

Y 4
.Sci 2
92-2/26

1025-A

92-2/26
Sci 2
92/4

FIRE RESEARCH AND SAFETY

GOVERNMENT DOCUMENTS

Storage

OCT 26 1972

LIBRARY
KANSAS STATE UNIVERSITY

HEARINGS
BEFORE THE
SUBCOMMITTEE ON
SCIENCE, RESEARCH, AND DEVELOPMENT
OF THE
COMMITTEE ON
SCIENCE AND ASTRONAUTICS
U.S. HOUSE OF REPRESENTATIVES
NINETY-SECOND CONGRESS
SECOND SESSION

OCTOBER 10 AND 11, 1972

[No. 26]

Printed for the use of the
Committee on Science and Astronautics



U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1972

85-502 O

COMMITTEE ON SCIENCE AND ASTRONAUTICS

GEORGE P. MILLER, California, *Chairman*

OLIN E. TEAGUE, Texas
KEN HECHLER, West Virginia
JOHN W. DAVIS, Georgia
THOMAS N. DOWNING, Virginia
DON FUQUA, Florida
EARLE CABELL, Texas
JAMES W. SYMINGTON, Missouri
RICHARD T. HANNA, California
WALTER FLOWERS, Alabama
ROBERT A. ROE, New Jersey
JOHN F. SEIBERLING, Jr., Ohio
WILLIAM R. COTTER, Connecticut
CHARLES B. RANGEL, New York
MORGAN F. MURPHY, Illinois
MIKE McCORMACK, Washington
MENDEL J. DAVIS, South Carolina
BOB BERGLAND, Minnesota

CHARLES A. MOSHER, Ohio
ALPHONZO BELL, California
THOMAS M. PELLY, Washington
JOHN W. WYDLER, New York
LARRY WINN, Jr., Kansas
ROBERT PRICE, Texas
LOUIS FREY, Jr., Florida
BARRY M. GOLDWATER, Jr., California
MARVIN L. ESCH, Michigan
R. LAWRENCE COUGHLIN, Pennsylvania
JOHN N. HAPPY CAMP, Oklahoma

CHARLES F. DUCANDER, *Executive Director and Chief Counsel*

JOHN A. CARSTARPHEN, Jr., *Chief Clerk and Counsel*

PHILIP B. YEAGER, *Counsel*

FRANK R. HAMMILL, Jr., *Counsel*

JAMES E. WILSON, *Technical Consultant*

RICHARD P. HINES, *Staff Consultant*

HAROLD A. GOULD, *Technical Consultant*

J. THOMAS RATCHFORD, *Science Consultant*

PHILIP P. DICKINSON, *Technical Consultant*

WILLIAM G. WELLS, Jr., *Technical Consultant*

JOHN D. HOLMFELD, *Science Policy Consultant*

CARL SWARTZ, *Minority Staff*

JOSEPH DEL RIEGO, *Minority Staff*

ELIZABETH S. KERNAN, *Scientific Research Assistant*

FRANK J. GIROUX, *Clerk*

DENIS C. QUIGLEY, *Publications Clerk*

SUBCOMMITTEE ON SCIENCE, RESEARCH, AND DEVELOPMENT

JOHN W. DAVIS, Georgia, *Chairman*

EARLE CABELL, Texas
JAMES W. SYMINGTON, Missouri
RICHARD T. HANNA, California
JOHN F. SEIBERLING, Jr., Ohio
MIKE McCORMACK, Washington

ALPHONZO BELL, California
MARVIN L. ESCH, Michigan
R. LAWRENCE COUGHLIN, Pennsylvania

CONTENTS

WITNESSES

| | Page |
|--|------|
| October 10, 1972: | |
| Hon. Robert H. Steele, U.S. Representative from Connecticut..... | 3 |
| Dr. Joseph E. Clark, acting chief, Fire Technology Division, National Bureau of Standards; accompanied by Dr. John Rockett, technical assistant..... | 32 |
| Mr. Howard Reynolds, fire chief, Eagleville, Conn..... | 42 |
| Mr. Dennis Smith, firefighter, Engine Company 82, New York City Fire Department..... | 44 |
| Mr. L. L. Kenney, chief, Fire Department, Miami, president, International Association of Fire Chiefs..... | 48 |
| October 11, 1972: | |
| Hon. Barry M. Goldwater, Jr., U.S. Representative from California..... | 55 |
| Mr. William H. McClennan, vice chairman, President's National Commission on Fire Prevention and Control; accompanied by Commissioner Dorothy Duke and Howard Tipton, executive director..... | 60 |
| Mr. Jack Waller, legislative representative, International Association of Firefighters, AFL-CIO..... | 77 |
| Mr. Johnnie L. Caldwell, comptroller general and State safety fire commissioner, State of Georgia; accompanied by Mr. John R. (Bob) Gore, Georgia State fire marshal..... | 82 |
| Mr. James W. Kerr, member, Committee on Fire Research, National Academy of Sciences, director, Support Systems Research Defense Civil Preparedness Agency..... | 87 |
| Hon. John H. Rousselot, U.S. Representative from California..... | 93 |

APPENDIX

STATEMENTS FOR THE RECORD

| | |
|--|-----|
| Edwards, Jack, U.S. Representative from Alabama..... | 97 |
| Eldredge, W. F., bureau chief, Department of Community Affairs, Fire Fighters Standards Council, Tallahassee, Fla..... | 97 |
| Frenzel, Bill, U.S. Representative from Minnesota..... | 98 |
| Grasso, Ella T., U.S. Representative, from Connecticut..... | 101 |
| Howard, James J., U.S. Representative from New Jersey..... | 103 |
| Van Deerlin, Lionel, U.S. Representative from California..... | 104 |

EXHIBIT

WITNESSES

1. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

2. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

3. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

4. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

5. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

6. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

7. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

8. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

9. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

10. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

EXHIBIT

1. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

2. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

3. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

4. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

5. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

6. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

7. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

8. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

9. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

10. [Name] of [Address] [City] [State] [County] [District] [Circuit] [Court]

FIRE RESEARCH AND SAFETY

TUESDAY, OCTOBER 10, 1972

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
SUBCOMMITTEE ON SCIENCE, RESEARCH, AND DEVELOPMENT,
Washington, D.C.

The subcommittee met at 10 a.m., in room 2325, Rayburn House Office Building, Hon. John W. Davis (chairman of the subcommittee) presiding.

Mr. DAVIS. The committee will be in order.

The Subcommittee on Science, Research, and Development today begins 2 days of oversight hearings on the subject of fire research. We hope through these hearings to get a better idea of where fire research in this country stands today, what the main thrust of the many ongoing fire research programs are, and what the Congress can do to further strengthen the work in this most important field.

In an average year over 200 firemen lose their lives fighting fires. 12,000 other Americans lose their lives in fires and thousands of others are injured. The annual property damage from fires exceeds \$2 billion. These losses are unacceptable. We must find ways to bring about a really significant reduction in these figures.

One way is through research. One of the largest professional organizations concerned with the fire problem, the National Fire Protection Association, has noted that in seeking ways to cut fire losses we are faced with what they call a "Research Deficiency."

In recent years the Congress has taken several significant steps to eliminate that deficiency. In 1967 the Flammable Fabrics Act was passed giving the National Bureau of Standards responsibility for research in this important area. Prior to that time the Bureau had concentrated most of its fire research work in the field of buildings and structures.

Then in 1968 the Congress passed the Fire Research and Safety Act which very substantially broadened the Bureau's responsibilities in the entire fire research area. In fiscal year 1972 well over \$2 million were provided for the National Bureau of Standard's fire research efforts.

Fire research, when it is done in an imaginative way, can lead to interesting and useful discoveries. One example has come to my attention recently. Statistics showed that 28 percent of accidental fires result from the unintended ignition of a match or a lighter. Most often a child is involved, and most often the victims of such fires are children. This finding led to the suggestion that matches and lighters might be redesigned to prevent unintended ignition, and I understand that several proposed new designs have been made and are under active consideration.

Our research program must be a continuing one and must respond to new conditions and developments in our society. Advances in technology is a major source of such new developments. In the building field we have seen the new kinds of fire problems that came with the skyscraper and more recently with the mobile home. In neither of these two cases have we yet reached satisfactory solutions to the fire problem. New materials also pose new challenges. Just the other day the Federal Trade Commission called attention to the high combustibility of certain plastic foams widely used in applications such as insulation material in buildings and cushion material in airline seats. Research of flame retardants may make these plastics of continuing usefulness while eliminating substantially the fire danger.

In the course of these hearings the subcommittee will hear from Members of Congress, from professional firefighters, and from fire research directors in the Government. We will also have before us the leaders of the National Commission on Fire Prevention and Control which was established by title II of the Fire Research and Safety Act.

It is appropriate that these hearings take place during the week which has been designated "Fire Prevention Week." The subcommittee looks forward to a productive set of hearings and welcomes the many distinguished witnesses who will be before us.

I might say I have reached the decision to go forward with the hearing despite the fact that some of our subcommittee members haven't arrived at this point. However, as all of you know, the testimony will be recorded and will be transcribed and read. We will have more subcommittee members a little later on. They will, of course, along with the rest of the members of Congress, have an opportunity to read the testimony.

We are honored this morning to have a fellow member of Congress with us, Congressman Robert H. Steele. Mr. Steele, it is a pleasure to have you and if you will come to the table, we will be most pleased to receive your testimony.

Mr. STEELE. Thank you.

Mr. DAVIS. I learned of the demonstration you put on in the Rayburn Building. Maybe before you have finished you might tell us a little bit about that.

(A biographical sketch of Hon. Robert H. Steele follows:)

HON. ROBERT H. STEELE, U.S. REPRESENTATIVE FROM CONNECTICUT

Robert H. Steele, Republican, of Vernon, Conn.; born in Hartford, Conn., November 3, 1938; attended the local schools in Wethersfield, Conn., and graduated from Wethersfield High School, 1956; Amherst College, B.A., 1960; graduate work in government and Russian studies at Columbia University, New York, N.Y., and received an M.A. and the Certificate of the Russian Institute, 1963; in 1960, acted as spokesman for one of the first groups of American students to visit the Soviet Union; in 1963, joined the Central Intelligence Agency and served 5 years in Washington, D.C., and Latin America as a Soviets pecialist; in 1968, returned to Connecticut to accept a position as securities analyst with The Travelers Insurance Co., Hartford, Conn.; earned national recognition as one of the leading pollution control analysts in the investment community; married Ann Elizabeth Truex of Wethersfield, Conn., 1961; four children: Kristen, Alison, Jeffrey, and Bradley; elected to the 91st Congress November 3, 1970, to fill the vacancy caused by the death of William L. St. Onge, and also to the 92d Congress.

STATEMENT OF HON. ROBERT H. STEELE, U.S. REPRESENTATIVE
FROM CONNECTICUT

Mr. STEELE. Mr. Chairman, and members of the committee, I appreciate this opportunity to review and discuss legislative alternatives to this country's growing fire problem and I appreciate very much your deep personal interest and the interest of this committee in this critical problem. I am also grateful for the committee's interest during National Fire Prevention Week to hear this testimony.

I would like to begin by presenting an overview of what I think is meant by the fire problem.

When we compare statistics with other countries, the United States has the highest per capita property losses in the world. Additionally, our death rate is twice that of Canada, three times that of the Scandinavian countries, and four times that of Japan and England. The immensity of these statistics is even clearer when we talk of death and injury. Fires killed approximately 12,200 people in the United States in 1971 and more than half of these individuals died in their homes. It is unconscionable that in a society where we place the highest of values on human life that more than 12,000 have perished during each of the last 6 years. For every death recorded there were an estimated 40 persons burned.

There is no dollar figure that can be placed on lives and injuries because the value of a single human life cannot be measured by money. But in terms of dollars, property destroyed by fire during the past year totaled \$2.845 billion, an increase of \$215 million over 1970. Fire losses this year are expected to top \$3 billion nationwide.

Some fire research experts have estimated that the dollar cost to the Nation in fire losses including deaths, injuries, man-hours lost, property damage and the increasing cost of fire protection equals about \$8 billion to close to 1 percent of our gross national product. Those dollar amounts are easily attainable when every day more than 6,600 fires occur, and you consider that today's structures are more complex and costly than ever.

Correspondingly, we ask most of our Nation's 2,175,000 firefighters from 40,000 departments to combat the immense and increasing fire problems with turnout coats which won't meet the flammability test for children's sleepwear. Furthermore, we have furnished the firefighter with equipment designed decades ago, and have not provided them with sufficient funds for training and educational programs. Yet, we ask our firefighters to engage in our Nation's most dangerous occupation.

If the facts were known, I think few American citizens would encourage their children in their childhood dream of becoming a firefighter. The work of firefighting has been described as the toughest, dirtiest, most brutalizing, and most debilitating work there is. To this description we can add the words "most dangerous." Last year 210 firefighters died in the line of duty. During the 10-year period 1960-70, 790 firefighters died—83 more than policemen killed in the line of duty. The number of injuries sustained is literally uncountable. In New York City alone more than 38,000 firefighters were injured or burned in 1970.

The dedication and raw courage of America's firefighters is a matter of record. It is imperative that their efforts and problems be formally

recognized by a national effort pledged to giving them the help they need and deserve. In this way we would be helping an estimated 2 million volunteer firefighters and 175,000 paid firefighters as well as every citizen of this Nation.

Some areas of Federal input are obvious. For instance, there are only two colleges in the country offering a 4-year course in fire protection engineering and last year a total of only 12 men were graduated with degrees in this science.

It is time that we had a National Firefighting Academy and more courses in firefighting techniques in community colleges and other schools which firefighters could attend at no cost to themselves. The present administration has worked vigorously toward a goal of expert law enforcement protection from our police departments by giving police officers an opportunity to attend various types of courses and schools like the new FBI training facility. Now, we must extend this type of training, such as the new FBI training facility provides, to our Nation's firefighters.

With the construction of complex manufacturing plants, high-rise buildings and thousands of new products which incorporate dangerous materials, the threat of fire has intensified, while the public generally has been led to believe that we work and live in safe, modern structures and that our society is doing all it can to reduce the toll of fire. I think it is clear we have to work to reduce this trend.

I have used the words "fire problem" in my opening remarks without attempting to define what in my mind is one of the most neglected social problems facing this country. Exactly then, what is the "fire problem?" First, we must take a comprehensive approach to permit us fully to grasp the complex and intricate relationships which collectively constitute the fire problem. A fire in a hypothetical high-rise building, combining the worst of typical fire hazards, would serve as a good example. Let us say that a small wastecan is the source of a fire on the 30th floor of such a building. In this building, there are no automatic alarm devices to warn people or alert the fire department of the occurrence of fire. The fire has begun to grow quickly feeding on furniture and rug underlays which contain highly flammable toxic materials and dense smoke is now filling the corridor and being vented by the air-conditioning ducts, utility cable conduits, and elevator shafts. These flues spread murderous fumes throughout the entire structure. The fire department arrives. With ladders too short to reach the fire-involved floor, the firefighters must combat the blaze from within, exposing themselves to temperatures reaching 1,500-2,000 degrees Fahrenheit, blinded by the dense, toxic smoke and having to battle the thousands of individuals trying to exit.

The elevators in this particular building rise to the 30th floor when flames activate the electronic touch-type call buttons and remain locked there as the opaque smoke makes the automatic closing devices inoperable, thus entrapping men, women, and children in a blazing inferno and hindering the firefighter trying desperately, but in vain, to reach the floor.

As the occupants futilely try to vent the rooms by knocking out the large fixed windows, their would-be rescuers must turn back as the turnout coats can no longer shield them from the intense heat generated by the fire, and their antiquated, heavy, and awkward breathing systems have run low on the 15 to 20 minutes of air they

supply. The number of deaths, the number of people injured, maimed, and disfigured for life, the number of firefighters hospitalized because of smoke inhalation, the number of lost workdays could clearly be of tragic proportions.

Even though this is a hypothetical example designed to dramatize some of the various fire hazards we face today, such a fire situation could develop in any one of scores of American cities today. The facts, statistics, and the many conversations that I and my staff have had with practitioners and fire research experts clearly indicate to me that the occurrence of fire, and the resulting loss of life and property, is, today, greater than it has ever been in our country's history.

To me it is incredible to think that 30 people will die by fire today and another thousand will be burned or injured. It is incredible that the Federal Government has really not recognized that fire is costing as much each year as is crime.

The purpose of my legislation is to recognize that there needs to be a national focus on fire and a continuing effort in fire research, prevention, suppression, and protection. All of the resources of Federal agencies in planning, purchasing, building, and regulating must be used in this effort.

As the House committee that has nurtured the development of NASA, I think that you can understand the potential of a coordinated effort toward a goal more than any other public officials.

In fact many innovations and technological breakthroughs have been used by the National Aeronautics and Space Administration in producing a wide variety of practical solutions to serious fire problems. NASA, for instance, has designed a firefighter's suit using materials that are commercially available to present manufacturers of the suits. The NASA coat can withstand a 1,500 degree flame directly applied to it and still give adequate protection to the wearer.

NASA has also prepared certain varieties of polyurethane foam which are nearly flame resistant and fireproof. Research experts from NASA have told me that for \$10 the average living room sofa or mattress could be completely treated for flame resistance. Treatments and materials are also commercially available to produce flame resistant wool carpeting, cotton clothing, and a wide variety of materials to be used for home furnishings and clothing.

Unfortunately, I have learned that many of these programs are in great jeopardy at NASA because of budget and priority restrictions and I would urge the committee to make an immediate evaluation of the firesuit development and breathing apparatus program or they will never be manufactured for firefighters.

In conclusion, I would say that most fires are not an act of God such as a hurricane or tornado. Fires are caused and can be prevented by man.

I wish to ask permission to submit for the record the full text of the seven bills which have been referred to your committee and supporting material and would be pleased to reply to questions.

Thank you very much.

Mr. DAVIS. Those will be included in the record.

Mr. STEELE. Thank you.

(The seven bills referred to, i.e., H.R. 12892, H.R. 12893, H.R. 12894, H.R. 12895, H.R. 12896, H.R. 12897, and H.R. 12898, follow:)

1 ferred to as the "Academy"), which shall not be an agency
2 or establishment of the United States Government. The
3 Academy shall be subject to the provisions of this Act and,
4 to the extent consistent with this Act, to a charter of the
5 Congress if such a charter is requested and issued or to the
6 District of Columbia Nonprofit Corporation Act if that is
7 deemed preferable.

8

ADMINISTRATION OF THE ACADEMY

9 SEC. 4. (a) The Academy shall have a board of direc-
10 tors (hereinafter referred to as the "board") consisting of
11 fifteen members, appointed initially by the President of the
12 United States, by and with the advice and consent of the
13 Senate. The President shall designate, as Chairman, one of
14 the fifteen members of the board. The board shall be rea-
15 sonably representative of the various regions of the coun-
16 try, of the various segments of the community including
17 private industry and labor, of all levels of government, of
18 consumer interests, and of the various types of experience
19 which are appropriate to the functions and responsibilities of
20 the Academy.

21 (b) The members of the initial board shall serve as
22 incorporators and shall take whatever actions are necessary
23 to establish the Academy as provided for under section 3 (a).

24 (c) The term of office of each member of the initial
25 and succeeding boards shall be three years; except that (1)

1 any member appointed to fill a vacancy occurring prior to
2 the expiration of the term for which his predecessor was
3 appointed shall be appointed for the remainder of such
4 term; and (2) the terms of office of members first taking
5 office shall begin on the date of incorporation and shall
6 expire, as designated at the time of their appointment,
7 one-third at the end of three years, one-third at the end
8 of four years, and one-third at the end of five years. No
9 member shall be eligible to serve in excess of three con-
10 secutive terms of three years each. Notwithstanding the
11 preceding provisions of this subsection, a member whose
12 term has expired may serve until his successor has qualified.

13 (d) Any vacancy in the initial and succeeding boards
14 shall not affect its power, but shall be filled in the manner
15 provided for by the organizational rules and procedures of
16 the Academy.

17 (e) (1) The members of the initial or succeeding boards
18 shall not, by reason of such membership, be deemed to be
19 employees of the United States Government. Except as pro-
20 vided in paragraph (2), members shall, while attending
21 meetings of the board or while engaged in duties related
22 to such meetings or in other activities of the board pursuant
23 to this Act, be entitled to receive compensation at the rate
24 of \$100 per day including traveltime.

1 (2) Members of the board who are full-time officers or
2 employees of the United States shall receive no additional
3 pay on account of their service on the board.

4 (3) While away from their homes or regular places of
5 business in the performance of services for the board, mem-
6 bers of the board shall be allowed travel expenses, including
7 per diem in lieu of subsistence, in the same manner as persons
8 employed intermittently in the Government service are al-
9 lowed expenses under section 5703 (b) of title 5 of the
10 United States Code.

11 (f) Eight members of the board shall constitute a
12 quorum.

13 (g) The board shall meet at the call of the chairman or
14 a majority of its members.

15 (h) The Academy shall have a president and such other
16 executive officers and employees as may be appointed by the
17 board at rates of compensation fixed by the board. No such
18 executive officer or employee may receive any salary or other
19 compensation from any source other than the Academy dur-
20 ing the period of his employment by the Academy.

21 **NONPROFIT AND NONPOLITICAL NATURE OF THE ACADEMY**

22 **SEC. 5. (a)** The Academy shall have no power to issue
23 any shares of stock, or to declare or pay any dividends.

24 (b) No part of the income or assets of the Academy
25 shall inure to the benefit of any director, officer, employee, or

1 any other individual except as salary or reasonable compensa-
2 tion for services.

3 (c) The Academy shall not contribute to or otherwise
4 support any political party or candidate for elective public
5 office.

6 FUNCTIONS OF THE ACADEMY

7 SEC. 6. (a) The Academy shall exercise its functions
8 and responsibilities in eight general areas relating to fire edu-
9 cation and training, as follows:

10 (1) recommended actions which can be taken by
11 Federal, State, and local government, and by private
12 individuals and organizations to improve and strengthen
13 fire protection, fire prevention, and fire suppression;

14 (2) promote and encourage eligible individuals to
15 pursue careers as administrators of fire service organiza-
16 tions at all levels;

17 (3) develop a curriculum and carry out programs
18 of instructional assistance and special workshops, semi-
19 nars, conferences, and other such instructional devices
20 that are necessary, for the purpose of introduction and
21 dissemination of information gained from investigation,
22 research, and development concerning the areas of fire
23 protection, fire prevention, and fire suppression;

24 (4) develop fire service extension programs to en-
25 courage and assist States, counties, and local communi-

1 ties to provide continuous training and operational
2 programs in firefighting techniques and procedures con-
3 cerning the utilization of firefighting equipment, fire
4 suppression and other areas related to firefighting in
5 general;

6 (5) promote and assist universities, community col-
7 leges, and other institutions of learning, in planning, de-
8 veloping, strengthening, improving, and carrying out
9 programs and projects concerning fire administration;

10 (6) assist States, counties, and local communities
11 in the development of training programs for firemen;

12 (7) gather data and disseminate information to
13 States, counties, and local communities with respect to
14 firefighting equipment, firefighting techniques, fire serv-
15 ices administration, and other areas related to firefight-
16 ing; and to establish and maintain educational programs
17 for the purpose of informing the public of fire
18 hazards and fire safety techniques, and to encourage
19 avoidance of such hazards and use of such techniques;
20 and

21 (8) establish a voluntary, uniform national testing
22 program for the purpose of enabling States, counties,
23 and local communities to evaluate the skills level of
24 their firefighters and fire administrators.

1 (b) The Academy, in exercising its functions and re-
2 sponsibilities under subsection (a), shall give particular at-
3 tention to the development of methods for encouraging all
4 sectors of the economy to cooperate with the Academy.

5 FINANCING OF THE ACADEMY'S ACTIVITIES

6 SEC. 7. (a) The Academy is authorized to accept con-
7 tracts and grants from Federal, State, and local govern-
8 mental agencies and other entities, and grants and donations
9 from private organizations, institutions, and individuals.

10 (b) The Academy may establish fees and other charges
11 for services provided by the Academy.

