire equipment of the Armed Forces, and at that time they was all being diverted through the Civil Defense that was good as far as it went but the whole story there was that none of the smaller towns could qualify for this equipment as they had no civil defense director and could not afford one so all of this equipment went to the larger cities and still does, the only thing that the samll towns gets are old worn out equipment that they buys off the cities at a token price since they have no trade in value.

It is heart rending to be called to a small town for help and when you get there find that their old truck has broken down and the fire is spreading all over town, then you have to try and get some of the local towns to help them out, but when they do they have only an old truck to send and in most cases it leaves them unprotected.

I hold certificates in a number of Firemen Schools, A number in Arson Investigation as well as a certificate in Fire Department Instructions and if any of my knowledge is of benefit to you please don't hesitate to call on me at any time, and please by all means if it is possible see that men get on this committee from the grass roots, and not men who will go into a town or what have you and eat a big Steak with the Chief and take what he says and goes, see that some of these men won't mind getting their hands dirty by looking under the carpet.

Respectfully,

JOHN W. HOOPER,
Deputy State Fire Marshall for the State of Alabama.

P.S.—You may not remember me by this address, I am formerly of Huntsville.

John W. Hooper,
305 N. College St.,
Greenville, Ala. 36037.

CHAS. E. JACKSON & ASSOCIATES,
Washington, D.C., March 29, 1967.

Hon. JOHN SPARKMAN,
Chairman, Senate Banking and Currency Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR SPARKMAN: I read with interest your S.J. Res. 46 to establish a National Advisory Commission on Fire Prevention and Control. It is apparent that there is a serious need to cope with this problem, and I am happy to note you are interested in it.

Sincerely,

CHAS. E. JACKSON.

FIRE CHIEFS ASSOCIATION OF ALAMEDA COUNTY,
April 20, 1967.

Hon. JOHN J. SPARKMAN,
U.S. Senator, Senate Office Building,
Washington, D.C.

DEAR SENATOR SPARKMAN: I have been directed by the Fire Chiefs' Association of Alameda County to make you aware of our feelings on your proposed legislation regarding the Fire Research Act of 1967.

All of the Fire Chiefs in Alameda County, California, try to keep abreast of and analyze all proposed Fire Service legislation both State-wide and National in scope.

We are, therefore, happy to inform you that of three (3) similar proposals we favor and support your legislation as presented. This is basically due to the fact that you have provided for the establishment of a National Advisory Commission on Fire Prevention and Control.

It is our feeling that some Fire Officials would naturally be on this Commission and a more comprehensive study could therefore be made.

The Association expresses sincere thanks to you for your interest in this and so many other problems.

Very truly yours,

ROBERT C. HANNON, *Secretary.*

INTERNATIONAL FIRE ADMINISTRATION INSTITUTE,
Albany, N.Y., April 24, 1967.

Senator JOHN J. SPARKMAN,
Senate Office Building,
Washington, D.C.

MY DEAR SENATOR: We have been tracking with greatest interest the legislation under consideration by Congress related to the nation's Fire Service.

The International Fire Administration Institute, chartered by the New York State Board of Regents, and affiliated with the State University of New York at Albany, has been through the years engaged in research related to the systematic and deliberate programs of an educational nature to develop and enhance the administrative posture of fire department executives.

We want you to know that we support Resolution S G 46 initiated by you in February, and if we can be of assistance to you, we would be delighted to make available the resources of this institution.

Your interest in the Fire Service is appreciated.

Very truly yours,

D. F. FAVREAU,
Professor and Executive Director,
International Fire Administration Institute.

STATE UNIVERSITY OF NEW YORK AT ALBANY,
Albany, N.Y., April 25, 1967.

Senator JOHN J. SPARKMAN,
Banking and Currency Committee,
Senate Office Building, Washington, D.C.

DEAR SENATOR SPARKMAN: I have read with considerable interest your statement on introduction of SJ–46 with respect to a National Advisory Commission on fire prevention and control.

I am delighted to know that you have taken this position, and I hope that the two branches of Congress will see fit to give strong support to this effort to resolve a variety of problems in this area.

Several years ago the State University of New York at Albany agreed to support the efforts of the International Fire Administration Institute to arouse interest in the fire prevention problem and to provide for increased training of public officials responsible for prevention and protection.

Our arrangement has been a satisfying one. We hope that it will continue for years to come and that we may have the increased support that will mean a widespread significant impact.

Professor Donald Favreau, one of our staff, who is acting as Executive Director of the International Fire Administration Institute no doubt has written you about his personal support. It is my purpose to pledge to you the continued interest of this University in the education program in fire prevention and protection daily revealed to be so necessary throughout the country.

Sincerely yours,

JOSEPH LEESE,
Director, Center for Executive Development.

MONTGOMERY, ALA., *February 23, 1967.*

Hon. JOHN SPARKMAN,
U.S. Senate, Washington, D.C.