12 (c) Amounts received by the Academy under this sec-
13 tion shall be in addition to any amounts which may be ap-
14 propriated to it under section 8.

15 SEC. 8. There are authorized to be appropriated to the
16 Academy such sums as may be necessary to carry out the
17 provisions of this Act.

92^D CONGRESS
2^D SESSION

H. R. 12893

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 2, 1972

Mr. STEELE introduced the following bill; which was referred to the Committee on Science and Astronautics

A BILL

To provide the Secretary of Commerce with the authority to make grants to States, counties, and local communities to pay for up to one-half of the costs of training programs for firemen.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That the Secretary of Commerce (hereinafter referred to as
4 the "Secretary") is authorized and directed to make grants
5 to States, counties, and local communities to pay up to one-
6 half of the total costs of training programs for firemen.

7 SEC. 2. For the purposes of the first section of this Act,
8 any State, county, or local community program is considered
9 approved by the Secretary if—

I

1 (1) it has a program to train either volunteer or
2 professional firemen in firefighting techniques,

3 (2) it is carried out under the auspices of a duly
4 elected governmental body or an incorporated fire
5 department,

6 (3) the curriculum of the program is provided or
7 approved by the National Academy of Fire Prevention
8 and Control, and

9 (4) it is subject to such other terms and conditions
10 as the Secretary finds necessary or appropriate.

11 SEC. 3. There are authorized to be appropriated such
12 sums as may be necessary to carry out the provisions of this
13 Act.

92^D CONGRESS
2^D SESSION

H. R. 12894

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 2, 1972

Mr. STEELE introduced the following bill; which was referred to the Committee on Science and Astronautics

A BILL

To provide the Secretary of Commerce with the authority to make grants to accredited institutions of higher education to pay for up to one-half of the costs of fire science programs.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That the Secretary of Commerce (hereinafter referred to as
4 the "Secretary") is authorized and directed to make grants
5 to institutions of higher education to pay for up to one-half
6 of the costs of fire science programs.

7 SEC. 2. For the purposes of the first section of this Act,
8 any fire science program is considered approved by the Sec-
9 retary if—

10 (1) it is directed to the understanding and develop-

1 ment of fire research, investigation, prevention, and
2 suppression,

3 (2) it is a two- or four-year program,

4 (3) it is carried out by an institution of higher edu-
5 cation, and

6 (4) it is subject to such other terms and conditions
7 as the Secretary finds necessary or appropriate.

8 SEC. 3. For the purposes of this Act, the term "institu-
9 tion of higher education" means an educational institution in
10 any State which (1) admits as regular students only persons
11 having a certificate of graduation from a school providing
12 secondary education, or the recognized equivalent of such
13 certificate, (2) is legally authorized within such State to
14 provide a program of education beyond secondary education,
15 (3) provides an educational program for which it awards a
16 bachelor's degree or provides not less than a two-year pro-
17 gram which is acceptable for full credit toward such a degree,
18 (4) is a public or other nonprofit institution, and (5) is ac-
19 credited by a nationally recognized accrediting agency or as-
20 sociation approved by the United States Commissioner of
21 Education for this purpose.

22 SEC. 4. There are authorized to be appropriated such
23 sums as may be necessary to carry out the provisions of this
24 Act.

92^D CONGRESS
2^D SESSION

H. R. 12895

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 2, 1972

Mr. STEELE introduced the following bill; which was referred to the Committee on Science and Astronautics

A BILL

To provide financial aid to local fire departments in the purchase of advanced firefighting equipment.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 That the Secretary of Commerce is authorized and directed to
4 make grants to local fire departments to pay up to one-half
5 the cost of purchasing firefighting equipment.

6 SEC. 2. For the purposes of the first section of this Act,
7 a local fire department is eligible for a grant if—

8 (1) members of the fire department are participat-
9 ing or have participated in a firemen's training program
10 conducted or approved by the National Academy of

1 Fire Prevention and Control, as established by the Na-
2 tional Fire Education and Training Act of 1972,

3 (2) the department is an agency of a State or
4 political subdivision thereof or it is incorporated by the
5 State in which it is located,

6 (3) all of the firefighting equipment purchased with
7 funds authorized to be appropriated under this Act con-
8 form with standards adopted by the National Bureau of
9 Standards with respect to firefighting equipment, and

10 (4) the grant is subject to such other terms and
11 conditions as the Secretary finds necessary and appro-
12 priate.

13 SEC. 3. Firefighting equipment, for the purposes of this
14 Act, shall be defined as any technical equipment used for
15 fire investigation, suppression, and extinguishment or emer-
16 gency first aid.

17 SEC. 4. There are authorized to be appropriated such
18 sums as may be necessary to carry out the provisions of
19 this Act.

92^D CONGRESS
2^D SESSION

H. R. 12896

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 2, 1972

Mr. STEELE introduced the following bill; which was referred to the Committee on Science and Astronautics

A BILL

To provide financial aid for local fire departments in the purchase of firefighting suits and self-contained breathing apparatus.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That the Secretary of Commerce is authorized and directed
4 to make grants to local fire departments to pay up to 90
5 per centum of the cost of purchasing heat-protective fire-
6 fighting suits and breathing apparatus.

7 SEC. 2. For the purposes of the first section of this Act,
8 a local fire department is eligible for a grant if—

9 (1) members of the department are participating
10 or have participated in a firemen's training program

1 conducted or approved by the National Academy of
2 Fire Prevention and Control, as established by the
3 National Fire Education and Training Act of 1972,

4 (2) the department is an agency of a State or
5 political subdivision thereof or it is incorporated by the
6 State in which it is located,

7 (3) all of the firefighting equipment purchased
8 with funds authorized to be appropriated under this
9 Act conform with standards adopted by the National
10 Bureau of Standards with respect to firefighting equip-
11 ment, and

12 (4) the grant is subject to such other terms and
13 conditions as the Secretary finds necessary or appro-
14 priate.

15 SEC. 3. There are authorized to be appropriated such
16 sums as may be necessary to carry out the provisions of
17 this Act.

92^D CONGRESS
2^D SESSION

H. R. 12897

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 2, 1972

Mr. STEELE introduced the following bill; which was referred to the Committee on Science and Astronautics

A BILL

To extend for three years the authority of the Secretary of Commerce to carry out fire research and safety programs.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That for the purpose of carrying out sections 16 and 17 of
4 the Act entitled "An Act to establish the National Bureau
5 of Standards", approved March 3, 1901 (15 U.S.C. 278f,
6 278g), there are authorized to be appropriated \$15,000,000
7 for the fiscal year ending June 30, 1973, \$10,000,000 for
8 the fiscal year ending June 30, 1974, and \$10,000,000 for
9 the fiscal year ending June 30, 1975.

I

92D CONGRESS
2D SESSION

H. R. 12898

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 2, 1972

Mr. STEELE introduced the following bill; which was referred to the Committee on Science and Astronautics

A BILL

To establish a National Fire Data and Information Clearinghouse, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That this Act may be cited as the "National Fire Data and
4 Information Clearinghouse Act of 1972".

5 SEC. 2. It is the purpose of this Act to establish a na-
6 tional clearinghouse within the National Bureau of Standards
7 in order to collect in one place all available information and
8 data relating to—

9 (1) incidents of fires in the United States, including
10 death and injury statistics for firefighters and others,

1 property loss information, information concerning causes,
2 locations, and numbers of fires, and other appropriate
3 information and data;

4 (2) technological research and development with
5 respect to fire suppression and prevention; and

6 (3) hazardous substances, including degree of flam-
7 mability, degree of toxicity, corrosive characteristics, and
8 other appropriate characteristics of such substances.

9 SEC. 3. (a) The Secretary is authorized and directed to
10 establish and maintain within the National Bureau of Stand-
11 ards a standard data processing and information retrieval
12 system for all information and data collected pursuant to
13 section 2 of this Act. This system shall be known as the
14 National Fire Data and Information Clearinghouse (here-
15 inafter referred to as the "Clearinghouse").

16 (b) In order to establish and maintain the Clearing-
17 house, the Secretary shall obtain such facilities as may be
18 necessary including buildings, computers, and data process-
19 ing equipment.

20 SEC. 4. (a) During January of each calendar year, the
21 Secretary shall publish a catalogue containing a summary of
22 all information and data stored in the Clearinghouse. Copies
23 of the catalogue shall be made available for interested persons
24 and the general public.

1 (b) The Secretary is authorized to prepare abstracts,
2 digests, bibliographies, indexes, microfilms, and other re-
3 productions of information and data stored in the Clearing-
4 house, and to make such items available to State and local
5 governments, industry and business, Federal agencies, and
6 other interested persons.

7 SEC. 5. (a) The Secretary shall establish and maintain
8 within the Clearinghouse an emergency information center
9 which can provide fire service organizations, at any time,
10 with any information and data collected pursuant to paragraph
11 (3) of section 2 of this Act.

12 (b) The Secretary shall obtain for the emergency in-
13 formation center described in subsection (a) a nationwide
14 telephone number so as to allow fire service organizations to
15 contact such center by phone at any time.

16 SEC. 6. (a) The Secretary is authorized to cooperate
17 with industry, organizations, State agencies, and other inter-
18 ested persons concerned with the collection of fire-related
19 data and information.

20 (b) The Secretary is authorized to utilize fire-related
21 data and information which any Federal agency has avail-
22 able to it.

23 SEC. 7. For the purposes of this Act, the term—

24 (a) "Secretary" means the Secretary of Commerce;

25 (b) "hazardous substance" means—

1 (1) any substance or mixture of substances
2 which (A) is toxic, (B) is corrosive, (C) is an ir-
3 ritant, (D) is a strong sensitizer, (E) is flammable
4 or combustible, or (F) generates pressure through
5 decomposition, heat, or other means, if such sub-
6 stance or mixture of substances may cause substan-
7 tial personal injury or substantial illness during or as
8 a proximate result of any customary or reasonably
9 foreseeable handling by firemen of such substance
10 or mixture of substances or exposure by firemen to
11 such substance or mixture of substances, and

12 (2) any source material, special nuclear ma-
13 terial, or byproduct material as defined in the
14 Atomic Energy Act of 1954 and regulations issued
15 pursuant thereto by the Atomic Energy Commis-
16 sion;

17 (c) "toxic" shall apply to any substance (other
18 than a radioactive substance) which has the capacity to
19 produce personal injury or illness to man through in-
20 gestion, inhalation, or absorption through any body sur-
21 face;

22 (d) "corrosive" means any substance which in con-
23 tact with living tissue will cause destruction of tissue by
24 chemical action;

1 (e) "irritant" means any substance not corrosive
2 within the meaning of subsection (d) which on imme-
3 diate, prolonged, or repeated contact with normal liv-
4 ing tissue will induce a local inflammatory reaction;

5 (f) "strong sensitizer" means a substance which
6 will cause on normal living tissue through an allergic
7 or photodynamic process a hypersensitivity which be-
8 comes evident on reapplication of the same substance
9 and which is designated as such by the Secretary;
10 before designating any substance as a strong sensitizer,
11 the Secretary, upon consideration of the frequency of
12 occurrence and severity of the reaction, shall find that
13 the substance has a significant potential for causing
14 hypersensitivity; and

15 (g) "flammable" shall apply to any substance
16 which has a flash point of above twenty degrees to and
17 including eighty degrees Fahrenheit, as determined by
18 the Tagliabue Open Cup Tester, and the term "com-
19 bustible" shall apply to any substance which has a
20 flash point above eighty degrees Fahrenheit to and in-
21 cluding one hundred and fifty degrees, as determined
22 by the Tagliabue Open Cup Tester, except that the flam-
23 mability or combustibility of solids and of the contents
24 of self-pressurized containers shall be determined by

1 methods found by the Secretary to be generally ap-
2 plicable to such materials or containers, respectively,
3 and established by regulations issued by him, which
4 regulations shall also define the terms "flammable" and
5 "combustible" in accord with such methods.

6 SEC. 8. The Secretary shall prescribe such regulations
7 as he considers necessary or appropriate to effectuate the
8 provisions of this Act.

(The supporting material referred to follows:)

THE FIELD OF FIRE SCIENCE EDUCATION

DEAN JOHN COLLINSON, SCHOOL OF ARTS AND SCIENCES, OF THE UNIVERSITY OF NEW HAVEN

Unlike many other public services, the average citizen has little contact with firemen. We tend to forget the vital role they play in our safety, our health, and our welfare. We see the policeman directing traffic, riding in his squad car. Our trash is picked up regularly; the mail arrives every morning.

But we become aware of the fireman only when our very lives are in danger, when our property is being destroyed before our eyes, when we must get to the hospital in the shortest possible time.

As important as extinguishing fires is, perhaps a more important function of the fireman is preventing fires. Building regulations, industrial safety, city planning are all of central concern to the fire department. And the task of preventing fires has become more and more complicated.

In the past there were relatively few building materials with which we were all familiar. As the world around us became more and more complex, as new and different materials were discovered, as industry produced the clothes we wear, the appliances we use, the food we eat, the houses we live in, new and different dangers arose.

In the past, the fireman could learn his job from other professionals in the fire service. The world is changing too fast, the changes are too complex for that to be true any longer.

Institutions of higher education are working to fill the gap between the world of yesterday and the world of tomorrow. Some two-year colleges have established programs to train firemen. These programs offer courses in fire prevention, fire suppression, and department administration.

In addition to the intra-departmental training and the two-year college degree, courses at the four-year junior and senior level are needed. This training falls into two areas, fire engineering and fire administration.

Fire engineering courses will enable the student to understand the aerospace age in which he must live and work. As the chemical industry produces new materials, new methods must be discovered to deal with them or old methods adapted to them. The needs of the fire department must be studied in relation to the socio-industrial structure of the community. Building codes and life safety codes must develop with the changes in industrial technology. Arson investigation must keep pace with the changes in criminal methods.

A program leading to a Bachelor's degree in Fire Science Engineering can be an upper-level two-year program, attracting students with degrees in fire science programs from the community colleges, and continuing the educational development begun there. The stress is first of all on fire prevention. Many of the courses cover fields important to every engineer, but adapted to the problems that will confront the fire engineer. The essentials of chemistry, but fire chemistry, statics, the way in which materials behave under various conditions of stress including heat, process and transportation hazards, the design of industrial structures and conveyances for the maximum protection of the worker and the public, these and many other subject areas are essential. Courses in fire suppression play a role almost equal to that of fire prevention. These include an investigation of fire suppression fluids and systems, fluid mechanics, thermodynamics. The student who completes this program is a planner, a designer of fire prevention systems, a judge of facilities and equipment.

The program leading to a Bachelor's degree in Fire Science Administration is able to apply modern management techniques to the development and operation of a fire department. His programs include courses such as accounting, cost control, industrial relations, communication, techniques of management, collective bargaining. He has the executive training needed to administer a billion dollar operation.

Fire Science, then, is a cross disciplinary field. It adapts courses from chemistry, mathematics, accounting, business administration, industrial engineering, mechanical engineering, and, in its arson investigation courses, criminal justice. These courses in other areas are adapted to fire prevention and suppression, to comprise a coherent area of study.

Fire prevention and control as an academic discipline is developing rapidly and will continue to develop. The fireman is a part of our democratic system and works

with all citizens to preserve law and order and to guarantee our freedom and welfare. Higher education will help the fireman perform his unique function within this system and understand its relation to the rest of society.

Mr. DAVIS. I want to thank you for a thoughtful presentation of the fire problem that faces us today. I am surprised that we are so much worse off than other countries. I would be at a loss to say why that is. I always thought of Japan as being particularly susceptible to the fire hazard, especially after the historic Tokyo fire that occurred in World War II. I wonder if you encountered anyone to explain why we are so much worse off than other nations?

Mr. STEELE. Mr. Chairman, I think I would have to leave that to the experts. Those figures, and particularly Japan, struck me with exactly the same surprise. I might mention in England they have a National Fire Academy. The English attribute substantial success to this academy in holding down the loss of life by fire. The other thing is the use of equipment that some of these countries have gone into more deeply than we have. I hope that would be one of the subjects that would be fully developed by the experts. I have been provided with those statistics which are indeed alarming and surprising.

Mr. DAVIS. I would certainly join you in that hope.

Mr. Chairman?

Chairman MILLER. I am surprised, Mr. Steele, that you are not familiar with the fact that this committee has gone into this matter in great depth. As a result of the Fire Research and Safety Act of 1968 there is a Commission that has been set up to study fire control and fire prevention. It has some of the leading people in this field on it. Mr. Pettis and I serve as the two congressional members of this committee. They meet regularly. I am sure they would be happy to have any information that you can give them as a layman.

However, I will say you can come here and tell us all about fires. Unfortunately the fire departments in this country are very jealous about their own prerogatives in this field. You will find if you go into it that you will get as much resistance from the chief of the fire department in some little town who wants it done his way or it isn't going to be done at all. This is one of the big problems that we have in trying to set these things aside. The former international president of the Firefighters Association comes from my district. He is very active and has pressed for a fire academy. I believe we should have one, but how well will OMB accept the setting up of a new school in this field?

Mr. STEELE. Mr. Chairman, if I may respond, I am well aware of the work that has been done by the committee and I have nothing but praise for that work. We have attempted in the legislation we have drafted to go on from the point where we are now. Moreover, I am also well aware of the National Commission's work and I testified in February before the Commission and they have given us enormous help in our work. Moreover, we have met now with fire departments from across the United States in what is now over 9 months of work on this problem. We quite recognize the problems involved but, at the same time, we feel there is a building consensus for the need for this kind of approach.

Mr. DAVIS. Mr. Mosher?

Mr. MOSHER. Thank you, Mr. Chairman.

I think our colleague from Connecticut has presented some very dramatic and convincing testimony as a keynote for these hearings.

Bob, I like your comment near the end as a keynote, to quote you:

I would say that most fires are not an act of God such as a hurricane or tornado. Fires are caused and can be prevented by man.

I think that is a very simple, obvious statement and yet it presents the very crux for Congress taking further action and some very fundamental action in this field. As Chairman Miller has said, this subcommittee has been very much interested in this question for several years. We have taken some steps in the right direction, and I think the President's Commission is going to present, I think, next year—is that right, the recommendations will come before us next year?

Mr. STEELE. That is right.

Mr. MOSHER. Chairman Davis fully intends to pick up these hearings again next year and get into the action phase, but I am delighted that today and tomorrow we can begin to give this the consideration that it deserves. And I like your keynote.

Mr. STEELE. Thank you very much. Again, I am very grateful for this opportunity to testify.

Chairman MILLER. Mr. Chairman?

Mr. DAVIS. Mr. Chairman.

Chairman MILLER. I would like to direct your attention to something that you haven't said here that represents a very serious problem in firefighting. That is in the nuclear field. How do you fight a fire that takes place where nuclear physics is concerned? There is a man at the Lawrence Radiation Laboratory, which happens to be in my district, who started life as a chemical engineer. He is a graduate in chemistry. He has been doing perhaps more research for the Government in this field than anyone else. Yet, when we wanted to bring him in, there were certain people who raised their eyes because what did he know about fighting fires. I dare say that if you had a fire starting in a nuclear plant, that the average firefighter wouldn't know what to do about it because it represents an entirely new field and one that is going to come closer to us as we go along. It is a very tough one to deal in. You were on that committee, weren't you, Mr. Mosher, that went out and visited these places?

Mr. MOSHER. Yes, sure.

Chairman MILLER. So I applaud you for your interest and the vigor you are showing. The implication is that we have sat back and done nothing about it. We have done and we are trying to do something about it. It is like most other things that you try to introduce into Government. You hit against a certain bureaucracy. It is easy to tell us—all the statistics you have given us here we have from the hearing on our bill. This is not new. I wish you would put yourself to thinking how we can move bureaucracy. It is not the bureaucracy alone in the Federal Government, but in the city and the States. Fire prevention has been turned over to the smaller subdivisions of the cities. They have very good organization. I don't fight with their organization. There are some very fine people in it, but it is very hard to get away with it.

Unfortunately, historically, if you go back to it, you will find two industries that were interested in fire prevention. One was the people that made the firefighting equipment and the other was the fire insurance companies. They have influenced a great deal the whole firefighting system in the United States. These were the only people that got into and took much of a look at it. So I applaud you for the

vigor that you are showing here, but I do want you to know that, in spite of how you feel about it from some of the implications of your statement, some of your colleagues in Congress are conversant with it and have been trying to do something about it during the last 5 years.

Mr. STEELE. I appreciate that, Mr. Chairman, and I would say again that these hearings and the attention that the subcommittee, I know, intends to give the Commission and that the National Commission is giving the problem augurs major steps forward in this field.

As far as getting around the bureaucracy, we have developed a very strong national consensus among firefighters on the need for the kind of legislation we have proposed, the National Fire Academy, et cetera. Endorsements for the approach have come from both paid and volunteer firefighters from across the country. I think for the first time we are seeing a consensus developing for this kind of approach. I think this will take us through the bureaucracy. I hope this will come out strongly and will be focused on in the rest of the testimony you will hear the balance of this day and tomorrow.

Mr. DAVIS. If there are no further questions, I want to thank you, Mr. Steele, for your work in preparing this statement and also I wish to thank you for your interest in this area. I don't know of a more important area in the entire spectrum of domestic problems.

Mr. STEELE. Thank you.

Mr. DAVIS. We have before us Dr. Joseph E. Clark. He is the holder of a doctor's degree in polymer chemistry and is the Acting Chief, Fire Technology Division of the National Bureau of Standards.

Dr. Clark, you may proceed with your statement.

(A biographical sketch of Dr. Clark follows:)

JOSEPH E. CLARK, CHIEF, FIRE TECHNOLOGY DIVISION, NATIONAL BUREAU OF STANDARDS

Born and raised in Philadelphia.

B.S. and M.S., Physical Chemistry, Villanova Univ., Pa.

Ph. D., Polymer Chemistry, Univ. of Windsor, Ontario, Canada.

Employed in industry by W. R. Grace and Company at their Washington Research Center, as a Senior Research Chemist responsible for polymer characterization and degradation studies.

Then employed as a Research Associate by the Manufacturing Chemists' Association; stationed at the National Bureau of Standards in Washington as Manager of their research project on the weatherability of plastics.

Presently, Chief of the Fire Technology Division, National Bureau of Standards, having previously served as Chief of that Division's Office of Flammable Fabrics.

Member:

Polymer Division of American Chemical Society

Chemical Institute of Canada

ASTM (American Society for Testing and Materials)

Information Council on Fabric Flammability

NFPA (National Fire Protection Association)

STATEMENT OF DR. JOSEPH E. CLARK, ACTING CHIEF, FIRE TECHNOLOGY DIVISION, NATIONAL BUREAU OF STANDARDS; ACCOMPANIED BY DR. JOHN ROCKETT, TECHNICAL ASSISTANT

Dr. CLARK. Thank you, Mr. Chairman. It is a pleasure to be with you. Accompanying me is Dr. John Rockett who is technical assistant for the Fire Technology Division at the Bureau of Standards.

Mr. DAVIS. Yes, we know him very well.

Dr. CLARK. Gentlemen, my name is Joseph E. Clark, and I am Acting Chief of the Fire Technology Division in the Institute for Applied Technology of the Department of Commerce's National Bureau of Standards. As Acting Chief of this Division, I am directly responsible for the Bureau's programs in the fire protection and safety area.

I am very pleased to have this opportunity to tell you about our new fire program. This program puts together the traditional building fire research program which the Bureau has conducted since the early 1900's with the programs established by the amended Flammable Fabrics Act, funded in 1968, and the Fire Research and Safety Act, funded in 1969. This single integrated program operated on a little over \$2 million in fiscal year 1972. Our objective is to reduce the high loss of life and property in this Nation due to unwanted fire.

It has already been pointed out this morning that most fires are not acts of God like tornadoes or hurricanes; they are acts of men. We can prevent a large percentage of America's annual fire toll of death, injuries, and property damage. Attacking the chain of events which lead to fire is our mission.

The "fire problem" is really a multitude of problems which contribute to our national loss from fires. Each one of these fire problems has several possible solutions. To provide a rational basis for our approach to these problems we have considered the basic chain of events which lead to fire loss:

(a) The exposure of ignitable material to an ignition source, for example, the exposure of paper in a wastebasket to a discarded match;

(b) The ignition of the material, for example, the paper catches fire;

(c) The spread of fire, for example, the wastebasket fire spreads up the draperies; and then

(d) The fire loss, for example, destruction of the wastebasket, draperies, other room contents, and perhaps the entire building.

This view of the basic chain of events: Exposure, ignition, fire spread, and fire loss, is useful to understand and attack the causes of human loss and property damage from fire.

To minimize fire loss we must interrupt this chain of events. Accordingly, the fire program which we have organized at the National Bureau of Standards is aimed at interrupting the fire chain at each juncture. Therefore, our program has the following major elements:

(a) Fire prevention;

(b) Fire control; and

(c) Fire suppression;

with the foundation activities of:

(d) Research;

(e) Information and data.

The foundation of our program lies in understanding real world fire problems through analysis of fire accidents (information and data activity) as well as researching fire to understand why and how fire hazards exist. These foundation activities provide a sound basis for outputs to building fire codes, fabric flammability standards, performance criteria for fire equipment, and the like.

I would next like to outline some activities in each of these major program elements, to give a brief picture of our work.

A. FIRE PREVENTION

As pointed out by the National Commission on Fire Prevention and Control in its interim report, fire prevention is a prime area in which to expect a major impact in saving human lives and property. Thus we are putting considerable effort into increasing public awareness of fire hazards, into encouraging the fire services to assist homeowners in voluntary inspections and similar fire protection activities, into exploring new designs for common ignition sources such as kitchen ranges, matches and lighters, and into providing the technical basis to the Secretary of Commerce for mandatory national standards on the flammability of clothing and interior furnishings.

In your opening remarks, Mr. Chairman, you mentioned the activities in which we are involved in ignition sources, specifically with matches and lighters. I would like to point out another area, the improved design of kitchen ranges. They are frequently involved in accidental fires. We are coordinating a major effort by manufacturers to update their standards on ranges to include safety devices such as warning lights and childproof knobs. The accident information we have points very clearly to the indication that these improvements might have a great impact on clothing fires.

In addition, the Federal Fire Council which was recently transferred to our jurisdiction from the General Services Administration can be a major avenue to increasing fire prevention activities in the Federal Government and in coordinating the Federal effort to reduce its own loss in federally controlled buildings. We should note that the clothing flammability standards set by the Secretary of Commerce for children's sleepwear are expected to have a significant impact in saving the lives of children threatened by fire. Likewise, standards on large carpets, small rugs, mattresses, blankets and upholstered furniture should have a very significant impact on building fire loss.

B. FIRE CONTROL

The control of fires can be accomplished through reduction of fire loads in buildings particularly through early detection and suppression of fire, and through minimization of smoke and fire movement in burning buildings.

Mr. DAVIS. What is the meaning of your phrase "fire load"?

Dr. CLARK. It is not a very well defined term. It is the amount of combustible material in a building, specifically in an enclosure—just about everything that is brought into the building after it is constructed and turned over to the occupants—the paper, the draperies, the rugs.

Mr. DAVIS. It would include something like lint in the air?

Dr. CLARK. Certainly all organic materials are a contribution to the fire load.

The Public Building Service announced a major grant to the Building Research Advisory Board which will subcontract to NBS a nationwide survey of fire loads in buildings. Our studies should develop a representative picture of fire loads in office buildings and, if additional funding becomes available, fire loads in hospitals and schools as well. Once the nature of these fire loads has been determined we should be better able to design buildings that resist the spread of fire.

In the category of automatic fire control our first emphasis has been on smoke detectors. We have analyzed most commercial smoke detectors and recommended design changes which some manufacturers have already incorporated, producing more effective fire detectors. We are also developing performance criteria for residential detectors, and exploring new approaches to early detection of fire, as well as measuring unique fire signatures so that we can reduce false alarms. I am told typically even for the relatively insignificant detectors we have today the false alarm rate is well over 10 times the actual number of fires that occur.

In addition, we develop design criteria and flammability tests for building materials and systems leading to viable building standards for fire-safe buildings. Under development in this area are: building design standards for smoke control based largely on the results of full-scale burning of several multistory buildings, this is in New York and Atlanta particularly, fire safety standards for America's day care centers, and a new flammability test for carpets aimed at more fire-safe corridor exits.

Chairman MILLER. Mr. Chairman, may I interrupt? In parts of Europe they have built buildings just to study fires set up in these buildings.

Dr. CLARK. Yes, sir.

Chairman MILLER. Do you have knowledge of any such thing done in the United States?

Dr. CLARK. In this country, I am not aware of a single facility which is capable of filling all our needs. For the past month or so we have been looking very carefully at the need for such a structure in this country to determine whether or not in fact we need build one or if the information that would result from carrying out the experiments in these large and expensive structures could be gathered by other means.

Chairman MILLER. They are very expensive. In Paris, there is one that is almost in the center of a residential area. They have conducted all their work in there.

Dr. CLARK. Yes; as a matter of fact we have had discussions of this matter with the former Director of the Bureau of Standards, Dr. Astin. He is coordinating efforts to look for international cooperation in facilities that are available in other countries. The French facility is one that we have focused on recently.

Chairman MILLER. I certainly hope he is successful, because this is one of the places we can begin to attack this thing at its roots.

Mr. DAVIS. I recall the test that was conducted in Atlanta. It was possible because they were getting ready to tear down an old hotel. It would seem to me that opportunity ought to present itself fairly often, what with all the new freeways being built.

Chairman MILLER. First, can you get the money to do it?

Mr. DAVIS. That is always the question.

Chairman MILLER. Yes; it is all right to get up and preach about these things, but can you get the money to actually do it?

Dr. CLARK. The third output area is fire suppression.

C. FIRE SUPPRESSION

Our present fire suppression activities are aimed directly in support of the fire services. We have tested the effectiveness of protective

clothing and equipment for firefighters and discovered some surprising inadequacies which might help account for the hundreds of firefighters' lives lost and the very high rate of firefighter injuries each year. Most firemen's protective coats are flammable; many are not as firesafe as children's sleepwear under the new Commerce flammability standard. Some firemen are wearing helmets which begin melting at temperatures the firemen could otherwise harmlessly withstand—clearly a melting helmet is not a very good protective "hard hat." Firemen's ladders have been known to fail after exposure to heat from burning buildings.

To help correct these inadequacies we are developing performance specifications to aid firemen in selecting safe and effective equipment. We have developed a performance specification to enable firemen to select better turnout coats; we have developed a do-it-yourself ladder test to enable firemen to verify their ladders' dependability, and are working toward similar guidelines for other equipment.

Furthermore, we are developing a guide to enable optimum use and placement of firefighting resources which balances specific local needs. Another project will develop analytical tools with which a local fire chief can analyze the injuries his department suffers. Based on this analysis the chief can decide whether or not he should modify his firefighting tactics, training, or equipment.

D. RESEARCH

Research can provide valuable new solutions to age-old problems. At NBS our approach is to define important fire problems in which new knowledge in science and technology can make a contribution to saving lives. Thus our investigation of the chemistry and physics of combustion processes might point the way to improve fire-retardant materials or improved fire extinguishers. The exploration of the dynamics of the fire situation may lead us to a firm knowledge of the best location for fire detectors. It is surprising that presently we do not really know how many fire detectors are needed in a building or their optimum location.

E. INFORMATION AND DATA

The accident data on which we should base our priorities and monitor our progress must be solidly founded. The accident information must also be quite detailed so that its analysis can clearly indicate the critical causes of fires that need to be attacked. Therefore, we have recently contracted for the design of a national fire loss data system which will use the valuable input of the National Fire Protection Association and various State and local data sources. A good example of the value of such a system is found in FFACTS, our Flammable Fabrics Accident Case and Testing System, which now guides our development of fabric flammability standards.

I hope that this brief overview of the five-pronged thrust of the NBS Fire program has been helpful to you.

In conclusion, I want to convey to you the sense of urgency we feel in saving lives and property from fire. This week, National Fire Prevention Week, is an appropriate time to renew our commitment to fire safety.

Mr. DAVIS. Thank you very much, Dr. Clark. There is one matter that has interested me for a long time about loss of life by fire. That is I have never encountered any statistics that distinguished between death and injury from burning and death and injury from inhaling toxic fumes. Have you ever seen a breakdown?

Dr. CLARK. Well, sir, we have attempted in looking through the presently available information to determine the exact cause of death. One of the problems has been that the people on site who have the greatest access to the detailed information are usually not very well trained or very well versed in how to accumulate this information in a meaningful way which would be helpful afterward. There is very good information available from our own accident data bank, from the National Fire Protection Association, from the States such as California, Oregon, and Washington, but unfortunately, the specific details which would point to the exact causes of death and those critical points that we could best attack are usually lacking.

Mr. DAVIS. Does your research at the Bureau include the analysis of the products of combustion as to the toxicity of them?

Dr. CLARK. Yes; we have several projects on this subject. In addition, in coordination with the National Science Foundation, we are working with the University of Utah to study the biological effects of smoke, specifically on test animals. The National Science Foundation programs in the fire research area are very closely coordinated with those of our own. We get a quite good synergistic effect in this area. A lot of their work is aimed at defining the toxic smoke inhalation hazard.

Mr. DAVIS. Is it possible to tell from autopsy whether death resulted from burning or asphyxiation?

Dr. CLARK. The best information that I have in that area is that it is very difficult to tell whether the actual cause of death is specifically attributable to any one of the individual causes that were present—the skin burns the high temperatures, the carbon monoxide and other gases which are ingested, and the smoke particles which may reach various depths in the respiratory tract. The size of the smoke particle is a very critical determinant. Afterwards it is very difficult to determine what gases and toxic substances have been carried by the particles into the respiratory tract to cause death, so it is quite a difficult problem. I know that there is some medical research work going on—the work that I am most familiar with is at the University of Utah—to investigate this specific area.

Mr. DAVIS. Thanks.

Mr. Miller?

Chairman MILLER. I just wanted to point out that in two places in Dr. Clark's very fine statement he says: "The single integrated program operated on a little over \$2 million in the fiscal year 1972." We are talking about the great loss that has taken place in life and yet we are only investing \$2 million a year in trying to get at it.

In another place he says that as additional funding becomes available, fire loads in hospitals and schools will also be undertaken. This all comes back to: If you get the money. I think that this committee can stress the fact in its report that we are underfunding the very thing that we are trying to do. I am certain if we funded this at the proper level, Mr. Steele's great interest would also be reflected because this is where you need it.

I had only one experience with fire that was close to me. I live in the Methodist Building on the fifth floor. Five or 6 years ago I was home alone and was awakened by a lot of smoke. As I looked out the front window, I saw smoke coming up and every once in a while it was lighted up with a blaze. Fortunately the floors in this building are 14 inches thick, concrete, but a man who lived right under me, a newspaperman, had fallen asleep with a cigarette. I don't need to tell you the rest of the story. This poor devil was so badly burned they couldn't embalm him. The fire was just rampant. About the time I came back from seeing the blaze, there was a rap at the door and there was a fireman there who said, "Get out immediately." I put on some clothes and got downstairs. The fire was suppressed, but the interior of the place was completely gutted. He had a pet cat and the pet cat was dead. It was a rather startling thing, but I went up and went to sleep the rest of the night. They had to recondition the apartment completely and do some work in our apartment because of smoke damage. The only thing that saved us was that this was a good fire-resistant building.

All of the Members who lived there, and there were a number of Congressmen who lived in the building at that time, more than there are now. It was shortly after Easter. I noticed one woman came down completely dressed with her Easter bonnet on. She was going to save that. It is quite an experience. It taught me a lot. But we do have a lot of educating to do with the American people in my estimation. We are a long way off. But I want to congratulate the National Bureau of Standards for its work. It pressed the Fire Research and Safety Act. Dr. Branscomb did a great job and you are doing a great job.

I mentioned nuclear physics. Are you doing any study as to fires that may be started this way?

Dr. CLARK. We have not put any major effort in to look into such specialized problems but we are aware of them.

Chairman MILLER. I know the AEC has done a lot with it. This man that I spoke of is called back here ever so often, but he is just right up there. He is gung ho on the matter of suppressing fires around nuclear setups.

Thank you, sir.

Mr. DAVIS. Mr. Mosher?

Mr. MOSHER. Dr. Clark, you referred to our new fire program, and I judge you mean a newly coordinated program?

Dr. CLARK. Yes, sir.

Mr. MOSHER. This new coordination has only really been in effect for a year now or a year and a half?

Dr. CLARK. That is correct.

Mr. MOSHER. Would I guess correctly that you would hope to give the committee a feeling that you are really just getting underway and getting momentum and that you look hopefully to a much larger program with some need for much greater support from the Congress, as indicated by the chairman, including more financial support?

Dr. CLARK. Yes; it is frustrating to see a field in which a major impact could be made in saving lives very simply—that is the primary thrust of our program, it is primarily for human safety and secondarily for property safety. It is frustrating to see the areas in which a major impact could be made and not have the resources to do it.

Mr. MOSHER. I get the impression at this point, just in your beginning stage, it is a fairly academic program. What are your policies? At this point, you can look upon it as sort of basic research that perhaps even to a certain degree is aloof from the practical firefighting forces of the country? What is your intercommunication with the practical firefighters of the country at this point?

Dr. CLARK. I believe I understand the thrust of your question. Let me say the underlying philosophy that we have in getting the program off the ground and really getting things moving is to plan by objectives. That is, we define specific objectives in the fire safety areas where research work is needed. The idea is to have this research aimed directly at an objective and know clearly just how we will get to that objective of fire safety.

We try to understand the real world problem through having a bank of accident information which tells us where to start and how to go about solving a problem. That is, we seek an understanding of what the real problem is, and the more complete that understanding is the better off we are in attacking the problem. This is supplemented through communication with the fire chiefs, the firefighters, the firemen on the line, and through our own disaster investigation team. We frequently go out and investigate fires ourselves, and in addition we see many, many reports on fires, even where our own people cannot be there.

Mr. MOSHER. How do you sense the attitude of the firefighter community toward the work you are doing? Is it cooperative? Is it antagonistic? Do they welcome you?

Dr. CLARK. I think we have a very good, a very positive working relationship with the firefighters, fire chiefs, fire marshals. We have a number of individual projects going with them, and I think it is normal to expect, initially, someone to be concerned about another person coming in and telling them what to do in their own field. I think that is a normal human reaction and we have, of course, occasionally seen that, but it is not presently a serious problem for us.

Mr. MOSHER. You aren't trying to do that yet, are you?

Dr. CLARK. We feel many of these men know more about the practical aspects of the fire problem than we do, and so we make a very strong attempt to communicate with them.

Mr. MOSHER. You spoke about discovering some surprising inadequacies. Rather than discovering, you are confirming some knowledge that a lot of people in the field must have known; isn't that true?

Dr. CLARK. What we find is that the more that we go out and talk to people in the fire services, the better we can define equipment and other problems. One of our problems then in response is to find out which ones are real, and which ones are the most important, and that takes a considerable amount of time and a lot of discussion and communication to set priorities.

Mr. MOSHER. We hear overused this term "systems approach" and "systems analysis," but I assume this is what you are attempting to do with respect to a very complicated volume of evidence that is available. You are trying to pull it together and make some sense out of it, are you not?

Dr. CLARK. Yes, the systems and operations studies are in a very early stage. The initial thrust of our fire services program, when the

funding became available a few years ago, was to look at the equipment areas specifically because we felt that the firefighters' equipment really was much below what it could possibly afford to the firemen for his own protection. Now that NASA is making some inroads into that area and our own programs are making progress, we think we can step back half a step and try to look at the total problem as a system and try to understand which parts of it are most likely to yield protection.

Mr. MOSHER. Then I get back to my original point. You are really just in the beginning?

Dr. CLARK. Yes.

Mr. MOSHER. And you do welcome and need further support?

Dr. CLARK. Very definitely.

Mr. DAVIS. Mr. Coughlin?

Mr. COUGHLIN. Thank you very much.

You administer both the Flammable Fabrics Act and the Fire Research and Safety Act?

Dr. CLARK. Yes.

Mr. COUGHLIN. Is your division the only division in the Federal Government that is actively engaged in fire prevention and safety work? Are there other departments in the Government?

Dr. CLARK. There are many others who are concerned about fire safety problems. I have a large chart that covers half of one wall in my office that shows who is doing what and tries specifically to trace how the money gets down to the State and local level. There are many programs. We try to keep on top of what everyone else is doing. We are perhaps at the more fundamental end of the spectrum when we compare ourselves to some of the firefighting problems that are being attacked in other parts of the Federal Government. We hope with the transfer of the Federal Fire Council to the Bureau of Standards that we will be able to get a better handle on the total coordination of Federal activities. They are very widely diversified throughout the entire Federal structure.

Mr. COUGHLIN. What other major efforts are there, as an example?

Dr. CLARK. NASA, HEW, and GSA. The new Occupational Safety and Health Administration has a very large effort in fire safety for employees. AEC, HUD, Department of Agriculture, the Forest Service—there is probably not a major agency in the Federal Government that does not have a significant program in this area.

Mr. COUGHLIN. Congressman Steele in his very excellent testimony cited the fact that the death rate in the United States is four times that of Japan and England. Do you have any notion why that would be?

Dr. CLARK. We have a lot of ideas which are rather from the seat of our pants rather than from the depths of our brains. Certainly the patterns of living are very different. I have heard that there are legal, would you say, impediments to fire accidents in Japan. I understand it is a crime to have a fire there, but I don't know if that has any impact. The cultural differences are very great. We hope to send someone to Japan for an in-depth study of such questions. We think we may be able to learn something from a study of the differences in fire accident rates in these countries. In Britain, the research station at Borehamwood has made a significant impact on their fire accident rate, and legislation there some years ago on open fireplaces and open

fires has probably had an impact as well. There is a multitude of problems and a multitude of reasons.

Another one of the problems may very well be that we do a better job of keeping tabs on how many accidents we have, as opposed to what is done in other countries. We don't really know for certain how accurate and precise our numbers are as compared to those in other countries. I think those numbers are probably reasonable estimates but we don't have any idea if they are relatively going up or down or staying steady.

Mr. COUGHLIN. Thank you very much. I regret that I have to go to another meeting.

Mr. DAVIS. If there are no further questions, I wish to thank you, Dr. Clark, and Dr. Rockett, for coming with us this morning.

I will ask the next three gentlemen to come to the table together. We have three gentlemen who are firefighters. One is the president of the International Association of Fire Chiefs, Mr. Kenney. Another is Mr. Dennis Smith from Engine Company 82 of the New York City Fire Department and who has become famous through writing a very interesting book about the life of a firefighter. And we have Mr. Howard Reynolds, fire chief of the Eagleville, Conn., Fire Department.

Will you come forward, please?

Chief Reynolds, will you proceed with your statement?

(A biographical sketch of Mr. Reynolds follows:)

HOWARD G. REYNOLDS, FIRE CHIEF, EAGLEVILLE, CONNECTICUT

Born: Mansfield, Connecticut November 26, 1910.

Educated in local schools and graduated from Bryant College, Providence, R.I. with a degree in business administration.

Resides on South Eagleville Road, Storrs, Conn. with his wife, Mary. Has a son, Guy, and a daughter, Gail.

Served with the United States Army Signal Corps in the South Pacific in World War II. Discharged as a Master Sergeant in December 1945. Formed a partnership in February 1946 with Ira F. Wilcox for the operation of an insurance agency. Continued until November 1962, at which time Mr. Wilcox died. Purchased his share of partnership and incorporated under the name of Wilcox and Reynolds, Inc.

Has served as:

President of Tolland County Association of Insurance Agents.

Director of Connecticut Insurance Agents' Association.

Director of New England Insurance Agents' Association.

Fire Mutual Aid Co-ordinator for State Office of Civil Defense.

Vice President—Eastern Connecticut Firemen's Training School.

Chairman—Statewide Radio Committee.

Chairman—Governor's Conference on Fire Prevention.

President—Windham and Tolland County Firemen's Association.

President—Connecticut Fire Chiefs' Association.

President—Connecticut State Firemen's Association. (28,000 members)

Has assisted in the formation of many volunteer fire departments in the State of Connecticut.

Has been active in the formation of Mutual Aid and Central Dispatching Systems. Charter Member of Eagleville Fire Department (1934). Served as chief for twenty years (1950-1970).

Charter member of New England Fire Marshals' Association. Member of New England Fire Chiefs' Association.

Served as Chairman of Legislative Committee of Connecticut Fire Chiefs' Association for 10 years.

Is Tolland County Commander of the Search and Rescue Team.

Is Chairman of the Consulting Committee on Fire Technology and Administration for the State of Connecticut Department of Education.

Is member of the Governor's Technical Advisory Committee for Fire and Civil Defense.
 Is Co-ordinator between the Fire Service of Conn. and Conn. State Police Dept.
 Was named by the Town of Mansfield as outstanding civic leader of the year for 1968.

**STATEMENT OF HOWARD REYNOLDS, FIRE CHIEF,
 EAGLEVILLE, CONN.**

Mr. REYNOLDS. Mr. Chairman and members of the committee, my name is Howard Reynolds. I have been an active volunteer fireman for 38 years, during which I served as chief of a volunteer fire department for 20 years. In addition, I am a charter member of the New England Fire Marshal's Association and a member of the New England Fire Chiefs' Association. Within the State of Connecticut I have served as president of the Fire Chiefs' Association and president of the State Firemen's Association.

I believe that I can honestly set forth the views of the volunteer firemen of this country. Of the total firefighters in the United States the volunteers make up the greatest portion by far. In our own State of Connecticut with 30,000 firemen, only 3,000 of these, or 10 percent, are members of fully paid fire departments.

In the last few years, the volunteer fire departments have had an almost complete turnaround in the type of firefighting requiring their services. No longer is a so-called rural fire department principally engaged in the suppression of brush fires and an occasional farm fire. With the move to suburbia, many new problems have been thrust upon the volunteers. Industrial parks, massive shopping centers, high-rise apartments, industrial plants—you name it—and suburbia has it.

This means extensive training to combat these new hazards and the purchase of more apparatus. Not only ordinary pumpers but aerial ladders or elevating platforms along with all the other specialized tools of the trade.

Many of our small towns have found that almost overnight, they now have an interstate highway running through their town. This means that they are going to have to respond to an increasing number of motor vehicle fires, not only in private passenger cars but in trailer trucks and valuable trailer cargo.

In most of our suburban towns, the volunteer fire department is the only organized emergency service that is available for instantaneous action. Probably because of this and because of the members dedication to the saving of life and property, we now find that many of our departments in rural areas are operating a rescue service and an ambulance service or a combination of the two. With the interstate highways that I previously mentioned, this becomes increasingly important. This means additional training on vehicle extrication.

In my own State, we have gone into this subject in depth and are conducting many classes throughout the State on vehicle extrication, including one for the trainees at the Connecticut State Police Academy.

Unlike industry, firefighters and ambulance and rescue personnel cannot be expected to acquire their skills by on-the-job training. True, the skills that they acquire will be expanded and become more efficient over a period of time as they gain experience, but we must exert every

effort possible to give them the benefit of all the training possible before we put them on the front line where our citizens' lives are at stake along with those of their fellow firefighters.

When a city or town spends a considerable amount of money for a piece of fire equipment or even if a volunteer fire department buys the equipment itself, the public expects, and rightly so, that firefighters know how to use the equipment that is provided and use it properly. How are we going to do this? We all know that in the excitement of a fire there are going to be some mistakes, and in many cases these mistakes occur because of a lack of adequate training. This is why we must have training over and over again. We need to establish such habits that, regardless of all the excitement, we will do the right thing almost automatically. This is one of the many reasons that we have to have firemen's training continuously.

In volunteer fire departments where manpower may be short in supply during the daytime, it is imperative that every man be capable of doing every job and exerting his utmost in combating the catastrophe of fire. This is also true today in fully paid departments where companies are undermanned due to shorter working hours and tight budgets.

I am sure that you are all aware that firefighting is the most hazardous occupation of any of the public services, even more so than that of a policeman.