DEAR SENATOR SPARKMAN: It is my information that there is either now or soon will be legislation introduced in Congress relating to the establishment of a Presidential Commission to study the tremendous loss of life and property as a result of fires, and to possibly provide for ways and means of coping with this problem nationwide.

During the seven and one half years that I have served as Commissioner of Public Affairs of the City of Montgomery I have been directly associated with the Montgomery Fire Department and although I would not represent myself to be an authority on fire problems, it is my considered opinion that it is of such magnitude both locally and throughout these United States that there is every justification for the legislation referred to in the foregoing.

As a citizen and a member of the Board of Commissioners, I urge you to use the influence of your office in support of this program as I believe it is most vital to the well being our our citizenry.

In the event that you should be in need of information relating to the fire problems as it concerns our fire loss experienced both in lives and property here in the City of Montgomery, I would be pleased to furnish same.

Thanking you in advance for your consideration, I am,

Very truly yours,

L. B. SULLIVAN,
Commissioner of Public Affairs.

CITY OF HUNTSVILLE,
Huntsville, Ala., February 22, 1967.

Senator JOHN SPARKMAN,
Senate Office Building,
Washington, D.C.:

It has been brought to my attention by fellow members of The International Association of Fire Chiefs that you have been in consultation with them and with Vice-President Humphrey with reference to a bill to be introduced in congress by you to create a presidential commission to study the fire problems in the United States, I understand that this study will be similar to the one recently completed by the President's crime commission.

While I have not had the privilege of studying this bill I am most interested in any solution that may be arrived at towards solving the fire problems in this country, your introduction and support of this bill will be most appreciated by those of us in the fire service, who are daily striving towards these objectives.

These problems need much more study and attention, as the adequate fire safety of our industrial, commercial, transport, and living habits, become more complex daily.

I earnestly urge you to give full weight and bearing in support of this bill.

Sincerely yours,

MASSEY TOLEN.

INTERNATIONAL ASSOCIATION OF FIRE CHIEFS, INC.,
New York, N.Y., February 20, 1967.

Senator JOHN SPARKMAN,
Senate Office Building,
Washington, D.C.

DEAR SENATOR SPARKMAN: This letter is being written from under two hats. First, as an Officer of this Association; and second, as Chief of the Fire Department of my home city, Opelika, Alabama.

You will recall the discussion of this problem briefly on your last visit to Opelika. And trust that you have since had the opportunity to review the contents of the Wingspread Conference which was placed in your hands. Which brings us to this point, I understand from my colleagues that you have been in consultation with them and with Vice-President Humphrey, with reference to a bill to be introduced in the Congress by you to create a presidential commission to study the fire problems in the United States; similar to the recently completed study by the President's Crime Commission.

Your introduction and support of this bill will certainly be most appreciated by those of us in the fire service, who are daily striving toward making our entire environment safe from destruction by fire.

These problems need much more study and attention, as the complexities of our industrial, commercial, transport, and living habits sky rocket. Not to mention, the military needs of adequate fire safety.

You will be hearing from other City and Fire Officials from your home state in this regard. I am

Most sincerely,

G. A. MITCHELL.

CITY OF GEORGETOWN,
Georgetown, S.C., April 3, 1967.

Hon. JOHN J. SPARKMAN,
U.S. Senate, Washington, D.C.

SIR: It is with great pleasure that I write to you with regard your interest in Fire Prevention and Control.

For quite sometime I have felt that a representative of the people, other than local Fire Chiefs should offer a bill to Congress. The type you have shown in the resolution, S.J. 46. Your step forward is one that has long been needed.

The Fire Service through the many organizations such as International Fire Chiefs Association, National Fire Protection Association, International Fire Fighters Association as well as State and Local Associations have been trying to spark the interest of persons such as yourself, in this all important matter of Fire Prevention and Control.

In a land of plenty with not to crowded areas in general, comparing other countries, we seem to lack in safety from Fire. We seem to feel that as a whole there is little to worry about. Then one day tragedy strikes, such as in Montgomery, as you say in your own State. This fills the headlines of newspapers and TV programs all over the United States. After one day all is forgotten, except by those who see these tragedies every day, namely the local firefighters and their chief officers.

Those of us that see this wonder. Why? With all the resources, past statistics, the learned people we have to study this problem. Do we rely on GOD almighty to help us in all our sins. We must face up to the fact that God did not make nor encourage the sin of disregard. Even-so the disregard of life and property safety from fire. We humans have placed this peril in what could be a garden of Eden. By his will and by his pleasure we have managed to keep this wonderful country of ours from total destruction. How, long would we be as patient as he has been, were we in his place?

How long will the blight of rotten, decaying homes and buildings be a part of everyday life? How long must we continue to ignore these unsightly scenes?

A pair of worn out old shoes are discarded with more regard, than these homes and buildings. Old shoes are placed in trash cans to be burned or buried, depending on the means of disposal in our towns and cities. Yet old homes, buildings yes even vacant lots, not to mention old discarded means of transportation, are left where all can see. Where little children as well as adults may be victims of some tragic happening.