I have seen good men injured in the performance of their duty because of the lack of proper training, and I have seen good men die for the same reason.

I think that we have to stop for a minute and realize that when we are able to interest a man in the volunteer fire service, first of all, he becomes a member because he is interested in serving his community and also perhaps to a certain degree, the excitement of being a fireman is enjoyed by him. We have all occupations represented from laborers to brain surgeons. However, we must realize that our volunteer also has the problem of earning a living, and he is only able to give us a limited amount of his time. We are in competition with his wife, who looks to him to do some work around the house and yard; with his television, with his fishing schedule, with his golf schedule, with his powerboat and a thousand other things. What I am saying is this: We are only going to get just so many hours of this man's time, and while we have him we had better use that time in training him to do the job that he volunteered for; namely, being a firefighter. In my opinion we ought not to be using up his fire department time in selling raffle tickets, in putting on bean suppers, and the hundred and one other methods that volunteers have used to raise money over these many years. The cost of fire equipment is tremendous, the technical information that he should and must have to properly do his job is so great that we have got to make every effort to make every minute of his time count.

I believe this committee has a number of proposals before it that can help the fire service. The fire service cannot remain static, as it has for so long. Its failure to modernize equipment or apparatus or to learn how to combat new hazards must, under the laws of progress, result in the retrograding in the service to the public.

There are so many things that need researching even in the ordinary firefighting tools of the fire department. For instance, for many years we have carried heavy 2½ inch double jacket hose with bulky

heavy brass couplings. This type of hose has its place, but in a rural area where we are trying to move large quantities of water from the source of supply, which is usually a river or pond, to the scene of the fire, it is much more advantageous to use a larger diameter, lighter hose in longer lengths with a quick hitch coupling so that we can move water in volume rather than under high pressure. By simply increasing the diameter of our hose by 1 inch, from 2½ inch to 3½ inch we find that we double the amount of volume of water that can be moved. This type of hose was developed and put into use in England. Only recently has it been available in this country. There are many things along this same line that could be developed, and this information passed onto the fire service. The individual fire departments can't afford a research and development division. However, they could pass on many worthwhile suggestions if there was an agency available to develop them.

I read with interest the provisions of the bills that provide grants to local communities for the partial payment of the training programs and the purchase of certain items of fire equipment, et cetera, and the portion that really impressed me is that before any community can become eligible for these funds they must have approved training programs. I think this is of the utmost importance.

I would like to conclude by mentioning the need for a centralized and coordinated system to adequately collect fire incident data. It is difficult to solve our country's grave fire problem when we are uncertain as to the magnitude of the problem or even what the problem is. There are relatively few sources from which reliable data can be obtained. The insurance companies assemble data primarily for actuarial purposes and not for fire protection engineering. A uniform reporting system coupled with a national data bank would greatly assist our country's fire services.

Thank you, Mr. Chairman.

Mr. DAVIS. Thank you very much, Mr. Reynolds,

Gentlemen, I believe I will go ahead to the next witness and ask you to withhold your questions in the interest of time. Our next witness is Mr. Dennis Smith, a firefighter with Engine Company 82 in New York City. I will have to say I didn't read your book, but I read the condensation which appeared in Reader's Digest and I enjoyed it very, very much.

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

(A biographical sketch of Mr. Smith follows:)

DENNIS SMITH

Dennis Smith, a native New Yorker, is thirty-two years old. He holds a Bachelor's degree in English, and a Master's degree in Communications, from N. Y. U., and is a Adjunct Assistant Professor at the College of New Rochelle. He has published in many newspapers, and national magazines, and is the author of "Report from Engine Co. 82," published by Saturday Review press. He was appointed to the New York City Fire Department in 1963, and feels that firefighting is the most worthy of all occupations.

STATEMENT OF DENNIS SMITH, FIREFIGHTER, ENGINE COMPANY 82, NEW YORK CITY FIRE DEPARTMENT

Mr. SMITH. Mr. Chairman and members of the committee: It is a great honor to appear before you today to offer my views of the problems faced by firefighters. My name is Dennis Smith, and I am

a New York City firefighter. The validity of what I have to say is based solely on the nearly 10 years of firefighting experience I have had. The opinions I offer are my own. I do not represent the management of the New York Fire Department, nor the executive board of my labor union local, but rather, I feel a responsibility to represent those men with whom I ride on the back steps of fire engines, with whom I pull hose into the dark unknown of a burning building, with whom I cough and vomit in the course of work, and indeed, with whom I share the responsibility of life itself.

Our job is not easy, and contrary to public opinion, it is not at all exciting in the romantic sense. It is difficult, dirty, and brutalizing work, that can most easily be illustrated by our line-of-duty death and injury statistics. But, you know about that. You know that according to the Department of Labor and the National Safety Council our rate of service-connected deaths, and the severity rate of our injuries are greater than that of any other occupation.

However, what you cannot know, unless you have been a victim of fire, or unless you have had experience as a firefighter, is the terrible reality of heat, coupled with the whirling poison of smoke. Even with modern technological knowledge, the best way to fight most fires is the ancient method of getting as close as possible to the fire, and putting water on it. This means, of course, that a firefighter must go into a building that everyone else has run out of.

The immediate interior area surrounding a fire is untenable for most men. The heat and smoke being lighter than air, rise to the ceiling, and then back down. The firefighter must crawl on his stomach, GI fashion, with his nose to the floor, until he reaches the fire. As he crawls, the heat attacks his face, sinking deeply into all pores, until it seems that the skin drips as in a Salvador Dali painting. And the firefighter combats this physical phenomenon by stretching his face until it distorts in a grotesque grimace. The smoke, meanwhile, has entered his lungs, and is working its way throughout the blood stream to the brain. The foreign substance attacks the biological system, and the body reacts to reject it, as a burglar alarm reacts to a forced lock. Heavy black mucous flows from his nose and mouth, mixes with a stream of perspiration, and falls to the floor. There is much coughing and choking, perhaps vomiting. All energy is being expended, and there is weakness, and a unique sense of semiconsciousness. Finally, the fire is met, and the firefighter opens his nozzle as others ventilate. The fire darkens, hissing its last threat and the heat and smoke escape through broken windows, and through holes quickly cut in the roof. The firefighter rests, satisfied only in the knowledge that he has done what few other people can do. And, he has done it well, for this is what firefighters do each day in all parts of the country, this is how fires are stopped, and this is why the tragedy of a holocaust does not exist. More importantly this how and why lives are saved.

It is reasonable to ask: Might not the physical punishment endured by a firefighter be substantially reduced by the wearing of a mask? The answer, of course, is self-evident. However, due to the urgency of conditions at a fire, the wearing of a mask is impractical, at best, and irresponsible at worst.

To illustrate the point: In New York City we use an air system called the Scott Air-Pac. It looks like deep-sea diving equipment.

It is big, cumbersome, and heavy, weighing over 30 pounds. The most crucial disadvantage of its design is that it must be harnessed to the back—a donning evolution that takes 60 seconds to complete. In the firefighting business we deal in seconds—seconds often determine whether we will save or lose a life. Recently, Engine Company 82 and Ladder Company 31 responded to a fire in a fully occupied tenement in the South Bronx. The fire was raging in three rooms of a four-room flat. As the men of Engine 82 stretched hose, a man from Ladder 31 raised the aerial ladder, and entered the fourth room. He made his search, and found four unconscious children. He handed them, one by one, to other firefighters on the aerial ladder. As he himself stepped onto the ladder, the room burst into flame. Two of those children were dead, but two lived. God alone knows how many people would have been lost at that fire had any of the firefighters taken 60 seconds to don a mask.

I am always suspicious of arguments that begin with the phrase "If we can send men to the moon." We send men to the moon, obviously, because we want to. We have designed and built machines of overwhelming complexity in this country—machines, for instance, that clear forests on one end, and lay concrete roads on the other. We have built them, because someone or group decided they wanted to.

I know that there are today engineers in this great country of ours who are thinking about the design of an efficient and practical mask for firefighters, a mask that is perhaps integrated into an outer or inner garment, or a mask that is light enough to wear all the hours one is on duty, or finally, a mask that can be donned in a second or two. The technology is there—we only have to ask of ourselves, do we want to do it? I want to, and my purpose in being here today is to ask you to want to.

There are multitudinous problems faced by firefighters that are completely beyond their control, from the physical deterioration of our urban centers, to the financial crises that exist in our city governments. However, it is profoundly sad that we do not have the money nor the technological resources to control the development of equipment that is the very lifeblood of firefighting. We need a mask to protect our lungs, and we look to you for help. Of equal importance, we need fire protective fire-clothing—in a word, clothing that does not burn—and we look to you for help. The firecoat and the fire boots we now use are made of cloth and rubber. They are waterproof and keep us adequately dry. But they give us no protection from fire. I know a firefighter whose fire clothes were burned from his body. The man suffered burns on 80 percent of his body, and now, with a false ear, ruined hands, and irreparably scarred, he does community relations work for the Baltimore Fire Department. This man would still be fighting fires today had he been wearing fire protective fire-clothing. You can ask him. His name is Tom Herz. He is here, and he has brought with him the remains of his firecoat.

At this time I would like to ask the permission of the chairman to have Tom Herz come and show you the remains of his fire gear and, at the same time, he can tell you about it.

Mr. HERZ. As Dennis explained to you, this [indicating] is what we are expected to wear and this is what firefighters in this country do wear. As you can see, it doesn't do much of a job, but I am standing here due to this mask which we are not allowed to wear. You can see

what happened to this particular mask due to the heat. This helmet was only a year old when I had it. You can see what heat has done to this particular helmet. There is no use in picking up the coat—it is all in pieces.

I came here at the request of my Congressman. I hope you don't take it as sensationalism, it is fact. Through the good grace of the Lord, I am standing here and it isn't because of this equipment.

Mr. SMITH. Thank you, Mr. Herz.

Mr. DAVIS. Thank you very much, Mr. Herz, we appreciate that.

Mr. SMITH. The real tragedy of this instance, and all instances where firefighters are burned, is that fire protective fire clothing exists. NASA, for instance, has developed a completely firesafe firecoat, but it costs \$1,000 to manufacture. Firefighters, simply, cannot afford it. The rubber coat that I now use cost me \$35.

The professional firefighters of this country risk every physical punishment in the course of their work. There is no risk they will not take to save a human life. They give of themselves beyond recompense, sometimes beyond understanding. There is no justification for the fact that they are inadequately equipped and inadequately clothed. Our lives can be made safer, and once made safer, the lives of the people of the United States will be made safer. The only prerequisite is that the Congress determines that they want to do it.

Mr. DAVIS. Thank you so much, Mr. Smith. I feel that your testimony, and in addition to that your book, has done more to articulate the problem and to describe it in its true dimension than anything that has come to my attention.

Mr. MOSHER. May I interject one brief question?

Mr. DAVIS. Certainly.

Mr. MOSHER. You say the rubber coat that you wear costs you \$35. Do you have to buy your own equipment?

Mr. SMITH. Yes, there is a uniform allowance each year. In New York it is \$225 with which we have to buy all our equipment. It includes a hose strap and spanner and other equipment that we use in fighting fires.

Mr. MOSHER. Are there certain standards? Can you buy whatever you want to buy?

Mr. SMITH. There are standards set. They are not universal. They are different from department to department. In our department there are standards. You have to buy within those standards. We have an inspection yearly and whatever gear you buy must meet the standards of the department.

Chairman MILLER. Would you yield?

Mr. MOSHER. Yes.

Chairman MILLER. Is that the standard? Is that typical of all fire departments throughout the country or does each city set its own standard?

Mr. SMITH. Yes, each city sets their standards. There are no uniform standards.

Chairman MILLER. Voluntary departments, are they furnished a certain amount for clothing and equipment?

Mr. REYNOLDS. In most of the departments in my area, the equipment is furnished by the department and assigned to individual members who are active firefighters, with some exceptions; some of them do buy some equipment of their own which is over and beyond what is furnished.

Chairman MILLER. Do you know whether or not that is universal throughout the United States?

Mr. REYNOLDS. I think there are probably as many different systems as there are—

Chairman MILLER. States?

Mr. REYNOLDS. As there are departments.

Chairman MILLER. Thank you very much, Mr. Smith. I want to join the chairman, who has just been called out, to say that I found your testimony most interesting and confirming most of my own thoughts.

We will now hear from Mr. L. L. Kenney, chief, fire department, Miami; president, International Association of Fire Chiefs.

Before you start, do you know a man by the name of Matthew Jimenez?

Mr. KENNEY. Yes.

Chairman MILLER. He is a close friend of mine.

Mr. KENNEY. He is a dynamic individual.

Chairman MILLER. Yes.

(A biographical sketch of Chief Kenney follows:)

CHIEF LAWRENCE L. KENNEY, MIAMI, FLORIDA

(Born March 21, 1920)

Has been with the City of Miami Fire Department 31 years and has advanced through the ranks and was appointed Chief of Department January 21, 1963.

Served 3½ years in the United States Coast Guard during World War II. Attended the U.S.C.G. Academy and was commissioned Ensign. Served on Coast Guard Cutters and the LST 27.

Fire Service Activities:

1. International Director from the Southeastern Division, IAFC
2. Constitution & By-Laws Committee, IAFC
3. Executive Board of the Metropolitan Committee, IAFC
4. Executive Committee of the IAFC
5. Host Chief to the 92nd Annual Conference of the IAFC, 1965
6. Committee Coordinator, IAFC
7. Program Chairman for 1972 Conference, IAFC
8. President of Dade County Chiefs' Association
9. Chairman of Committee on Fire Prevention in Educational Occupancies, State of Florida
10. State Committee Member on Portable Fire Extinguishers
11. Executive Committee for Statewide Fire Prevention Conference of Florida
12. Advisory Council Member, Fire Protection Research International
13. Fire Fighters Standards Council, State of Florida
14. NFPA Committee on LP Gas and Fuel Gas

Have had several articles published in Fire Journals, such as Fire Engineering, Fireman Magazine, and Fire Chief Magazine.

Has had several papers presented at various meetings and symposiums such as:

- National Academy of Sciences
- IAFC Workshops
- Bahamas Fire Protection Association

**STATEMENT OF L. L. KENNEY, CHIEF, FIRE DEPARTMENT, MIAMI;
PRESIDENT, INTERNATIONAL ASSOCIATION OF FIRE CHIEFS**

Mr. KENNEY. Mr. Chairman and members of the Science and Astronautics Committee, my name is Lawrence Kenney, chief of the Miami, Fla., Fire Department and president of the International Association of Fire Chiefs. I am, indeed, honored to be given this

opportunity to be here today to discuss the legislative bills that can do so much toward providing adequate fire protection for the citizens of this country. All of our citizens deserve, and should be given, good protection for their lives and their property from the ravages of fire.

Historically, local government has been responsible for providing fire protection, and has done a commendable job. Unfortunately, the financial crisis that most local governments have faced in recent years has not allowed them to provide their fire departments with the education, training, and newly developed apparatus, tools, and equipment that are vitally necessary for the efficient and effective operation of fire departments.

Many educational institutions offer courses in fire administration and fire technology; many training facilities offer excellent recruit training and advanced or special training; seminars are conducted on firefighting tactics and strategy, hazardous materials, transportation accidents, high-rise buildings, natural and LP gas emergencies, and many other subjects that the fire officer must be thoroughly familiar with.

When you consider that the local government loses the services of those attending these courses and seminars, and still must pay their salary, costs of travel, tuition, and living expenses during attendance, the cost becomes prohibitive.

Improvements in apparatus, tools, and equipment have not kept pace with the technological advances that have been made in buildings, building materials, industry, and chemistry. Firefighters must face space age emergencies with stone age equipment. There have been some improvements, but in most cases even these are beyond the financial reach of local government.

An example of this is the explosive tool that has been available for several years, but only a few fire departments are using it. This tool can breach a wall, open a roof, or blast a hole in a steel door in a matter of seconds. These routine fire department operations are necessary at almost every fire, either for rescue or to reach the seat of the fire or for ventilation. Firefighters must still use the ax and/or the battering ram for these jobs. If rescue is necessary, the delay caused by using these primitive tools could result in the loss of life; the delay in reaching the seat of the fire or in ventilating the building could result in unnecessary property damage.

Another example is closed circuit television, where the camera is mounted at the top of the aerial ladder, and the monitor is on the apparatus. By extending the ladder over the fire, the officer in charge can view the overall problem, and plan his operations accordingly. He can also detect changing conditions immediately and alter his plans to cope with the changes as they occur. The use of closed circuit TV eliminates the necessity of sending a firefighter to the top of the ladder and exposing him to the heat and dense smoke and the danger of a flash of fire or an explosion, if hazardous materials are involved.

Structural damage to a building can be detected by the camera without subjecting the firefighters to the danger of building collapse, which kills so many firefighters. This equipment could be extremely valuable to the officer in charge of any fire, and could prevent injury or death to the firefighter. The cost, again, prohibits its use except by a very few departments.

Self-contained breathing apparatus has been available for years, but few local governments can afford to furnish this equipment for all on-duty personnel. Every day, firefighters must expose themselves to the toxic byproducts of combustion of synthetics and plastics that are found at all fires today. These toxic fumes kill or cripple those dedicated men who think only of saving the lives and property of others. The breathing apparatus that is available does provide adequate protection; however, research is necessary to reduce the weight and size of the units, and at the same time, increase the air capacity to provide more working time per unit at fires. The present weight places an excessive load on a firefighter's back and causes rapid exhaustion. The size of the unit restricts freedom of movement in confined spaces, and prevents crawling through small windows or transoms to make a rescue or extinguish the fire.

The air capacity must be increased. Present units are rated at 30 minutes, but the strenuous work and the tension that a firefighter works under reduces this time to 15 to 20 minutes. When you consider that it may be necessary to climb many flights of stairs or cross from one side of a warehouse to the other side just to reach the fire. It does not allow much time for firefighting because enough air must be reserved to return to the outside.

Fire chiefs throughout the country are forced to send their men into extremely hazardous places with turnout coats that do not provide adequate protection. Material is available to make turnout coats that will provide much better protection and reduce the weight. Racing car drivers use it—the chiefs and firefighters know that this material is available—but again, the cost of this material prevents local government from providing it for firefighters.

The name of the game in firefighting is teamwork. In order to hold the loss of life and property to a minimum at a fire, all operations must be coordinated by the officer in charge of the fire. This is very difficult, if not impossible, if you do not have good communications at a fire involving a high-rise building, warehouse, hospital, industrial plant, or any other large structure, or a large brush fire. Most fire apparatus are equipped with 2-way radio, but when the officer and crew leave the apparatus to go to the upper floors or the opposite side of a building, or to the far side of a large brush fire, if they do not have a handie-talkie, they cannot advise the officer in charge of the prevailing conditions, or changing conditions. They cannot call for additional manpower, if needed, or for help if they become trapped. Handie-talkies have been available for several years and are provided by some departments to a limited degree. Every fire apparatus should have a handie-talkie so that the crew can communicate when they leave the apparatus. Providing this equipment will save lives and reduce property damage. Handie-talkies are expensive—and again, the cost is prohibitive for local government.

Many fire departments throughout the country are using fire hose couplings with threads that are not national standard threads. This presents serious operational problems when neighboring cities try to assist each other at major fires. Fire departments of today inherited this problem that has existed for many years. Even though the fire chiefs would like to correct this situation, the cost is prohibitive. In my own Miami department, we use a 1½-inch thread that is not used by any other department. When I was appointed chief in 1963,

that was going to be one of my first projects—to convert to national standard threads. I soon learned that there was more to it than just changing the hose couplings. You must change all of the nozzles, double males, double females, gated wyes, Siamese, the apparatus connections, and all tips on the 2½-inch stack tip nozzles. We just could not afford to do it. For the past year, I have been working with Chief Robert Ely from San Diego, Calif., who has invented a machine for converting hose couplings. He has accomplished a tremendous job on the west coast and is willing to assist fire departments all over the country. Fire departments need financial assistance to standardize all hose and hydrant threads.

Another pressing need of the fire service is a national fire data and information clearinghouse. One of the most valuable weapons in fire prevention is the history of what caused fires. Being able to evaluate the fire experience of other departments can prevent similar fires, fire deaths, and property loss. Most fire departments keep fairly accurate records, and learn from their own experience. This information is not available to others unless the fire is reported in one of the trade magazines, and even then some of the most important information is missing. This valuable information should be made readily available to all fire departments.

The financial crisis has forced many local governments to close down fire stations, and reduce manning on the apparatus. Instead of improving—fire protection is deteriorating. If we allow this to continue, we will be sowing the seeds of disaster in our communities. We need your help to reverse this trend.

The dedicated men in the fire service are willing to fulfill their responsibility. They must be given the opportunity to acquire the necessary education and training—they must be provided with the new apparatus, tools, and equipment to do their job. I urge you not to let them down, and to give favorable consideration to the bills that Congressman Steele has introduced.

Thank you.

Mr. DAVIS. Thank you very much. I am sorry I had to miss the first part of your statement, but I will read it with a great deal of interest.

Mr. Miller?

Chairman MILLER. I just want to congratulate the chief on his fine statement. He points out the problems which many of us are familiar with. Some of them we have tried to remedy, but unfortunately the matter of the money to do this is not readily forthcoming. I think we can make a better case for it. I believe as the National Bureau of Standards accumulates the information and data that they will then give you a chance to work on some of these things and I congratulate you on this. I think that one of the things that perhaps these people don't understand and you could drive home by using a very simple example is that we kill as many people by fires each year as were lost in Vietnam.

Thank you.

Mr. DAVIS. Mr. Mosher?

Mr. MOSHER. I am interested in some comments by the chief where he is talking about self-contained breathing apparatus. I have become aware just recently, through correspondence with an Ohioan,

who informed me of a proposal in NASA to fund some very sophisticated research, to develop a lightweight, self-contained breathing apparatus that will afford—well, it can be used for more than 30 minutes. I believe you referred to the air capacity of the present unit. The present units last 30 minutes. NASA wants to create a breathing unit that will have a longer capacity. A bright Ohio man, who is a capable and responsible person, is attacking this effort on NASA's part, arguing that it is a complete waste of the taxpayers' money. It will be expensive research, and even if NASA developed this equipment, firefighters wouldn't use it he claims. He argues that a firefighter can't remain in a building for more than—you suggested 15 or 20 minutes here in practical terms. He suggested even if they had units that were lightweight and that were rated for, say, an hour, this wouldn't help them much because they couldn't stand the heat, they couldn't stay in the buildings that long. Is he right, would NASA be making a foolish use of taxpayers' money to develop the type of equipment you are talking about?

Mr. KENNEY. Absolutely not. The problem is how long it takes you to reach the seat of the fire. You have to get to the fire before you extinguish it. Even though these masks are rated at 30 minutes, I haven't seen one yet, under the conditions that a firefighter works, that would last 30 minutes. Usually it is more like 15 minutes. You enter a smoke-filled building; if it takes you a period of time to get to the fire, you must turn around and start out, you don't have time to fight the fire. We do need masks that have greater capacity.

Mr. MOSHER. You are assuring me, then, that if NASA can succeed in this research and development effort, you think it would be a good use of the taxpayers' money?

Mr. KENNEY. Definitely. It is something the firefighters have needed for many years.

Mr. MOSHER. Do you see this effort being done anywhere else, in private industry or anywhere else?

Mr. KENNEY. No, they are selling the product they have now. I have had many discussions with manufacturers of equipment. The only thing we have been able to get out of them in recent years was a new type of harness that is a little lighter in weight and much easier to get into, so we can get into the mask. Dennis says it takes 60 seconds. Our people can get into the mask in less than 10 seconds from the time they arrive on the scene, it is between 5 and 10 seconds.

Mr. MOSHER. It is still a time and weight problem?

Mr. KENNEY. Yes, and the bulk, the size of the unit. It is cumbersome when you work inside a building in a confined space.

Mr. MOSHER. This would be a significant thing for the Government or NASA to do if they could?

Mr. KENNEY. It would be a tremendous asset.

Chairman MILLER. It should be noted that that would be another fallout from the space effort.

Mr. MOSHER. I was going to make the same comment. This man argues that this goal seems to him to be completely outside the mission of NASA. I argue that this committee, at least, and I think the Congress in general, wants NASA to use its tremendous technical genius and managerial capacity to provide applications, to provide technology that has earthbound applications, and this is a wonderful example of it.

Mr. DAVIS. I would like to agree with Mr. Smith's statement that any time anybody says "If we can go to the moon, we ought to be able to do something else," like him, I raise my eyebrows in suspicion. But this is an example where we could do something. I agree heartily with Mr. Miller's statement that the problem is just money. We know how to do it, it is a question of popular support and the willingness to undergo the expense that is necessary.

I had one other thought, it was about the fire that took the lives of three of our astronauts. This committee conducted an investigation into that fire. I dare say no fire had ever been investigated with the amount of detail that that fire was. NASA did a fantastic job of analyzing that fire. They are capable of fantastic things in the area of fire research and fire safety. I would disagree with my colleague's friend, Mr. Mosher's friend in Ohio, who thinks it is outside the legitimate jurisdiction of NASA. I don't think so at all. Almost every agency, as has been brought out earlier, has a legitimate concern with fire prevention and fire protection, and not the least of them is NASA.

Are there any other questions?

Are there any other comments that any of you gentlemen would like to offer?

If not, I would like to say that I feel awfully glad that we scheduled these hearings and thus gave you a forum in which you could direct the attention of this committee as well as the country to a problem of a dimension that most members of the public don't even suspect. We are grateful to you and you do a great public service by coming before us.

Chairman MILLER. I join Mr. Davis in his remarks.

(Whereupon, at 11:55 a.m., the subcommittee recessed.)

Mr. DAVIS: I would like to agree with Mr. Smith's statement that any time anybody says "If we can go to the moon, we ought to be able to do something else," like that, I raise my eyebrows in skepticism. But this is an example where we could do something. I agree heartily with Mr. Miller's statement that the problem is just money. We know how to do it. It is a question of popular support and the willingness to undertake the expense that is necessary.

I had one other thought. It was about the first time that the lives of three of our astronauts, this corporation contracted an investigation into that line. I have say so that had ever been investigated with the amount of detail that has been done. NASA did a fantastic job of investigation that day. They are capable of fantastic things in the area of investigation. I would disagree with my colleagues (smile), Mr. Joseph, friend in Ohio, who thinks it is outside the jurisdiction of NASA. I don't think so at all. Almost as a matter of fact, it has been brought out earlier, has a legislative concern with the jurisdiction and the protection, and not the least of them is NASA.

Are there any other questions? (smile) Are there any other comments that any of you gentlemen would like to offer?

Mr. DAVIS: I would like to say that I feel as if I had that a very good time here and this case for a forum in which you could have the attention of the committee as well as the country to a problem of a dimension that most members of the public don't even suspect. We are grateful to you and you do a great public service by coming before us.

Chairman DAVIS: I join Mr. Davis in his remarks. (smile) We adjourn at 11:05 a.m. The aforementioned recessed.

FIRE RESEARCH AND SAFETY

WEDNESDAY, OCTOBER 11, 1972

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND ASTRONAUTICS,
SUBCOMMITTEE ON SCIENCE, RESEARCH, AND DEVELOPMENT,
Washington, D.C.

The subcommittee met at 10 a.m., in room 2325, Rayburn House Office Building, the Hon. Earle Cabell presiding.

Mr. CABELL. This hearing will come to order, please.

This hearing is a continuation of the hearings conducted by the Subcommittee on Science, Research, and Development on fire problems.

We are delighted to have our witnesses with us this morning. I wish to extend to you the apologies and regret of Chairman Davis of the subcommittee who could not be here this morning because of a death in his family.

Our first witness this morning is the Honorable Barry M. Goldwater, Jr., a Member of Congress since 1969, and who will discuss the special problems associated with forest fires. Now, coming from California and having some firsthand information on that, I am sure that you have some very valuable testimony for us.

(A biographical sketch of Hon. Barry M. Goldwater, Jr., follows:)

HON. BARRY M. GOLDWATER, JR., REPUBLICAN, CALIFORNIA

Born in Los Angeles, Calif., July 15, 1938, eldest son of Senator Barry M. Goldwater of Arizona and Margaret Goldwater; attended grammar school in Phoenix, Ariz., and Staunton Military Academy in Virginia; majored in business and marketing at the University of Colorado and Arizona State University, graduated from Arizona State, 1962; engaged in corporate finance and "institutional brokerage"; formerly a partner in the firm of Noble Cooke, division of Gregory & Sons, stock brokers; Episcopalian; member of the Sons of the American Revolution and many civic and professional organizations; elected to the 91st Congress by special election April 29, 1969, to fill the vacancy caused by the resignation of Ed Reinecke; reelected to 92d Congress.

STATEMENT OF HON. BARRY M. GOLDWATER, JR., U.S. REPRESENTATIVE FROM CALIFORNIA

Mr. GOLDWATER. Thank you very much, Mr. Chairman and members of the committee.

I appreciate this opportunity to appear on this very timely subject. It always seems timely. Hopefully one day we can say that the effort was worthwhile. I hope we will eventually curb or eventually eliminate forest fires.

I am pleased to present these comments on behalf of myself and five of my California colleagues, Congressmen Rousselot, Teague, Wilson, Veysey, and Pettis. The six of us have addressed ourselves to the problems of forest and wild fires during the past several years.

Most of the comments before the committee have and will involve the problem of structure fires and I wish to present our comments on the problem of the wild or forest fire.

Forest and grasslands cover half of all the land in the United States. In 1969, an area equivalent to the State of Maryland was totally consumed by fire—in the 5-year period from 1965 through 1969, an area equal to all of Vermont, New Hampshire, Massachusetts, and Rhode Island was totally destroyed, again by fire,

The effects of these fires are far reaching. In addition to the loss of valuable timber, fires have a terrible impact on lives, in terms of employment and destroyed property. The greatest of all tragedies, however, is the senseless loss of life. Fires also destroy watershed cover and then the resulting floods and erosion silt our waterways.

I am amazed that in this age of great innovations, great technological achievements, so few innovations have been introduced to combat forest fires. This is not to say that the agencies responsible for our forests have not done their jobs, they have done everything they could with the tools they had at hand. The problem has been one of underestimation—the job is far larger than anyone realized.

We have recently entered an era in our Nation's history that is very encouraging. The American people, and I join them in this view, have become truly alarmed and very angry at the state of our environment. They care—and they are making themselves heard—about our forests, recreation areas, wildlife and a myriad of other vital ecological problems.

Eminent forestry authorities are predicting that in many parts of the world, wood deficits may occur before the end of the century. Fires have sharply cut into our wood supplies, and an attempt to increase the yield of timber is underway. However, many otherwise suitable forested areas are actually deficient in the very elements needed to speed up the yield of timber. I have been told that experimentation is underway to fertilize large forest areas and stimulate growth, so as to realize a full-grown tree in 30 years, that would normally have taken 60 years to grow. However, if the forest fires that I mentioned earlier are allowed to flare up, year after year, the battle to save our forest environment could well be lost.

With these facts in mind, I urge this committee to take affirmative action on the forest or wild fire problem in this country. The resource of the entire Federal Government must be applied to the problem, particularly high technological resources. For example:

1. NASA should utilize satellites for the detection of forest or wild fires. New infrared sensing devices are very effective. I have brought an example of this that was used in the Romero fire on October 10, 1971. This is an infrared picture taken from an airplane at 13,000 feet. They were able to spot the fire perimeters, the hot spots, and thus direct their limited crew capability where it could best be utilized. This will spot forest fires and catch them before they get out of control, but it is also a device utilized by the fire chief to direct fighting the fire.

As I said, this was taken from an airplane at 13,000 feet, utilizing an infrared scanner which converts electro-magnetic energy. Satellites could provide more comprehensive intelligence.

2. NASA should continue its fire research which will assist in all types of fires. Of particular note are NASA developments for protective clothing, fire detection systems, and breathing apparatus.

3. New aircraft, both rotary and fixed-wing, must be developed to replace the old WW II aircraft which are now being used. Consideration should be given to providing both a retardant loading and water scooping capability.

4. Up-to-date communications systems must be provided through an integrated fire control system.

I am pleased to see that some new ideas are being utilized by the U.S. Forest Service, but they have only scratched the surface. The Forest Service should work closely with NASA, the Department of Defense, and the Department of the Interior. It should be the intention of this committee that all of the technological resources of NASA be applied to the problem.

For fiscal year 1973, Congress appropriated \$4 million for this purpose, but this funding is inadequate to carry out the programs of which NASA is capable to handle. Our committee should definitely consider an increased appropriation of at least several million dollars in fiscal year 1974.

I also hope that this question will be considered in the recommendations of the President's National Commission on Fire Prevention and Control to be released next year. Certainly, the Commission could do a great deal in this regard.

In closing, Mr. Chairman, I thank you for allowing me to appear before the committee. It is my sincere hope that the Federal Government will use all its resources to prevent and control fires and I believe that our committee can insure that the technological developments of this Government are, in fact, utilized to its fullest.

Mr. CABELL. Thank you very much, Mr. Goldwater. I was particularly interested in the prevention portion of this problem which is going to entail an awful lot of education because every dollar spent on prevention could save \$10 not only the loss of the forest, but the actual cost of fighting and combating that fire. I think your remarks are certainly well taken on that score.

Mr. Mosher, do you have any questions?

Mr. MOSHER. Unfortunately, I have just come in, so I have missed your colleague's comments, but I will read them thoroughly. I can appreciate the importance, particularly out in this area of California, but I can assure you that it is important in the Midwest, too, and I am glad to see that you are making this point.

Mr. GOLDWATER. It is a problem all over our country, especially since half of our country is covered with timberland and grassland and these fires are devastating and destroy a tremendous amount of resources. When we discuss the problem of fire, we cannot neglect this very dangerous, this very destructive segment of fire and the problems of fire.

Mr. CABELL. Mr. Chairman, in your usual way, you slipped in here quietly and I didn't catch it.

Chairman MILLER. I just have to slip in to make sure you are working.

Mr. CABELL. Wou'd you care to make a statement?

Chairman MILLER. I didn't hear his statement, but coming from an area like his in which forest fires are one of the great tragedies that occur from time to time, I can understand his concern. In the work that has been done so far, I don't think very much, if anything, has been done in this field. The Forest Service, of course, conducts a lot

of studies, but I don't know that we have gotten very far into it, although I want to assure you that you have my interest and that I understand you. I have seen a few forest fires, too.

Mr. GOLDWATER. Yes, sir; being a Californian, I can certainly appreciate what these forest fires cost. I might say that during the past year, Mr. Rockétt, from the Bureau of Standards, has been aware of this problem, in fact has conducted some research into it. I think it needs to be emphasized when we talk about fire, there is the problem of the forest and forest fires. We can talk about structures and that is very important, but it seems to me that we need a coordinated effort in order to really get an understanding of how best to prevent and then fight, and certainly I am very well aware of the chairman's fine work on the President's Commission on Fire Prevention Control and look forward to the report that will be released shortly.

Chairman MILLER. I thank you for bringing this up. I, for one, am very sympathetic to your cause.

Mr. CABELL. Mr. McCormack.

Mr. MCCORMACK. Thank you, Mr. Chairman.

I want to thank Mr. Goldwater for his statement. I come from a large rural area with a large forest cover, I guess I have about 30,000 square miles. The largest fires in the country were, I believe, in my district, last year. What we are talking about, Mr. Chairman, as Mr. Goldwater pointed out, is detection. He emphasized NASA's involvement and the use of aircraft. This is really what we are getting at. Fundamentally the only way we are going to fight forest fires outside of early detection and good communication is having large pieces of air detection that can move quickly into a forest fire area. This is a novel application of aircraft. It is going to be very expensive to develop an airborne fire engine to move quickly into a forest fire area and effectively stop a fire before it gets out of control.

The only way we are going to do this is with significant Federal financial support for this sort of development. I think it is extremely important. Although the original R. & D. and original capital outlay may be high, in the long run it will pay for itself many times over.

Mr. GOLDWATER. I appreciate your emphasis on aircraft, both fixed-wing and rotor. Those of you who have witnessed fires have certainly watched the very effective efforts of the utilization of these aircraft.

Now, it is a fact that the aircraft that we have now in this kind of effort are mostly World War II. There is a need to update. There is a need to research the delivery systems, the actual retardants themselves and the coordination of these aircraft by the ground. We need more of them. We need faster capability. I might emphasize that the Department of Defense has been studying this problem with the idea that perhaps they could play a role with modular insertions in the back of certain types of their aircraft like the C-130 on a standby basis. One of the best resources we have in this area is the private contractor and certainly we should not forget him and his best interests and his capabilities. I think that if we move into this area, we do not want the Federal Government to preempt the private contractor but to try to find a way where we can work with him, update his aircraft and put him in a position where he can, in fact, be effective.

Chairman MILLER. I don't know about other States, I am not too familiar with them, but in California the forestry people out there,

the State groups, are quite alert to this. When you get into it, you have got to work through them.

Mr. GOLDWATER. We were able in the last few years to increase the Forest Service budget. In this particular area of fire-retardant delivery for research, we tried to get better patterns on the ground and better kinds of chemicals. Also we have increased the budget for R. & D. of vegetation control and fire prevention—how to get in there and get the thickets and the twigs out of the forest. There is a great deal of research and development going on because of this effort. I agree with you that we need to do more of that. It would be hopeful that the effort here on the Space Committee would try to coordinate our efforts with the Department of Agriculture in their efforts.

Chairman MILLER. I think this lays a little foundation for what this subcommittee can do next year.

Mr. CABELL. Well, I have never found any dearth of projects that need working on. If you think we are looking forward to nothing to do next year—

Chairman MILLER. No, we will have plenty to do next year, and this is one field that we do have an interest in. When we discussed the fire bills last year, we heard statistics as to the number of people that were burned up in fires, but very little was in this particular field. There is so much to do in the other field that you can get tied up with it and not spread your efforts far enough.

Mr. CABELL. Any comments, Mr. McCormack?

Mr. McCORMACK. No.

Mr. CABELL. Thank you very much for coming here and for your excellent handling of it.

The next witness that we have is William H. McClelland who is Vice Chairman of the President's National Commission on Fire Prevention and Control. Mr. McClelland is also president of the International Association of Firefighters, AFL-CIO.

Mr. McClelland, we will be very happy to have you join us.

(A biographical sketch of Mr. McClelland follows:)

WM. HOWARD MCCLELLAN, VICE CHAIRMAN OF THE PRESIDENT'S NATIONAL COMMISSION ON FIRE PREVENTION AND CONTROL OF WASHINGTON, D.C.

William Howard McClelland of Boston, Mass., has been president of the International Association of Fire Fighters, AFL-CIO-CLC, since 1968. He was first elected to that office in August of that year and was re-elected by acclamation in 1970.

Mr. McClelland was born Sept. 11, 1907, and has spent most of his adult life as a fire fighter and as an official of the IAFF.

He became president of the union at a time when the IAFF was entering a period of increased concentration on the use of the collective bargaining process as a means of bettering conditions for fire fighters and other public employees.

Mr. McClelland's presidency of the IAFF has been marked by a considerable expansion of staff services to assist the membership in using the collective bargaining process to best advantage, and to develop better methods of conveying to people in the community the scope and importance of the needs and activities of the men of the fire service. Under Mr. McClelland's direction, a vigorous broadening of community services and public relations programs has taken place, in order to acquaint the public with the hazardous nature of fire fighting, the professional requirements of the work, and the dedication of fire fighters to the public service. A special aspect of this effort has been concerned with the harassment of fire fighters in the course of their work in many parts of the nation's larger cities, and the need for increased protection of the men both on fire fighting equipment and at the locale of fires.

President McClennan has expanded the international union staff to provide broadened organizing, research, education, and collective bargaining assistance to local affiliates. Since 1968 the union has increased its membership substantially, to a total of about 150,000 in the U.S. and Canada. It also became increasingly active in legislative affairs, both in Washington and Ottawa, and in the various state and provincial capitals.

William Howard McClennan was president of the Boston Fire Fighters Local 718 for four years before being elected IAFF Third District Vice President in 1958. He was vice president for the New England States for 10 years before his election as IAFF president.

A graduate of the Boston school system, Mr. McClennan attended Boston University, the Boston College Labor Relations School and the Labor Guild School, and took specialized courses at Harvard University and the Universities of Massachusetts and Connecticut.

Mr. McClennan and his wife, the former Muriel Ross, have two sons. They are Howard, Jr., of Racine, Wisc., and Ronald, with the U.S. Air Force.

STATEMENT OF WILLIAM H. McCLENNAN, VICE CHAIRMAN, PRESIDENT'S NATIONAL COMMISSION ON FIRE PREVENTION AND CONTROL; ACCOMPANIED BY COMMISSIONER DOROTHY DUKE

Mr. McCLENNAN. Thank you, Congressman.

Mr. Chairman, my name is William McClennan. To my left is one of our Commissioners, Dorothy Duke, and to my right is our Executive Director, Howard Tipton, from the Commission.

We have prepared a quite lengthy documentation of what we have been doing. I am not going to read it all, Mr. Chairman and Congressmen. I am going to touch on what are the highlights. We are submitting the full report with the preliminary recommendations that we made to the President with our report.

Mr. CABELL. Without objection, the entire statement will be entered into the record and we will be happy to have your recap and any further comment.

Chairman MILLER. Mr. Chairman, I have the pleasure of serving on this committee, too.

Mr. McCLENNAN. You certainly do.

Chairman MILLER. I want to welcome my fellow Commissioner or Commissioners, I haven't had the pleasure of meeting the lady before.

Ms. DUKE. Thank you.

Chairman MILLER. These people are thoroughly involved in what they are doing. They realize the importance of their subject. They have had a long association with it. I think the Commission is doing a very good job.

Mr. CABELL. Thank you, Mr. Chairman. I might say that the entire Congress is quite aware of the position and the interest of the chairman in this because it took a special ruling of the Speaker to stop Chairman Miller from wearing that hat on the floor that you people gave him a short time ago.

Chairman MILLER. Do you want me to send down for it? You will have to get something to bolster it up, my neck isn't strong enough, it is a little heavy.

Mr. McCLENNAN. We will get you another one.

Chairman MILLER. Oh no, this is fine.

Mr. McCLENNAN. Dick Bland, our chairman, was ill and couldn't be here today.

On behalf of the National Commission on Fire Prevention and Control I wish to thank you, Mr. Chairman for this opportunity to

discuss the progress of our Commission with the Science and Astronautics Committee. Since the appointment of this Commission by President Nixon, we have labored diligently and are dedicated to finding more effective ways to reduce our Nation's terrible loss from destructive fire. We have held hearings in four regional cities focusing on life safety, fire protection in buildings, the fire services, the burn epidemic, fire research, forest and wildlands fires, and fire prevention. We have received over 100 position papers from experts in private and public agencies analyzing various aspects of the fire problem and have conducted a survey of fire departments (10,000) to determine critical issues. Our analysis has led us to a single conclusion: we have within our Nation the capabilities to bring about a significant reduction in life and property loss.

Consider, for a moment, the current magnitude of the fire waste of our Nation's resources: more than 12,000 Americans were killed in fires in 1971; 330,000 were crippled, injured and burned; direct property loss totaled \$2.6 billion. Adding treatment costs for burn injuries at \$1 billion, support for fire departments at \$2.5 billion and \$3.3 billion in lost productivity, destructive fire wastes \$9.4 billion annually.

Then, too, Americans pay approximately \$6 billion in fire insurance premiums each year, of which a significant portion is not productive money but simply used to replace fire losses.

Unfortunately, the richest and most technological advanced nation in the world leads all the industrialized countries in per capita deaths and property loss from fire. While differing reporting procedures make international comparisons somewhat unreliable, the fact that the United States reports a deaths-per-million-population rate nearly twice (59.5 versus 30.0) that of the next ranking nation, Canada, leaves little doubt that this Nation leads the other industrialized nations in fire deaths per capita. Similarly, in the category of economic loss per capita, the United States exceeds Canada by one-third.

We estimate that the total net U.S. fire cost amounts to over \$13 billion annually; that is \$60 for every man, woman, and child in the country. As a comparison, losses from unsafe consumer products have been estimated to be \$5.5 billion annually, and these losses have been far more effectively publicized.

The Commission is left to conclude that our Nation's fire priorities are wrong. Our resources have been directed at stopping the fire after it starts rather than preventing it. Prevention is the most cost-effective solution.

As in the past, the insurance industry is an important element in the fire protection system. The standard schedule for grading cities and towns of the United States with reference to their fire defenses and physical condition is a method used by the insurance industry for establishing fire insurance rates. The premiums charged for fire insurance are set in part by the public protection provided. That level is attained through taxation or solicitation. Fire departments are heavily influenced by the grading schedule in determining priorities and in expression of their needs. Since the grading schedule gives minimum credit (approximately 7 percent) for fire prevention activities, over 95 percent of all fire department budgets are spent on suppression rather than prevention.

Sprinkler systems have an excellent record of property safety and should be required in all high-rise structures, institutional occupancies and buildings of specific volume/utilization relationships. Early detection and alarm systems should eventually be required in all residential units. We estimate that as many as 2,600 lives could be saved annually by this requirement.

Research and development must be expanded to achieve a fundamental understanding of fire and how it is propagated. This then leads to safe building construction and furnishing materials and improved fire extinguishing equipment. Faced with what is perhaps an 80 percent people and 20 percent technological problem, research is needed to examine the economic and social problems attendant to destructive fire. Perhaps the most important research needed is in the area of human behavior. In that area, a subject of special concern is the arsonist. Fire chiefs in many cities believe that more than half their fire losses are due to arson. In reality, we pursue an economic system that provides incentives for prearranged fires in the form of insurance payments, income tax write-offs and low cost land clearance.

Architects, with a few notable exceptions, are largely indifferent to providing a satisfactory level of protection for life safety in buildings. Most architects find it easier and acceptable to clients to design to the minimal life safety standards of the building codes. Existing codes need concentrated review for applicable engineering principles and to assure allowance for cost trade-offs that recognize a safe total building design. In turn, building owners and occupants see fire either as something which will never happen to them or as a risk which they can tolerate because fire prevention measures are costly. Physiological researchers and product engineers are largely unaware of the toxicological effects of products when consumed in a fire.

The fire equipment industry has, for the most part, shown more interest in maintainnig its captive market, than in developing new products, enhancing safety, or improving production methods to cut costs. For example, fire truck costs range from \$40,000 to \$100,000 the delivery period may be a year or more.

Then, too, the Federal Government has been largely indifferent to the fire problem with the notable exceptions of the U.S. Forest Service research and data programs, the Fire Research and Safety Act, and the flammable fabrics program.

Indifferent to fire as a national problem, Americans are similarly careless about fire as a personal threat. There is an old saying in the fire protection field to the effect that fires have three causes: men, women, and children. It takes the careless or unwise action of a human being, in most cases, to begin a destructive fire. In their home environments, Americans live their daily lives amid flammable materials close to potential sources of ignition. Few private homes have fire extinguishers, much less fire detection systems. Too few multiple-family dwellings and institutions have adequate equipment for extinguishing fires. And often when fire strikes, ignorance of what to do leads to panic behavior and aggravation of the hazards, rather than successful escape.

The gravity of the fire problem expressed in Public Law 90-259 arises partly because of this national indifference, and partly because rapid changes in American society have created a complex of varied and confusing problems. We suffer what anthropologists call "cultural

lag"; our methods of handling the fire problem are attuned to the America of yesteryear, not to either contemporary or future needs.

A number of important changes in American society during the past several decades bear directly on the fire problem. Increasing urbanization has created social problems—the migration of the poor into cities, the development of ghetto areas, the rising expectations of minorities without the comparable ability to realize these expectations—that have had an effect on the fire problem. The poor are shunted to the most run-down neighborhoods, where century-old buildings are virtual tinder boxes. Few of the crowded apartments house and tenement buildings have sprinkler systems or other protective equipment, because landlords see no profit in decent, long term upkeep of their properties. Tenants must often warm their rooms with dangerous portable or makeshift heaters because central heating is inoperable or nonexistent. In the past 10 years, flaring discontent in the ghettos has added burdens to fire departments in the form of riots and fires, arson, harassment of firefighters, and false alarms. Antiquated laws and time-consuming protective procedures delay removal of abandoned buildings—fires waiting to start. The movement for minority rights has forced upon us the realization that fire departments are, in general, still career sanctuaries for white Americans. Black and brown Americans are underrepresented in the fire departments in nearly every community in which they live.