Our National and Local Governing bodies call upon us to keep our highways clean, to help keep America beautiful. Yet within our own neighborhoods are these things that are a menace to life. They are not only eyesores but a burden to taxpayers, Towns, Cities, and our Nation as a whole, in one degree or another.

I sincerely pray that our Congress and our President will give this all important matter due and careful thought. We should add to our many slogans one such as "Keep America and Americans safe from fire" also "Clean up our own backyards". Only through good Fire-Prevention Habits on a local level as well as National, can we hope to reduce the tragic Loss of Life and property.

Not everyone can be a firefighter, but everyone can be a fire preventer. Even if we have to be made to by some means.

Thank you most kindly, for taking time to read this. I wish you every success in your effort to bring this to the attention of all persons concerned. S.J. 46 is that first step needed.

Sincerely,

H. M. MORGAN,
Chief, Georgetown Fire Department.

AMERICAN PLYWOOD ASSOCIATION,
Washington, D.C., March 2, 1967.

Hon. JOHN J. SPARKMAN,
U.S. Senate, New Senate Office Building,
Washington, D.C.

DEAR SENATOR SPARKMAN: I read with interest your remarks in the Congressional Record of February 27 introducing S.J. Resolution 46, to establish a National Advisory Commission on Fire Prevention and Control. I am sure it will receive prompt attention of the entire forest products industry as well as that of other building materials manufacturers.

Since close to 60% of all structural (softwood) plywood goes into home building, the subject of fire safety is vital to us and we are in complete accord with the need to continually strengthen all fire safety assurances wherever possible. The American Plywood Association retains a fire expert as a permanent member of our technical staff and throughout the years has spent considerable time and money in our own research program and in cooperation with the Bureau of Standards and the Underwriters Laboratories.

My purpose in writing at this time is to express the hope that, should a National Advisory Commission on Fire Prevention and Control be created, its membership will be broad enough in its total experience to assure full examination of all the factors involved in fire safety.

In the early paragraphs of your remarks you expressed the belief that a "wholesome and productive re-examination of construction, in both design and materials, can be made." This is most encouraging, and we would hope that "design" would receive thorough exploration. Proximity of exits, treatment of areas of egress (corridors, stairways), one-story vs. multi-story construction, placement of sprinklers, etc. are as vital to fire safety as building materials.

I know you are aware of the thousands of examples of fire safe schools where wood products have been used and complete safety is guarded by one-story construction with exits to the outside and corridors designed in such a manner that schoolrooms can be vacated in two or three minutes at the most.

I think it is fair to say that, historically, there has been too much faith placed in so-called non-combustible building materials. True, such products do not contribute to fire. Sadly enough, however, the recent McCormick Place disaster tells us there is really no such thing as a non-combustible building material.

I am sure the American Plywood Association will stand ready to contribute technical know-how whenever desired. I am sure also that one of our top executives with the proper background would be willing to participate in the commission if this is in order.

With your long experience in housing, you are acquainted with the American Plywood Association and other wood products associations, so you know this is not a letter written in panic at the sight of the word "fire". This is an offer of cooperation and I express the hope again that, should an Advisory Commission be created, their studies will be professional in every way, with all factors thoroughly explored.

Sincerely yours,

JOHN D. RITCHIE,
Regional Vice President.

MONTGOMERY, ALA., *March 1, 1967.*

Hon. JOHN J. SPARKMAN,
U.S. Senate,
Washington, D.C.

MY DEAR SENATOR: I am asking your help with data or any material that will help me to debate on a resolution that I want to bring before the Alabama Y.M.C.A. Youth Legislature in the very near future.

The resolution concerns the establishment of a national advisory commission on fire prevention and control. All available information on this subject will be appreciated.

I am attaching a copy of the resolution that I will propose to the Y.M.C.A. Senate. While this is mock legislature I feel it will get publicity and help bring this needed commission before the eyes of the people.

If you think the resolution needs rewording or any alterations; please correct it and send it back to me.

Thanking you in advance for your cooperation.

Sincerely,

ERMA H. COOK.

RESOLUTION OF ERMA H. COOK

Be it resolved by the House with the Senate concurring:

Whereas the cities of Alabama and the Nation have had several tragic fires this year.

Whereas our Senator John Sparkman, Alabama District, is proposing to establish a National Advisory Commission on Fire Prevention and Control.

Whereas the young people of Alabama would like to support Senator Sparkman and see this commission established.

Whereas the young people would like to have our Governor, Lurleen Wallace, join with Senator Sparkman and work with him.

Whereas the young people of Alabama within their respective cities, would work along with their City Mayors to help establish this commission.

Whereas, we, the young people of Alabama, extend sympathy to the families of loved ones lost in fires this year, and honor ones that heroically risked their lives to save others: therefore be it

Resolved by the 1967 Youth Legislature of Alabama, That upon passage of this resolution that a copy be sent to Senator Sparkman, the Governor of Alabama, and all Alabama city mayors.

○