Because we believe the fire problem is significant enough to warrant attention at the highest level of Federal Government, the Commission is presently considering that a high Federal office be established to provide a national fire focus.

We believe that a nation dedicated to the value of human life cannot set aside its responsibility for preventing suffering from burning—the most traumatic human injury. We see this Federal focus:

- (a) providing a public forum for discussion of fire problems and solutions,
- (b) coordinating Federal programs relating to fire prevention, research, and control,
- (c) publishing an annual plan to provide the public, Congress, and the executive branch with a coordinated, overall program for reducing life and property losses from fire, and
- (d) serving as a center to refer requests for information to the appropriate agency, department, or private organization.

The Federal focus would include a National Fire Academy. The National Fire Academy would have a number of educational functions, among them:

- (a) providing advanced training and education to the Nation's fire services in such fields as arson investigation, management, fire prevention, and fire safety,
- (b) assisting Federal, State, regional, and local fire services in training and education by providing course materials, financial support, demonstration projects, and special instructors,
- (c) helping local communities in fire prevention through public education programs, and
- (d) promoting or providing fire education for fire protection engineers, architects, and code officials.

This Federal focus would complement existing programs of research and action in Federal agencies and private sector. It would focus attention to their missions, coordinate their efforts and promote interest in areas of research or action that have been neglected.

The seemingly constant increase in the cost of operating fire departments combined with the increasing demand on tax funds for new and additional services is forcing many policymaking officials to seek new means of providing fire protection. To the extent that fire protection planning exists, it usually is limited to such matters as working toward lightweight quick couplings of hoses or toward a computer which will calculate the pressure needed at the fire pumper or in more and better training. As important as these concerns may be, it appears that the role of the municipality to provide adequate fire protection must be completely reassessed, and the function of the fire service in light of the conditions which exist in our cities today must be redefined.

The search for alternatives to the conventional fire service as a method for providing this protection includes a consideration of these four significant modifications to the conventional fire service: (a) regionalization or consolidation of the fire protection efforts of several separate jurisdictions, to pool efforts toward a single better system to service the entire region, (b) sharing of the responsibility with property owners by the establishment of codes and regulations requiring them to provide built-in fire control equipment in their buildings, (c) private or contract service, whereby the community establishes a contract with a private group to provide fire services to the community, and (d) reduced protection, usually forced by the inability of the community to fund the fire department at a level of manning which existed in previous years.

For the municipal environment—the people and the property—the basic fire needs can be forwarded as a list of objectives. There is a unanimous agreement among the public, city officials, fire department personnel, and insurance people that these objectives, in order to priority, are:

- (a) to prevent fires from starting,
- (b) to minimize loss of life and property when fire occurs,
- (c) to extinguish the fire with the minimum damage resulting from suppression effort, and
- (d) provide the necessities to regroup and rebuild and return to productivity with the minimum of delay.

Our commission is preparing a final report with enthusiasm because we know our national fire losses can be reduced. This must be done at the local level but will only be accomplished if coordinated and augmented by the Federal Government.

Attached to our statement is a copy of our preliminary recommendations which we are refining and developing for our final report.

(The prepared statement of Mr. William H. McClennan follows:)

PRESENTATION OF WILLIAM HOWARD MCCLENNAN, VICE CHAIRMAN OF THE NATIONAL COMMISSION ON FIRE PREVENTION AND CONTROL

On behalf of the National Commission on Fire Prevention and Control I wish to thank you, Chairman Davis, for this opportunity to discuss the progress of our Commission with the Science and Astronautics Committee. Since the appointment of this Commission by President Nixon, we have labored diligently and are dedicated to finding more effective ways to reduce our nation's terrible loss from destructive fire. We have held hearings in four regional cities focusing

on life safety, fire protection in buildings, the fire services, the burn epidemic, fire research, forest and wildlands fires and fire prevention. We have received over one hundred position papers from experts in private and public agencies analyzing various aspects of the fire problem and have conducted a survey of fire departments (10,000) to determine critical issues. Our analysis has led us to a single conclusion: we have within our nation the capabilities to bring about a significant reduction in life and property loss.

Consider, for a moment, the current magnitude of the fire waste of our nation's resources: more than 12,000 Americans were killed in fires in 1971; 330,000 were crippled, injured and burned; direct property loss totaled \$2.6 billion. Adding treatment costs for burn injuries at \$1 billion, support for fire departments at \$2.5 billion and \$3.3 billion in lost productivity, destructive fire wastes \$9.4 billion annually.

Then, too, Americans pay approximately \$6 billion in fire insurance premiums each year, of which a significant portion is not productive money but simply used to replace fire losses.

In an America that has grown conscious of its ecological responsibilities while remaining cognizant of its international economic position, we find another consideration is pertinent: that fire destroys, or alters beyond usefulness, natural and humanly transformed materials that we need to manage carefully. Whether it is trees in the forest, a warehouse full of paper made from trees, or coal in a mine, fire wastes America's resources. Destructive fire is an irreversible process!

Unfortunately, the richest and most technological advanced nation in the world leads all the industrialized countries in per capita deaths and property loss from fire. While differing reporting procedures make international comparisons somewhat unreliable, the fact that the United States reports a deaths-per-million-population rate nearly twice (59.4 versus 30.0) that of the next ranking nation, Canada, leaves little doubt that this nation leads the other industrialized nations in fire deaths per capita. Similarly, in the category of economic loss per capita, the United States exceeds Canada by one-third.

We estimate that the total net U.S. fire cost amounts to over \$13 billion annually; that is \$60 for every man, woman and child in the country. As a comparison, losses from unsafe consumer products have been estimated to be \$5.5 billion annually, and these losses have been far more effectively publicized.

The Commission is left to conclude that our nation's fire priorities are wrong. Our resources have been directed at stopping the fire after it starts rather than preventing it. Prevention is the most cost-effective solution.

There are reasons why our nation has not acted to prevent fires. Some are traditional, others economic or technological. The typical image of what a fire department should be—an image which firemen share—is a heroic-proportioned battalion of fire fighters and people-rescuers, not a professional corps of fire preventers. Further, there is little incentive today to change that approach.

As in the past, the insurance industry is an important element in the fire protection system. The Standard Schedule for Grading Cities and Towns of the United States with Reference to their Fire Defenses and Physical Conditions is a method used by the insurance industry for establishing fire insurance rates. The premiums charged for fire insurance are set in part by the public protection provided. That level is attained through taxation or solicitation. Fire departments are heavily influenced by the Grading Schedule in determining priorities and in expression of their needs. Since the Grading Schedule gives minimum credit (approximately seven percent) for fire prevention activities, over 95 percent of all fire department budgets are spent on suppression rather than prevention. In most states, insurance rates on dwellings are not affected by an improvement in the classification of a city when the city is in class 4 or better. Homeowners, who suffer 80% of all fires in this country are the major consumers of insurance, obtain no reduction in insurance premiums and little additional fire protection for tax dollars spent to improve a city's grading beyond class 4. Most of their tax dollar goes for reduced premiums for the mercantile, manufacturing and public buildings. The insurance industry can help us create incentives for unfire by rewarding consumers where their fire departments practice fire prevention.

Sprinkler systems have an excellent record of property safety and should be required in all high rise structures, institutional occupancies and buildings of specific volume/utilization relationships. Early detection and alarm systems should eventually be required in all residential units. We estimate that as many as 2,600 lives could be saved annually by this requirement.

As Charles Morgan, President of the National Fire Protection Association has observed, "It is not for lack of knowledge that we are suffering grievous losses

from fire, but because of our failure to apply what we already know, much of which has been known for years."

Still, there is much that is not known about fire and its destructiveness. Over and over again, the Commission found that our studies of the fire problem were hampered by the very poor data base. Testimony and data received to date indicate that a national and local uniform data system is an essential first step in allocating resources for any cost-effective solution. Such a system should build upon existing data collection efforts such as those of the National Fire Protection Association, the American Insurance Association, various states and foreign governments.

Research and development must be expanded to achieve a fundamental understanding of fire and how it is propagated. This then leads to safe building construction and furnishing materials and improved fire extinguishing equipment. Faced with what is perhaps an 80 percent people and 20 percent technological problem, research is needed to examine the economic and social problems attendant to destructive fire. Perhaps the most important research needed is in the area of human behavior. In that area, a subject of special concern is the arsonist. Fire chiefs in many cities believe that more than half their fire losses are due to arson. In reality, we pursue an economic system that provides incentives for prearranged fires in the form of insurance payments, income tax write-offs and low cost land clearance.

Indifference also helps to account for the extraordinary magnitude of the fire problem in the United States. For example, it is not uncommon for fire chiefs to be unaware of the technological state of the art in their field (communication, technological transfer). Nor is it uncommon for fire chiefs, especially those of the volunteer fire departments, to be unconcerned about preventing fires because they see their job as only putting them out.

Architects (with a few notable exceptions) are largely indifferent to providing a satisfactory level of protection for life safety in buildings. Most architects find it easier and acceptable to clients to design to the minimal life safety standards of the building codes. Existing codes need concentrated review for applicable engineering principles and to assure allowance for cost trade-offs that recognize a safe total building design. In turn, building owners and occupants see fire either as something which will never happen to them or as a risk which they can tolerate because fire prevention measures are costly. Physiological researchers and product engineers are largely unaware of the toxicological affects of products when consumed in a fire.

The fire equipment industry has, for the most, part, shown more interest in maintaining its captive market than in developing new products, enhancing safety or improving production methods to cut costs. For example, fire truck costs range from \$40,000 to \$1000,000 and the delivery period may be a year or more.

Then, too, the federal government has been largely indifferent to the fire problem (with the notable exceptions of the U.S. Forest Service research and data programs, the Fire Research and Safety Act and the Flammable Fabrics Program).

Lastly, the American people in general are ignorant of, and hence indifferent to, the fire problem. The problem has not been portrayed with the same urgency as, for example, the far less lethal problems of air pollution and poliomyelitis. Polio, which in the peak year of 1952 killed little more than a third as many people as died by fire in that year, has been virtually eradicated because of the public attention it received. Moved by the sight of crippled children, Americans dug into their pockets to support research and control programs to attack the polio problem. No such concern has come forth regarding the fire problem.

Indifferent to fire as a national problem, Americans are similarly careless about fire as a personal threat. There is an old saying in the fire protection field to the effect that fires have three causes: men, women and children. It takes the careless or unwise action of a human being, in most cases, to begin a destructive fire. In their home environments, Americans live their daily lives amid flammable materials close to potential sources of ignition. Few private homes have fire extinguishers, much less fire detection systems. Too few multiple-family dwellings and institutions have adequate equipment for extinguishing fires. And often when fire strikes, ignorance of what to do leads to panic behavior and aggravation of the hazards, rather than successful escape.

The gravity of the fire problem expressed in Public Law 90-259 arises partly because of this national indifference, and partly because rapid changes in American society have created a complex of varied and confusing problems. We suffer what anthropologists call "cultural lag;" our methods of handling the fire problem are attuned to the America of yesteryear, not to either contemporary or future needs.

A number of important changes in American Society during the past several decades bear directly on the fire problem. Increasing urbanization has created social problems—the migration of the poor into cities, the development of ghetto areas, the rising expectations of minorities without the comparable ability to realize these expectations—that have had an effect on the fire problem. The poor are shunted to the most run-down neighborhoods, where century-old buildings are virtual tinder boxes. Few of the crowded apartment houses and tenement buildings have sprinkler systems or other protective equipment, because landlords see no profit in decent, long-term upkeep of their properties. Tenants must often warm their rooms with dangerous portable or makeshift heaters because central heating is inoperable or non-existent. In the past ten years, flaring discontent in the ghettos has added burdens to fire departments in the form of riots and fires, arson, harassment of fire fighters and false alarms. Antiquated laws and time consuming protective procedures delay removal of abandoned buildings—fires waiting to start. The movement for minority rights has forced upon us the realization that fire departments are, in general, still career sanctuaries for white Americans. Black and brown Americans are underrepresented in the fire departments in nearly every community in which they live.

Urbanization has also created more of a demand for intensive use of land; as a result, there are bigger buildings which create more complex safety problems from fire. More people are concentrated in buildings and exposed to the threat of fire or its toxic gases and smoke. People can be dead within minutes after relatively low levels of toxicity are reached. High rise buildings, though hallmarks of urban progress, present problems for which there are no solutions within the capability of many contemporary fire fighting units. Upper floors are difficult to reach and heat and smoke are slow to vent in modern air-conditioned buildings.

Because we believe the fire problem is significant enough to warrant attention at the highest level of federal government, the Commission is presently considering that a high federal office be established to provide a national fire focus.

The need for this focus is manifold. We believe that a strong attack on the fire waste of this nation is not only warranted—it is necessary. We believe that the most effective fire attack can no longer be mounted solely by the local community because of the technology, complexity and cost. We believe that the individual should have the reasonable assurance of fire safety in his occupation, recreation and residence. We believe that a nation dedicated to the value of human life cannot set aside its responsibility for preventing suffering from burning—the most traumatic human injury. We see this federal focus:

- (a) providing a public forum for discussion of fire problems and solutions,
- (b) coordinating federal programs relating to fire prevention, research and control,
- (c) publishing an annual plan to provide the public, Congress and the Executive Branch with a coordinated, overall program for reducing life and property losses from fire, and
- (d) serving as a center to refer requests for information to the appropriate agency, department or private organization.

The federal focus would include a National Fire Academy. The National Fire Academy would have a number of educational functions, among them:

- (a) providing advanced training and education to the nation's fire services in such fields as arson investigation, management, fire prevention and fire safety,
- (b) assisting federal, state, regional and local fire services in training and education by providing course materials, financial support, demonstration projects and special instructors,
- (c) helping local communities in fire prevention through public education programs, and
- (d) promoting or providing fire education for fire protection engineers, architects and code officials.

This federal focus would complement existing programs of research and action in Federal agencies and private sector. It would focus attention to their missions, coordinate their efforts and promote interest in areas of research or action that have been neglected.

Many of our recommendations will call for augmented programs and new efforts by state and local governments. We recognize that many of these governments are unable to undertake new expenditures in fire protection without federal help. Thus, we also envision there being a grant-making agency in the field of fire protection, functioning as a responsibility of the federal focus.

Recognizing that the fire problem is increasingly concentrated in urban areas, the Commission will recommend that every sizeable community develop a comprehensive master plan for fire protection. Each such effort would be eligible to receive federal assistance as an incentive for local participation. The master fire protection plan begins with defining goals and methods for evaluating the fire protection needs of the community and then develops the fire department and other municipal resources to produce the maximum cost-benefits.

Planning for fire protection is a local government function and city administrators are facing an increasingly difficult responsibility to provide for proper service. The increasing difficulty is symptomatic of many services in the contemporary urban milieu. In the case of the fire service, there has been a continued decline in the spirit of fraternity and public service that, traditionally, has been a major strength of the fire department. Public adulation and sympathy for the plight of the fire fighter has been waning, technological problems are increasing, costs are rising and demands on the fire service are increasing in large account because of other social problems of the city.

The seemingly constant increase in the cost of operating fire departments combined with the increasing demand on tax funds for new and additional services is forcing many policy-making officials to seek new means of providing fire protection. To the extent that fire protection planning exists, it usually is limited to such matters as working toward light-weight quick couplings for hoses or toward a computer which will calculate the pressure needed at the fire pumper or in more and better training. As important as these concerns may be, it appears that the role of the municipality to provide adequate fire protection must be completely reassessed, and the function of the fire service in light of the conditions which exist in our cities today must be redefined.

The search for alternatives to the conventional fire service as a method for providing this protection includes a consideration of these four significant modifications to the conventional fire service: (a) regionalization or consolidation of the fire protection efforts of several separate jurisdictions, to pool efforts toward a single "better" system to service the entire region, (b) sharing of the responsibility with property owners by the establishment of codes and regulations requiring them to provide built-in fire control equipment in their buildings, (c) private or contract service, whereby the community establishes a contract with a private group to provide fire services to the community, and (d) reduced protection, usually forced by the inability of the community to fund the fire department at a level of manning which existed in previous years. We see the need for increasing use by cities of professional guidance from private management firms which analyze the fire function using "systems techniques" and "management sciences." The stakes are too big, too complex and too important to rely on traditional methods.

For the municipal environment—the people and the property—the basic fire needs can be forwarded as a list of objectives. There is a unanimous agreement among the public, city officials, fire department personnel and insurance people that these objectives, in order of priority, are:

- (a) to prevent fires from starting,
- (b) to minimize loss of life and property when fire occurs,
- (c) to extinguish the fire with the minimum damage resulting from suppression effort, and
- (d) provide the necessities to regroup and rebuild and return to productivity with the minimum of delay.

Our Commission is preparing a final report with enthusiasm because we know our national fire losses can be reduced. This must be done at the local level but will only be accomplished if coordinated and augmented by the federal government.

Attached is a copy of our preliminary recommendations which we are refining and developing for our final report.

PRELIMINARY RECOMMENDATIONS OF THE NATIONAL COMMISSION ON FIRE PREVENTION AND CONTROL, JULY 18, 1972, SILVER SPRING, MD.

Data and Information

1. A national fire data system is required that removes unnecessary duplication of effort, contains information of specified credibility, and enhances the collection, processing and dissemination to the users.

2. Participation by competent inputters, i.e., fire chiefs, fire marshals and fire investigators, is an essential ingredient of the system; and therefore, incentives should be created to encourage their involvement. Such incentives should involve

a subscription service, or selective feedback of data requested by and of interest to the inputers.

Detection and Alarm

1. Fire detection and alarm systems are recommended for all residences. The recommended order of priority for implementation should be federally assisted (new), federally assisted (existing), private (new) and private (existing).

2. Federal support should be provided and work be conducted by, or coordinated by, the National Bureau of Standards relative to research and standards for residential fire detection and alarm systems.

(a) Research and development work on fire detection systems should continue and be accelerated in order to:

(1) Define specific performance criteria and standards for operation and installation of fire detection systems and hardware. Unique requirements for single-family dwellings (including mobile homes), multi-family dwellings, modular homes and high-rise structures must be detailed.

(2) Produce rigid performance type standards to insure production for the open market of reliable, inexpensive and maintenance free detection devices and systems which are the best available within the state-of-the-art.

(3) Advance the state-of-the-art in detection devices.

(b) The National Bureau of Standards should expedite work on standards relative to state-of-the-art residential fire detection systems in order to encourage their use by homeowners and builders. The information developed, including names and sources of supply of proprietary devices, total system costs and installation and maintenance requirements should be disseminated and publicized in the news media, technical press and through the recommended HEW public education program. This information should be provided aggressively to state and local governments for distribution and for incorporation into codes and ordinances. Enforcement of the minimum standards requirements should be undertaken through federal, state and local regulations.

3. The Department of Housing and Urban Development should begin immediate discussions with representatives of the insurance industry, mortgage industry (including life, property, health and accident insurance) to firmly establish:

(a) Incentives for installation of fire detection systems in residential occupancies of all types (i.e., one- and two-family, multi-family, owner-occupied, etc.)

(b) Penalties for fires in residential occupancies for both owners and occupants.

(c) How the mortgage and insurance industries promote home fire safety.

4. Appropriate regulating bodies (e.g., Federal Communications Commission) should investigate possible role of telephone companies and cable TV companies as manufacturers, installers and/or maintainers of detection systems.

5. Detection and alarm systems should be mandatory in all "new" federally-assisted housing.

Fire Safety

1. The federal government should develop an effective year-round continuing fire safety education program for the general public. Major emphasis should be placed on fire prevention in the home. This program should include national and regional programs by all communications media directed toward specific fire prone groups, such as the young and the elderly. They should cover seasonal fire hazards, and should be geared through language, background and program timing to the promised recipients. These programs should be designed as the result of increased research in the psychological aspects of public motivation. Included in these programs should be education of the public on the value of inspections of all types of occupancies.

2. The federal government should require fire safety education in the schools carried out through the school year. Schools presenting an effective fire safety education program should be eligible for federal financial assistance.

3. The federal government should sponsor fire education courses for educators to provide a teaching cadre for fire safety education.

4. Legislation should be enacted to prohibit the sale and use of fireworks except those to be used in public displays.

5. A fire safety education course should be a requirement for all education degree programs.

Research and Development

1. There should be a significant increase in fire research activity directed to the critical fire problems, with careful attention to a judicious balance of basic and applied research so organized that they feed and stimulate each other.

2. The Committee feels that the fire research areas to be emphasized should be expanded at a later time, but consist basically of the following items:

- (a) Underlying basic research to understand the nature of fire
- (b) Unwanted fires in the home
- (c) Destructive forest fire
- (d) Detection, alarm and extinguishing system
- (e) Personal protection for fire fighters
- (f) Improved fire suppression methods and equipment
- (g) Industrial and commercial fires that destroy jobs
- (h) Transportation fires

Immediately needed research efforts range from investigation leading to the early application of existing fire knowledge in fire protection engineering to basic scientific and engineering research to solve urgent fire problems.

3. National, university and industrial laboratories have to be involved in a balanced way in fire research.

We commend the recent cooperative efforts between NBS and NSF-RANN in the fire research area. This cooperation minimizes duplication of effort, ties together basic and applied research, mobilizes the research community to the fire problem, and enhances the transfer of information among government, university and private sector researchers. This trend could well be encouraged, expanded and formalized through a federal focus of effort by a mechanism; such as the establishment of a Federal Fire Commission.

In determining the research needs of the country in the fire area, the Commission used among many fire papers and testimonies presented, the 1969 Report of the Committee on Fire Research of the National Academy of Sciences. Its efforts are commendable in that they provided a useful and independent overview of the problem. A continuation of such efforts should be encouraged.

4. There should be expanded federal government financial support to fire research.

5. A public motivation study should be conducted for promoting fire safety.

Federal Participation

1. Recognizing the financial plight of many communities and the previous lack of federal assistance to fire fighters, federal legislation should be enacted to establish a program for federal financial assistance to the fire services in the areas of equipment, facilities and training materials.

2. The Commission takes note of existing and proposed federal, state and local requirements for improved life safety in institutions such as nursing homes, hospitals and day care centers. Federal financial participation should be available only for those institutions having approved fire detection and extinguishing systems.

3. The full cost of operating the proposed National Fire Academy and subsidizing the attendance of fire service members should be borne by the federal government. The federal assistance for members of paid and volunteer fire departments would cover cost of travel, tuition, teaching materials and accommodations. The fire department should continue to pay salaries of students. The acceptance of grants and other forms of support from other political entities and from the private sector shall be encouraged.

4. Eligibility for federal assistance should be based on participation of fire departments in the proposed national fire data collection system.

5. The Commission recognizes the problems of the fire hazards posed by materials and consumer products (such as furnishings in buildings). Fire hazard control should be of prime concern in material and product development and that a system of fire hazard grading for consumer information be considered.

6. A formal fire safety analysis and filing of a fire safety impact statement with the concerned federal agency shall be required for all major federal construction projects or federally sponsored projects.

7. Federal funds shall be made available only to those fire departments that have adopted an effective, affirmative action program related to the recruitment and employment of members of minority groups.

8. Eligibility of schools for federal aid should be contingent upon inclusion of fire safety as an integral part of the regular curriculum.

National Fire Academy

1. There should be an independent and permanent "Federal" Fire Commission appointed by the President.

2. The "Federal" Fire Commission should be the primary focus for the nation's fire problems.

3. The "Federal" Fire Commission shall be responsible for the creation of a National Fire Academy and appoint a board to operate the Academy. That board shall be under the Commission's authority.

4. The "Federal" Fire Commission shall have, in addition, the following main functions:

(a) to inform the public and Congress, concerning national fire problems and insure proper attention to them;

(b) provide a forum for discussion of fire problems and solutions by the private sector and the federal government;

(c) periodically conduct analyses and evaluations either directly or by contract to determine the magnitude and character of the fire problem;

(d) evaluate the total federal fire problem including research with respect to the overall objectives of fire loss reduction;

(e) coordinate plans relating to fire prevention, research and control submitted by the separate federal agencies and departments;

(f) make requests of public and private agencies to provide support in evaluation of research programs;

(g) recommend or endorse new programs or changes in the overall program which will achieve desired objectives. Publish an annual plan to provide the public, Congress and the Executive Branch with a coordinated, overall program for reducing life and property losses from fire;

(h) serve as a center for receiving requests for information about fire and referring these requests to the appropriate agency, department or private organization.

5. The National Fire Academy shall have the following main (but not limited to) functions:

(a) Provide for the nation's fire services specialized training and education in:

- (1) officership
- (2) arson investigation
- (3) engineering—fire protection
- (4) fire instructors
- (5) management
- (6) fire prevention and fire safety

(b) Assist federal, state, regional and local fire services in training and education:

- (1) provide course materials and training techniques
- (2) provide financial support
- (3) accredit program
- (4) demonstration projects
- (5) provide special instructors
- (6) disseminate information

(c) Identify problems or trends for the fire services.

(d) Develop model programs for the fire services.

(e) The National Fire Academy shall provide the following services to the community:

- (1) public education programs
- (2) local community fire prevention efforts
 - a. information dissemination
 - b. provide financial support
 - c. special personnel
- (3) promote or provide fire education for:
 - a. fire protection engineers
 - b. architects
 - c. code officials

Flammable Fabrics

1. The development of improved testing methods for determining the hazards of flammable fabrics be expedited.

2. The development of acceptable fire retardant fabrics be expedited.

3. The federal government support an education program to inform the public of the hazards of flammable fabrics with the aim of creating an effective consumer

demand for fire safe items. Attention should be focused on the problems of the young and the elderly.

4. The Federal Trade Commission should issue public warnings about flammable apparel and other fabrics, including release of the trade name and the name of the retail outlets, when fabrics are found which fail to meet the standards.

5. The Committee considered the question of whether we should endorse the transfer of all flammable fabrics responsibility to the proposed Consumer Safety Agency, and felt that unless the Commission were to make a decision and a public statement now, no effect could be achieved by this Commission on the question. This Committee was opposed to making any such statement at this time. The Committee itself was divided on the advisability of the transfer. Although unifying responsibility should increase efficiency, the Committee recognized the possibility that the flammable fabrics problem might receive a lower priority in the new agency and that present efforts might be delayed two or three years. If the new agency is in existence at the time of our final report, we would recommend that the flammable fabrics problem be given high priority.

6. The federal government offer research grants for the development of needed flame retardant fabrics and fabric treatments. An example is the need for a flame retardant polyester.

7. The federal government expedite the development of standards reducing the contribution of ignition sources to flammable fabric accidents, such as the design of cooking equipment, match boxes, cigarettes, etc.

Forest and Rural Fire Safety

1. The adoption of programs for planned use of fire (i.e., prescribed burning in reducing hazardous fuel accumulations in forest and wildland areas.)

2. Major consideration should be given to the intensification of effort in the management of vegetative fuels including fuel breaks, green belts, conversion to less flammable fuels, and disposal of burnable debris to prevent dangerous accumulations.

3. A total coordinated wildland fire prevention package needs to be designed and implemented. This would necessitate the optimization of a mix of prevention preparedness and suppressor capability.

4. All states should provide adequate laws to regulate all types of burning. State fire laws should be adequately enforced and judicial cooperation be improved.

5. Development should be expedited of improved early warning fire danger rating and fire weather forecast systems.

Additional research is needed to provide information on fire weather behavior and control systems. This research should include: the study of weather modification to reduce lightning-caused fires; new prevention techniques; the development of modernized air tanker fleets; and implementation of night fire fighting programs.

6. Fire prevention programs should include action plans to educate children in the area of wildland and forest fires.

7. The federal government shall promote the organization, training, encourage and advise fire forces in the rural areas where fire protection does not exist.

Fire Services

1. The National Fire Academy develop improved fire curricula for local use, training local instructors and providing fire training instructors to local state and regional fire training centers.

2. Federal financial assistance should be made available to local fire fighters to attend colleges and courses approved by the National Fire Academy.

3. Federal financial assistance should be made available to support fire departments training programs.

4. The Federal Fire Commission shall empower any necessary studies of the personal safety of the fire fighters.

5. The problem of minority employment as presented by the Financial Participation Committee is considered as an adequate and appropriate statement of the problem.

6. The National Fire Academy develop and provide a model national entrance test.

7. Arbitrary cuts in manpower in order to reduce budgets should not be used. The effect on injury, workload and level of protection must be considered.

8. While it is impossible to develop a standard for all fire equipment, due to the terrain, environment and weather conditions encountered during operations, it is imperative that safety guidelines be developed mandating the protection of the fire fighter from accidents and harassment.

9. Each fire jurisdiction prepare a master plan for local fire protection which will:
 - (a) present a philosophy and plan for fire protection which will best meet the current and future fire protection needs of the city.
 - (b) serve as a basis for a fire loss system within the fire department, and for program budgeting.
 - (c) provide a "management by objectives" system within the fire department.
 - (d) provide for the identification and implementation of the optimum cost/benefit in fire protection.
10. Centralized functions, such as dispatching, procurement and training, be implemented and encouraged through incentives such as federal assistance.
11. Fire services formally recognize (through their professional organizations) and actively pursue fire prevention as the primary goal.
12. Methods should be developed by the National Fire Academy for cost-effective analysis of community fire protection levels and for evaluating fire department effectiveness.
13. Development of ambulances, paramedic and rescue services be encouraged in all fire departments.
14. The Federal Communications Commission be requested to allocate more radio frequencies for fire services use.
15. Metropolitan areas should be encouraged to consolidate fire department operations where many separate local jurisdictions exist.
16. The fire service throughout the United States suffers from a lack of standardization in terminology, symbols and names which results in difficulties with surveys, equipment purchase, and many other problems. The federal government should review, amend and adopt the book, "Fire Terminology," published by the National Fire Protection Association.

Residential Life Safety

1. Home Fire Prevention National Advertising Campaign—A broad national advertising campaign should be sponsored jointly by the U.S. Department of Health, Education and Welfare and the National Fire Protection Association and conducted by the Advertising Council, Inc. The success of public service campaigns conducted by the Advertising Council has been amply demonstrated, an outstanding example being the Fire Prevention Campaign with the "Smokey Bear" sponsored by the U.S. Forest Service. This campaign has been described as "the country's most single successful program of environmental protection." For 30 years public service advertising has urged Americans of all ages and sizes to take steps to prevent forest fires. During those years, man-caused fires have been reduced from 5,000 to 176 fires per million visitors to our forests. This has helped save \$17 billion in natural resources. Advertising Council campaigns are supported by newspapers, television and radio networks and local stations, magazines, outdoor and transit advertising and business and employee publications. A continuing Home Fire Prevention Campaign, with federal funding of not more than one million dollars annually would produce advertising worth 100,000,000 dollars if privately purchased, would pay off handsomely in reduced loss of life and injury and in reduction of fire losses.

2. Dwelling Inspections by Fire Departments—The most effective plan yet devised to reduce fires in homes has been an annual inspection by the local fire department of every home in their community. Hundreds of fire departments, large and small, paid and volunteer, have conducted such inspections with remarkably good results in reduced dwelling fires, as a public service with no extra cost to the taxpayers, and with substantial side benefits in public good will and support. Such inspections are voluntary, but few home owners reject an offer to help save the lives of their families and safeguard their property from fire.

Annual home inspections by fire departments should be undertaken by all U.S. fire departments as their direct contribution to the national effort to reduce life loss and injury from fire and that the National Home Inspection Plan be supported and encouraged by all the appropriate federal, state and local officials, and all the national, state and local fire protection and fire service organizations.

Federal funds shall be available only to departments having such inspection programs.

3. Exit Drills in the Home (OPERATION EDITH)—The fire experience reveals that many people die in home fires because they have not thought about what they and their family should do when fire breaks out. Preplanning for a possible fire emergency saves lives. The Fire Marshals Association of North America has endorsed and is sponsoring local programs designed to get people to plan in advance how to get the family out of the house safely if a fire happens.

The ultimate responsibility for life safety from fire in any home rests with the head of the family.

The Commission supports the OPERATION EDITH plan and recommends its wide acceptance and implementation in every community. This recommendation should be emphasized in the national educational program.

4. NFPA should develop a model national fire prevention code with due emphasis upon fire safety in residential occupancies. The code should be drawn in such a fashion as to be easily enacted into law by local authorities.

5. The Commission commends the action of model building code groups in moving toward requirements for early warning fire detection systems in residences.

The four model building code groups should give serious consideration to other measures which are safeguards against residential fires, for example: limits on the fire and smoke hazards of interior finishes.

6. The NFPA study of single fatality dwelling fires had shown that 52% of deaths in such fires are due to the inhalation of smoke and poisonous gases. Therefore, in order to reduce the losses of life from destructive fires, the federal government should increase its support through grants for the investigation of:

(a) The nature of injuries produced by exposure to the smoke and poisonous gases released by the burning of fabrics and building materials utilized in the home.

(b) The means for treatment of these injuries.

7. The Commission recognizes the existence of a nationally recognized standard for the protection of life in mobile homes. Authorities having jurisdiction at all levels should adopt and enforce this standard for mobile homes.

8. Schools giving degrees in architecture and engineering should include in their curricula courses in fire safety and the American Institute of Architects, professional engineering societies and the State Registration Boards give this concept their support.

Transportation

1. Existing government agencies enforcing safe handling of hazardous materials be given adequate enforcement powers and personnel to bring about fire safety.

2. A formal fire safety analysis and filing of a fire safety impact statement with the appropriate federal agency be required for all major federal or federally-sponsored projects.

3. The performance of a formal fire safety analysis and filing with the appropriate federal agency shall be required from all producers and shippers of hazardous materials.

4. The Interstate Commerce Commission, Department of Transportation and Treasury Department be directed to initiate a significant program to reduce the potential hazards to life safety and the surrounding environment in case of accident involving chemical and other hazardous substances conveyed on the Nation's transportation systems.

5. Because the magnitude of the fire problem resulting from transportation accidents involving hazardous materials can easily overpower local fire service efforts and endanger a sizeable part of a community, these hazards should be controlled by a coordinated fire prevention program, conducted by the concerned federal agencies, and with an effective implementation program in the field.

6. The Department of Transportation, with the assistance of the Federal Fire Commission, the Joint Fire Council, the Manufacturing Chemists Association, and other concerned organizations, shall initiate a cooperative comprehensive transportation accident fire control program (including use of the Chemical Transportation Emergency Center (ChemTrac)) to insure that local fire services have the necessary knowledge to quickly, safely and effectively control any transportation accident fire.

7. The Department of Transportation shall be directed to initiate a significant program to insure adequate fire protection at airports.

8. The Department of the Treasury shall be required to establish adequate fire regulations with the enforcement thereof, for the transportation, storage and transfer of hazardous materials in international commerce. These efforts shall be coordinated with the local fire services.

9. The appropriate federal agencies (ICC, Postal Service, DOT, etc.) shall initiate and enforce the proper labelling of all shipments of hazardous materials and set the fire safety standards for air shipment.

10. The appropriate federal agencies shall assure that adequate maintenance programs of roadway and equipment shall be conducted by the Nation's railroads to reduce the probability of accidents which cause fires.

Building Fire Safety and Code Regulation

1. An annual fire safety program, including fire drills, be required for occupants of all high-rise buildings to convey fire safety information in the areas of fire prevention and emergency action.

(a) This requirement should be mandatory in all federally owned and operated high-rise buildings.

(b) This requirement should be encouraged on the State and local levels for all other high-rise buildings.

2. The National Bureau of Standards expand existing studies to update fuel loading information in both residential and commercial buildings. These expanded programs should be continuous in nature being funded on a regular basis.

3. Existing codes be strongly enforced by the authority having jurisdiction.

4. The Commission recommends that the development of improved test methods for interior furnishings be expedited. These improved tests must, in addition to present criteria, be addressed to:

(a) What gases are involved?

(b) What is the toxicity of these gases?

5. The model codes must complement this additional information.

ADDENDUM

In addition to the major recommendations given, there are other items of concern:

1. The Commission would like to compliment GSA, which is involved in developing a systems approach to fire safety in building design and construction. Increased efforts are needed in this area with major emphasis to be placed on cost-effectiveness and performance systems.

2. Consideration should be given to the legal burden on building owners and occupants in respect to fire incidents.

3. All model codes are presently involved in updating requirements. This action should continue with the idea of developing a national life safety code for high-rise buildings.

4. The research and development recommendations should direct themselves to the development of programs for material characteristics, structural systems, fuel loading and design and coordinate these on a national basis.

5. The National Fire Academy should accept as one of its functions the development of fire fighting technology applicable to high-rise building fires.

6. Medical research and development should be promoted to study human tolerances in respect to life safety in buildings.

7. The continued development of more effective methods of protecting high-piled and rack storage is encouraged.

8. The expanded use of fire protection engineers during building design stages is urged.

9. An improved system needs to be developed to insure maintenance and operation of existing fire protection equipment.

10. More effective code enforcement should be emphasized.

11. The adoption of NFPA-101 Life Safety Code as a minimum in all state and local jurisdictions is encouraged.

12. The National Bureau of Standards should continue to expand its efforts to function as an adaption laboratory to bridge the gap between highly technical studies and recommended practice.

13. Codes should be responsive to changing times.

14. Codes and regulations should be more uniform and consider more fully the smoke and other non-heat products of combustion.

15. A more explicit, well defined set of terms and definitions should be developed and used to avoid the confusing and often contradictory proliferation of terms that occur in various codes.

Mr. McCLENNAN. Thank you for allowing us to come here and give you our report. I am quite pleased as a firefighter with the progress this Commission is making. We are on our way to solving many of the problems of the fire service.

Mr. CABELL. Thank you very much. It is very obvious that your Commission hasn't been sitting idly by but are trying to attack this subject pretty wholeheartedly.

Do any of your associates have anything they would like to add before we ask for any question?

Commissioner DUKE. As a consumer of products sold on the market I feel that more must be done. We are protected if we go to the drugstore for medicine and we are protected if we go to buy meat or food. I go to buy a sofa or clothing for my grandchildren, and there are no standards. We have all heard of the Flammability Act. It is still not in effect. There is still no protection. This is the kind of thing consumers look at. Most people don't think fire is going to occur in their home. It is easy to say we should have education and fire protection and all the other kinds of things, but you can't stimulate a rally on "Let us have some fire protection." It is just not very popular. It is unfortunate, but it is the truth.

Mr. CABELL. It is a case of hiding your head in the sand.

Commissioner DUKE. I think that is true. I wonder, then, where does the protection come?

Mr. CABELL. You have raised a good point.

Chairman MILLER. It is not only a good point, but it is a point that your Commission can work on and I am sure you are working on. This is the first time you have ever had a facility that can make direct contact with Congress other than your organizations. I am certain, knowing the members of this committee the way I do, that they will take very seriously the recommendations that come with the assistance of other organizations that go to make up the membership of the Commission. Maybe we can make some progress in a field that has been too long allowed to lie dormant. We have taken too much for granted. I want to thank you for your very fine suggestions. Mr. Cabell is quite conscious of these things—how many terms were you mayor of Dallas?

Mr. CABELL. Two terms.

Chairman MILLER. So he has seen the problem from the city end.

Mr. CABELL. One further comment, if I may, with reference to flammability of clothing and so forth, I think it points up the need of coordination of all our various regulatory agencies, particularly within the Government. I am reminded of a situation that occurred not too far back where a national concern made a terrific effort that all of their baby clothes, their bedding, their wearing apparel were flameproofed and advertised it as such. Then the same company came out and made a terrific sales effort on a phosphateless detergent to save the pollution of our waters and unfortunately that particular detergent completely negated the nonflammability of the baby clothing and the bedclothing that they had gone to such expense to develop and promote. That sticks way out in my mind as to the necessity for the coordination of these various efforts—all of which are good, but sometimes we have to have some trade-offs as to what the final choice will be.

Mr. McCormack?

Mr. McCORMACK. I have nothing to say, but I would like to congratulate Mr. McClennan, Ms. Duke, Mr. Tipton, and Chairman Miller for the work that the committee has done. I am sure we will see you next year.

Mr. CABELL. You keep on fussing about that.

Ms. DUKE. Yes; I am sure my fellow commissioners will, too.

Mr. CABELL. While we are not supposed to distinguish between Miss and Mrs. and Ms., you follow the precepts of your sex, keep fussing and you will be sure to prevail.

Ms. DUKE. Thank you. You can be sure I will prevail because I am a native Texan.

Mr. CABELL. Next, we call on Mr. Waller, who is a legislative representative of the International Association of Firefighters, AFL-CIO.

(The biographical sketch of Mr. Waller follows:)

JACK A. WALLER, LEGISLATIVE REPRESENTATIVE, IAFF

I joined the Fire Service in 1938. I was promoted to Captain in 1945. I retired from the active Fire Service in 1967, as Captain. Served as a Local Union Officer and twelve years as Secretary of the Washington State Council of Fire Fighters and eight years from 1956-64 as Vice President of the 7th District of the International Association of Fire Fighters.

I was a member of the Pension Board for the City of Spokane for twenty years 1941-61. The 2-year preceding coming to Washington, D.C. as Legislative Representative of the International Association of Fire Fighters, I served as the Spokane County Civil Defense Director and did legislative work for the County Commissioners.

This activity followed being Legislative Representative for the International Association of Fire Fighters of the State of Washington since the session of the year of 1941.

**STATEMENT OF JACK WALLER, LEGISLATIVE REPRESENTATIVE,
INTERNATIONAL ASSOCIATION OF FIREFIGHTERS, AFL-CIO**

Mr. WALLER. Because the issues under consideration are of the utmost importance to the International Association of Fire Fighters and its more than 160,000 members in the professional fire service, we have prepared a statement of our views.

The International Association of Fire Fighters welcomes these hearings, for they give promise of carrying out the legislative intent of the fire research and safety law passed by Congress in 1968. It is our profound hope that out of these hearings there will emerge a strong consensus behind a program of action for consideration by the President and the Congress. The IAFF will be prepared to work with extraordinary vigor for the implementation of a forward-looking program to help make the fire service both more effective and more safe for the men who stand in the front line of community defenses against fire and disaster. The need for constructive action is overwhelming. Our members have been very patient, but now they want to see positive programs, and your legislation will accomplish this.

The spectre of death, or injury is the constant and fearsome companion of the professional firefighter in the cities and towns of America. Our union's research efforts show that the rate of death in line of duty among firefighters has climbed to an awesome 115 per 100,000 men. This is the highest of any occupation—about 55 percent higher, in fact, than for professional law enforcement officers, whose on duty death rate was a substantial, but comparatively lower, 73 per 100,000.

Furthermore, statistics show an astounding rate of 39.6 accidents per 100 firefighters in 1971. About 25 percent of these were sufficiently serious to require the men to take time off from their work.

We in the IAFF know that firefighting is an inherently dangerous occupation, and that it will never be truly safe. Nevertheless, we—and we believe, the American public—have a moral obligation to strive in every possible way to make the firefighting profession safer than it is today. In addition, all of us have a responsibility to seek to lower the number of deaths caused by fire from the present figures of over 12,000 a year, and take steps to decrease the heavy burden of expense caused directly and indirectly by fire—an expense which some observers feel may be as high as the cost of crime in this Nation.

Next, we will follow our beliefs. They are not necessarily listed in the order of their importance.

1. Need for improved early detection and alarm systems.

The IAFF supports the development of improved devices of this type; but we would emphasize that they should be regarded as complements, not substitutes, for a well-trained, well-equipped, fully-staffed fire department.

2. Need for improved fire prevention programs: The IAFF supports every effort along these lines. We would caution, however, that in a period of tight budgets, fire prevention programs are among the first activities to wind up on the chopping block. When this happens, it is a clear-cut case of “penny foolish.”

3. Need for improved fire control equipment: This is a clearly existing need. We are aware that advances have been made—but we know equally well that dangerous byproducts of technological advances in the construction of office buildings and factories have created new hazards for both occupants and firefighters.

4. Need for improved protective equipment for firefighters: Our members and officers have had frequent occasion to voice profound dissatisfaction with much of the equipment now used by firefighters. There has been little effective technological advance in these products. Masks are clumsy and cumbersome. They carry a too-limited supply of oxygen. They are far too heavy for a man who is groping through flame-scarred, smoke-filled areas. Protective clothes are not nearly protective enough, and when soaked with water—as they frequently are—they become so heavy as to destroy much of the firefighter's working effectiveness.

The newspapers and magazines keep telling us that this is a technological age of miniaturization and experimentation in the use of lightweight materials—dividends of the Nation's multibillion dollar space program. But so far the stuff we carry lightly to the moon does not seem to have been carried into the fire service of America.

5. The need for a national fire academy: The International Association of Firefighters places the highest possible priority on the establishment of a National Fire Academy. The members of the IAFF have made clear, in convention resolutions, in local meetings, and in discussion with the Government, that we believe the creation of an effective and active National Fire Academy is essential to the improvement of our national program of fire prevention and control.

Today we are having a lack of leadership on the national fire scene. There are many organizations with fine purposes and fine records. There are numerous Government bodies dealing with fire, at the State and local levels. There are conscientious civic-minded citizens who work for better fire service. But there is no national leadership, no real clearinghouse, no central focus for providing suggested

minimum standards, or uniform training methods, or recommendations for administrative improvements, or guidance to communities on getting more for their money in firefighting equipment.

All these things are urgently needed—not sometime—but now. The creation of an adequately financed National Fire Academy is the best way of achieving them.

Lastly, the fire service needs Federal financial aid if we are to meet our responsibilities for fire prevention and control. Local communities need this kind of fiscal aid. Firefighters need it, too; large numbers of our members, despite the IAFF's best efforts through the years, work longer hours than persons in any other municipal occupation. We need a program of Federal funding to help communities finance a modern and humane 42-hour workweek. It does not make sense for firefighters, who so often risk their lives in the course of duty, to have to subsidize the fire service through work schedules of 50, 60, and sometimes even 70 hours a week.

Members of the committee, the firefighters of the Nation look to you to help force a breakthrough into a new and modern era of fire prevention and control—an era in which we can effectuate major savings in life and property.

President Nixon expressed our attitude on this matter when he said, in his state of the Union message on January 20, 1972:

Above all, we must not lose our capacity to dream, to see, amid the realities of today, the possibilities for tomorrow. And then, if we believe in our dreams, we also must wake up and work for them.

We of the International Association of Firefighters appeal to you to dream the big dreams, and to help us in our work to achieve a better future for firefighting in America.

Thank you.

Mr. CABELL. I might say from personal knowledge, I know of a good many of your people who certainly feel the way you do and make those needs known. I am referring to Mr. Emerson and Chief Hendrix. Your voice is being heard, maybe not quickly enough, but it is coming through, nevertheless.

With respect to respiratory equipment, to what extent should such equipment have a useful life? I know that is a very definite problem. There is a problem of respiration during intense smoke or fumes.

Mr. WALLER. With respect to the breathing equipment available for the fire service today—it will have a rating of 30 minutes. In actual fire service, we find it is a lot closer to 15 minutes with a possible 20 minutes. If we are talking about just as a firefighter, anything we could do to improve it would be an improvement. A goal would be to develop a lightweight mask that would last upward to an hour. It would very well satisfy the needs of the fire service.

Mr. CABELL. Haven't you got a rather dangerous situation if you are depending upon oxygen where you are in the area of fire? If there was a leak, it could be more dangerous?

Mr. WALLER. This is one of the real problems, as I understand it, that the engineering people are running into in the development of a mask. We used compressed air in most of the Scott Air-Pacs and maybe regeneration of pure oxygen. But then you are getting into the serious problem of oxygen in the proximity of the fire, so there are some serious engineering problems.

Mr. CABELL. Then you have a real problem in weight?

Mr. WALLER. Honestly, the present apparatus is useful 15 or 20 minutes. We are talking about carrying something over 30 pounds. If you put on his coat, he is up over 50 pounds that he is carrying without counting carrying out someone who weighs 200 pounds.

If it was known what the astronauts equipment weighed on earth, it would be quite different as to how weightless it was up on the moon.

Mr. CABELL. We are in agreement that that is a field that needs very definite research.

Mr. WALLER. Very definitely. I was to the hearing yesterday and Congressman Mosher observed that someone in his State of Ohio commented that there was no need for greater duration of the mask to last and everyone who was asked this from the fire service was very emphatic, I want to say wherever Mr. Mosher's friend got his knowledge of the needs of the fire service, it was very inadequate.

Mr. CABELL. Mr. Chairman.

Chairman MILLER. That is a very good statement. I am certain your organization gets along well. I have a constituent whose name is Mat Jiminez, you have probably heard of him.

Mr. WALLER. Yes.

Chairman MILLER. He has needles and sometimes he isn't a bit particular whether they are sharp or not.

Mr. CABELL. Mr. McCormack?

Mr. McCORMACK. Thank you. I just want to congratulate Mr. Waller for his statement and point out with some pride that Mr. Waller is a constituent of mine from Washington State. I am very glad to have you here today, Jack.

Mr. WALLER. Thank you, Congressman.

Mr. McCORMACK. I certainly sympathize with the position you have taken. It has been my privilege to work with the firefighters in my home State as a member of the legislature and I believe that the needs that Mr. Waller is expressing for the firefighters for adequate protection and adequate equipment are certainly very substantial and real. It seems to me that one area of approach that we could be considering very seriously, if we are going to have revenue sharing by the communities, is assistance to provide adequate firefighting equipment, not only individual lifesaving equipment, oxygen supply and fire-resistant clothing, but also for major pieces of equipment so that we would not have the very long delays because of the problems related to financing and the purchasing of firetrucks and other types of firefighting equipment. This is one of the most justified areas of Federal assistance to our communities that I can imagine.

Mr. WALLER. Thank you.

Mr. CABELL. With reference to updating firefighting equipment, if you will pardon the personal reference, I do see that there have been some improvements made. Last week I participated in the opening of a firefighters' museum back in my home town. The major item of equipment in that museum is the first horse-drawn steam pumper that the city raked up enough money to buy in 1885. Compare that with some of our big snorkels. So there have been some advances. It was named after my grandfather who fought in the Civil War and whose nickname was Old Tiger. He was mayor of the city at that time. It was quite interesting to go back to the museum and see what progress has been made.

Mr. WALLER. Yes, we wish it could be more rapid. We realize that.

Mr. CABELL. That is the old American system of wanting to get somewhere fast.

Mr. WALLER. Of course we know there can be other improvements, too. As technological advances are made in other fields, that can be applied to the fire service.

Mr. CABELL. I want to thank you not only for your personal appearance, but for what your association is doing in the educational field and in working toward not just benefits for your membership, but for safety and protection of lives and property of all concerned. I do commend you and your organization, both for what you are doing, and for your appearance here today.

Mr. WALLER. Thank you for your kind words. We appreciate them very much.

Mr. CABELL. The next witness is a close friend of an associate in Congress, the Honorable Jack Flynt, a Representative from Georgia. He will introduce our next witness.

Mr. FLYNT. Mr. Chairman, Mr. Chairman Miller and members of the committee.

Thank you very much for according me this privilege and pleasure of presenting to you, as you stated in calling me to the witness stand, a very dear friend of mine, and an outstanding public official of our State. I am sure you are well aware that I have an extremely high regard for this committee and its members. I am always proud to be associated with it and to appear before it.

In past years, it has frequently been my pleasure to preside over the House sitting as a Committee of the Whole when legislation out of this committee has been considered by the House and certainly I am delighted to take this opportunity to express the admiration which is shared by the House of Representatives as well as myself for the manner in which the legislation of this committee is brought to the House of Representatives.

Today, Mr. Chairman, it is my very great pleasure to present to this committee an outstanding fellow Georgian, the Honorable John L. Caldwell, the comptroller general, who by virtue of being comptroller general is the insurance commissioner of the State of Georgia and who by virtue of being the insurance commissioner is the State safety fire commissioner. Mr. Caldwell has served in this capacity for 2 years and is serving his first term in this constitutional office. In our State, in addition to the Governor and Lieutenant Governor, there are six State officials whom we refer to as "constitutional officers." The comptroller general is one of these constitutional officers.

Prior to General Caldwell's election to the post which he now holds, he served in the general assembly of our State for 16 years, during which time he served as chairman of what many of us consider the most important committee in the house of representatives. Because of reapportionment he served eight full terms, but had to be elected nine times because the courts abolished one term of the legislature. He is, indeed, an able and an outstanding public official. He is knowledgeable and articulate in the subject matter which this committee is considering at this time.

Before I present him to you, I would also like to acknowledge the presence of Mr. John Robert Gore, the State fire marshal of our State,

who is the executive assistant to the comptroller general in his capacity as safety fire commissioner of Georgia.

It is indeed my pleasure to introduce and present to you my warm personal friend, a public official of whom we in Georgia are extremely proud, the Honorable John L. Caldwell, comptroller general and State safety fire commissioner of Georgia.

Mr. CABELL. Thank you very much.

Before you start, I wonder if the chairman of our full committee—the Committee on Science and Astronautics—would like to make a rebuttal about the remarks you made about this committee.

Chairman MILLER. I can testify that our colleague from Georgia has always been a strong supporter of this committee. Of that I am very proud. I am very proud to know him. I don't know that I could say much more than that. We are happy to have him here and we are happy to have you here, Mr. Caldwell, and you, Mr. Gore.

(A biographical sketch of Mr. Caldwell follows:)

JOHNNIE L. CALDWELL,

COMPTROLLER GENERAL OF GEORGIA

Johnnie L. Caldwell is the twenty-second Comptroller General of Georgia. As a State constitutional officer, Mr. Caldwell holds one of the most influential posts in his State's government, thereby affecting the lives of almost every Georgian.

The duties of the Comptroller General are numerous. He serves not only as Comptroller General but also as State Insurance Commissioner (regulating the insurance industry), as State Industrial Loan Commissioner (regulating the small loan industry), and as State Safety Fire Commissioner, providing for the protection, safety, and well-being of all Georgians.

Born August 10, 1922, in Taylor County, Georgia, Caldwell has spent most of his adult life serving the people. After being discharged from the Army after World War II, he opened and operated several successful businesses. Caldwell has also been a practicing lawyer for over 20 years, serving his hometown of Thomaston, Georgia, and the surrounding areas.

After being elected to the Georgia House of Representatives in 1954, he served for 16 consecutive years before his election to the Office of Comptroller General in 1970. When he declared for statewide office, his fellow lawyers of the Griffin Circuit Bar Association passed a resolution in recognition of his "outstanding contribution and service to the people of Georgia" and endorsing him for this office.

Besides his many legislative achievements, Caldwell has already begun important work with the National Association of Insurance Commissioners (NAIC). After less than two years in office as Insurance Commissioner, Caldwell has recently been elected to the full NAIC Executive Committee, and also serves as chairman of the Laws, Legislation, and Regulation Committee.

Caldwell is married to the former Martha Smisson of Fort Valley. They have three married children and six grandchildren.

**STATEMENT OF JOHNNIE L. CALDWELL, COMPTROLLER GENERAL
AND STATE SAFETY FIRE COMMISSIONER, STATE OF GEORGIA;
ACCOMPANIED BY JOHN R. (BOB) GORE, GEORGIA STATE FIRE
MARSHAL**

Mr. CALDWELL. Mr. Chairman Miller, Mr. Chairman Cabell, and gentlemen of the committee, I want to thank you for inviting me to come and participate in this hearing and to you, Congressman Flynt, let me say I appreciate those remarks, and I hope when I finish you won't say I am the most overly introduced witness you ever heard of.

This subject, the laws of fire safety, are very dear to me. I have a close look at it almost daily. I realize the great need and, as the Congressman stated, having served in the General Assembly for some

16 years, I thought I knew a little bit about fire safety from that vantage point, but after the duties that I now have, and being able to go to various fire schools and see some of the tragic things that we see in the disaster areas, I realize that there are many things that need to be done. I want to commend this committee on its efforts in looking into this thing.

There are a couple of things that I would particularly like to discuss with you. One of them is on testing and research. We find in Georgia, though there are laboratories throughout the Nation that do test material and they give us individual data as to smoke generation, and as to flame spread, there are many other factors that there is absolutely no testing on and we find that there is no testing on the placing of these various items together to determine what would happen. For example, in a room if you had a number of items that were tested and you knew what the flame spread was of either one of them alone, you don't know what the flame spread of the aggregate is in a building or some structure where people live or are incarcerated. We believe that it is absolutely necessary that some form of centralized testing be done that would give us a basis on which to build our foundation at the State level. We think training of the individual is one of the things that we let go by the board for so many years that is in dire need of help. I know from my experience over the years that the fellows who sat in front of the red truck and played checkers were undertrained. They do not require any training. In the early days, they held up the hose and hoped the fire went out and many times they saved the chimney. But today we need to have training that will save lives and property. This day and time the fireman has to go into the seat of the fire. He has learned you can't stand on the outside because if you do, you will lose the entire structure and economically this is a great loss to the people. So they are now going to the seat of the fire.

I appreciated the comments of the gentleman, Mr. Waller, and your comments with reference to the mask—that is a great need because they cannot stand on the outside and put out a fire. The buildings are too large and the structures are too tall. It just doesn't work.

We feel there is need for the training of these men in the area of not only doing his job in suppression of fire, but in the prevention. We are charged in Georgia with inspecting every building that has 20,000 square feet or more, three stories or more, or will house 75 people or more. That gives us 127,000 inspections. With a very small staff, we are unable to do the kind of job that needs to be done. But if we had a central training center such as the academy and if we were able to train the local people, there would come a time when the inspection would be done on a local level by firemen that are familiar with each and every building in his community. We in Georgia are beginning a fire school. The university system has appropriated half a million dollars for the first phase of a structure for training at Southern Tech. The Board of Regents recently in June of this year announced the installation of a 2-year course in fire science in all the colleges in Georgia that is available to the men in the fire service, but these men are not highly paid men. As was stated here in the testimony, they have to work outside jobs in order to make a liveli-

hood for their families, so they have no time left to go to school and, if they did, they don't have the funds to go with, but we believe if the Federal Government, through your help here, continues to look toward the improvement of the fire service and fire prevention that you will, in some fashion similar to the Omnibus Crime bill, do something for the fire service, for the firemen.

I believe a recent survey shows that there are more firemen killed in the line of duty than there are peace officers. I do not take anything away from peace officers. There are peace officers in my family, so I certainly believe that the training that they are getting, good as it is, is still too little. But the fireman himself who looks after us and our property when we sleep has been forgotten. He is still the man that plays checkers in front of the red truck and we do need help. I would like to see the fire academy. I would love to see some central testing. We use such things as a 14-story hotel building that was torn down a week before last in Atlanta. The fire service of Atlanta went into this building and conducted a school by setting fires in various areas of this hotel prior to the demolition. This helps because we don't know what day we may be in a larger hotel or a smaller one or when we may be in a hospital or when we may be in a nursing home where people can't help themselves.

We recently made a total survey of all of the jails in our State. We find that they are in pitiful shape. I know from meeting with other commissioners across the Nation that they, too, are short of help. I am sure that we can't come to you and say "Give us the money that we need," but if you could give us the technical assistance that we need to get the training and the testing done, I believe that the people on the local level after receiving this will come forward and do more to bring their fire service up to a standard that we can be proud of.

Mr. Chairman, I appreciate having had this opportunity. I will submit myself to any questions that you or the committee members might have. I want to again say I urge you—the list of bills that I have seen that your committee is studying, the one that would pay half of the tuition for these firemen to get education, the one that would assist in the buying of equipment, the one that would set up testing laboratories, the one that would set up the Fire Academy—all of these are bills that we at the local level are in dire need of. I would commend them to you. I have contacted each member of the Georgia delegation, I am happy to report that each one of them favors this legislation.

Mr. CABELL. Thank you very much.

Mr. Gore, do you have anything you would like to add?

Mr. GORE. No, sir; other than I could second what the Commissioner has said about an academy and training.

Mr. CABELL. Mr. Miller?

Chairman MILLER. I would like to thank the Commissioner for a very well-stated position that many of us recognize. It is always very good to hear this. If I would have any suggestion to you, Mr. Commissioner, it would be when you meet with people from other States in your own field that you encourage them to contact their legislators.

Mr. CALDWELL. I certainly will, sir.

Chairman MILLER. It is highly essential that this be done to get a proper approach for this in Congress.

I know that the man who will succeed me on this committee next year will be devoted to this, no matter who takes charge of the Congress because both the men, the Democrat and Republican are both quite concerned with the work of this committee in this field.

Thank you.

Mr. CABEL. I would like to pose a couple of questions even if I be accused of meddling. I don't think there is any question in the world but what there is a responsibility on the part of the Federal Government to assist in setting up a Fire Academy along the lines of the FBI Academy, and the Police Academy that they have in Louisville and other places. Under the financial restraints, believe it or not that the Federal Government has to work under, we don't have an endless supply of money, particularly in view of the action taken yesterday where there was a definite limit put on expenditures for the current year, so we have to look at priorities.

Would you agree with me that a million dollars spent on advances in technology and training and development of equipment that that million dollars would go further and do a better job than the million dollars handed out at \$1,000 a whack to a thousand different municipalities just to be spent at their discretion? Maybe it would go for TVs in the firehouse or air conditioning for some of the chiefs' cars, or something of that sort.

Mr. CALDWELL. May I respond?

Mr. CABELL. Yes, I would like you to.

Mr. CALDWELL. Mr. Chairman, having served in the capacities as heretofore stated to this committee, it would be my opinion that small amounts of money that would be divided up between municipalities and counties throughout this Nation, and let me address myself particularly throughout my own State of Georgia, would be money that could be used as all of us could use money, but that was not the vein in which I addressed my remarks. I believe if the Federal Government spent this million dollars in one place for a testing laboratory or a part of a testing laboratory or for the high-level training that the academy could give that we might draw from that training on the local level, that all of us would benefit much more than we would otherwise, because a thousand dollars to a community is not enough to set up an academy, it is not enough to train men with, and I think that the placing of this money in a central location that would furnish us with strength and foundation to build from, would be far more valuable than any distribution you make.

Mr. CABELL. I am glad to hear you say that. My question was not directed on the basis of any of your testimony or in rebuttal in any sense. We are faced at the moment with a great hue and cry concerning revenue sharing which more likely should be termed "deficit sharing."

There hasn't been a mayor anywhere in the country that hasn't been up here in the past few months. They are crying the blues worse than anything I know. If I were a mayor I would be one of them.

My questions were very definitely oriented to this question. I am delighted with your response there because there is a limitation and I question the place of the Federal Government in taking over the administrative responsibilities of the various municipalities, but I do not question the obligation of the Federal Government to act as a catalyst, if you please, for an academy for the upgrading, updating of

these more technical matters that the municipality on its own can't possibly do.

When I speak of the academy, and I think that this holds true in some of our police academies, that they would take care of the subsistence or maybe part of the salary even of those men who were attending those schools—a burden which many small municipalities can't possibly carry. If they have three or four men off in an academy, then their budget just wouldn't permit that overlap or duplication, so that is the sort of thing that I am talking about where, in my opinion, the Federal Government could do more in the final analysis for the municipality.

Along those lines, I know that I am expressing only my opinion. I don't know that the committee will agree with those remarks when they read the record, but I was most interested and appreciative of your attitude.

Mr. CALDWELL. Mr. Chairman, in my State last year there was exposed by virtue of arson \$12 million monthly to loss. I do not mean that there was \$12 million lost, but you have a \$5 million building and though you only lose \$400,000 worth of it, there was an exposure of that much. We need people that can reduce that to \$100,000 or, hopefully, to zero, people who have been tested and trained as to what to do.

There are so many materials today—I also am in charge of the construction of mobile homes and since we are the largest producer in the Nation, we have quite a task. We do regulate the type of material that is put on the wall, but in our homes or in many other type structures, there is no regulation as to what goes on that wall and this kind of testing, if it is brought to bear back home from a central laboratory that has done the work or an academy, we believe it would do much to curtail the starting of the fire.

Chairman MILLER. Mr. Caldwell, the Bureau of Standards has a very well-equipped laboratory for doing a lot of the things that you have been discussing here. Perhaps we haven't been using it to its fullest or have allowed it to expand. It may be possible as far as the research into materials and other things that they are in an excellent position to do it if we encourage them and give them the money to do it.

Mr. CALDWELL. We commend them for what they have done, but we say it needs to go much further.

Chairman MILLER. I hope to get that expressed in the report.

Mr. CABELL. Yes, I concur.

I was going to extend you the courtesy of equal time inasmuch as the Chair expressed some opinions that get into a political field, so certainly the chairman is entitled to equal time.

Chairman MILLER. I have no desire to. I look at my friend John Flynt and I know I better keep my expressions within certain bounds or he will get me in the hall when no one is looking.

Mr. CABELL. Thank you most sincerely. I think you have made a good contribution to this.

Thank you, Mr. Flynt, for bringing these fine people up here.

The next person we have on the docket is Mr. James W. Kerr. He is a member of the committee on fire research of the National Academy of Sciences and a director of the support systems research of the Defense Civil Preparedness Agency.

Mr. KERR, you come here with considerable credentials, we are happy to have you here.

(A biographical sketch of Mr. Kerr follows:)

JAMES W. KERR, MEMBER, NAS COMMITTEE ON FIRE RESEARCH, CHAIRMAN, RESEARCH COMMITTEE OF THE INTERNATIONAL ASSOCIATION OF FIRE CHIEFS

James W. Kerr, a retired Regular Army Officer, founded and still heads the Support Systems Research Division of the U.S. Defense Civil Preparedness Agency, in the Pentagon. A native of Maryland, he was raised abroad. He is a Phi Beta Kappa graduate of Davidson College, has an MS in Physics from NYU, and has done graduate study at Freiburg, Germany. At present he is a member of the NAS Committee on Fire Research, and Chairman of the Research Committee of the International Association of Fire Chiefs, as well as holding numerous other committee memberships related to emergency operations. Member, Dunn Loring Vol. FD, Fairfax County, Va., numerous publications. Member SAR, Scottish Rite 32°, Elder Presbyterian Church, Silver Beaver-Boy Scouts, and Fellow of the Explorers Club.

STATEMENT OF JAMES W. KERR, MEMBER, COMMITTEE ON FIRE RESEARCH, NATIONAL ACADEMY OF SCIENCES, DIRECTOR, SUPPORT SYSTEMS RESEARCH, DEFENSE CIVIL PREPAREDNESS AGENCY

Mr. KERR. Mr. Chairman and Mr. Chairman Miller:

I looked at the departure of Mr. McCormack with mixed emotions because I last saw him at a banquet at Kennewick, Wash., where he was a speaker and there was no way I could make my airplane without walking out in the middle of his speech and creating a disturbance.

Mr. CABELL. Knowing Mr. McCormack, I am sure he made allowances for it.

Mr. KERR. I have been a member of the Committee on Fire Research since 1970, and prior to that time was involved continuously with the committee in a liaison capacity beginning in 1962. My remarks do not necessarily reflect individual opinions of my colleagues on the committee, nor do I speak for the parent organizations—the Division of Engineering of the National Research Council, the National Academy of Sciences or the National Academy of Engineering.

The disclaimer in the first paragraph is required. As a member of the committee I do not represent the National Academy of Sciences. I believe I do accurately reflect the consensus of that committee, however, and have prepared this statement on that basis. The committee has in the past formulated documents suggesting a national program for fire research and I have avoided an attempt to duplicate that and I have hit the points that have been most recently discussed by our committee gatherings. My own statement is colored by the fact that I am a volunteer firefighter of some years standing and will probably go into that in a few moments.

The Committee on Fire Research was established in 1955 at the behest of the Federal Civil Defense Administration (now the Defense Civil Preparedness Agency, a part of DOD). It has been supported also by National Bureau of Standards, U.S. Forest Service, and National Science Foundation. The members (10 at the moment) contribute their talents and time to advise on and to stimulate research aimed at solutions to the fire problem. This generally involves review of research suggestions, collaboration on position papers, and conduct of symposia on fire problems. Publications include symposia

proceedings with associated position papers, the Directory of Fire Research in the United States (every 2 years), and Fire Research Abstracts and Reviews (three times each year). One notes that the number of research projects listed in the 1971 directory fell off 25 percent from the 1969 issue, despite improved collection of data for the later edition. Among all civilized nations, the United States loses most to fire and spends least on the solution to fire problems, on a per capita basis.

This illustrates a major aspect of the fire crisis: aside from this entirely voluntary compilation by the Committee on Fire Research, there is no central collation of fire studies in the United States. In the area of fire, there is no focal point for research, nor for training, nor for fire service guidance, nor any of the other good and useful Federal functions known in our society. Alone among the major service groups, the fire departments and organizations have no "home" at Federal level. Once there was such a "home"—the old Office of Civil and Defense Mobilization and earlier the Federal Civil Defense Administration served as a major locus for collecting fire information and supplementing service training. This went by the boards when the Office of Civil Defense moved into DOD in 1961.

This lack of a Federal focal point has several bad results, roughly as follows:

- Lack of collation of research output;
- Duplication of effort;
- Failure to get information into the hands of users;
- Inconsistent level of proficiency among fire departments;
- Lack of continuity of research programs;
- Chaos in standards and codes; and
- Failure to address the most urgent problems.

Let us now take up these basic evils in related sequence.

FIRE SERVICE PROFICIENCY

Although the senior leaders of most large cities are of fairly uniform proficiency, this is thanks to their initiative and industry rather than to any Federal effort to feed them new information, or to set standards for performance (hence for promotion). Mobility of chiefs and other officers from city to city is improving as time goes by, but there is still no reasonable way for the city fathers to establish in any simple fashion relative merit among strange candidates for fire chief, in some cases not even from among members of their own department. We do not provide a central training facility or exercise Federal quality control over such training as exists here and there, or prescribe standards for evaluating officers and men.

Improvement in mobility is to be noted, as I said above, within highest ranks and the largest cities. Within volunteer organizations, where a man becomes chief through the electoral process, only a few places have attempted to impose and enforce standards. Nearby Fairfax County, Va., has pioneered in this endeavor, but has had no Federal input and no other locality can be expected to honor the credentials of a volunteer moving in from Fairfax County, no matter how proficient he may have proven himself to be while here. The U.S. Forest Service, under the Clark-McNary Act of 1924, has shown us

that firefighting forces can be unified and properly used. Why not urban forces?

Let me pause to say I am not knocking volunteers, being one, nor am I attempting to draw any invidious comparison between volunteers and paid forces. There is a view within paid forces that in some areas is quite justified: that every volunteer is holding down a job that a paid man should have. There is some basis in fact for that. I would be the last to debate it. In other places, the tax base being what it is, without large Federal support, there wouldn't be a chance to have anything other than a volunteer organization. If you were hiring the volunteer at his hourly rate, you would never be able to afford him, which means we get for free some pretty high-priced help in a lot of places.

On the subject of standards, I should mention such aspects as building codes. There are many codes, some good, some are legalized by Government action on a spotty basis at various levels, none is uniformly enforced. Rarely is even a good code enforced retroactively, that is, existing structures are usually exempt from provisions of newly-enacted codes. The worst codes specify design rather than performance, and are usually obsolete by the time they are on the books. In short, we need a means to inject advancing technology into regulation, and to enforce the regulations. Federal incentives could play a major role here.

Once again the fire service has been an innovator in fitting the requirements for fire prevention and control to the circumstances of their environment, prescribed burns, for example, if certain types of forests are not burned to a low level, in due course there will be an awful big fire. This type of prescriptive thing is well recognized in the Forest Service.

Legislation, such as that governing hose threads and couplings, is surely desirable. I am concerned that a piecemeal approach may be less than optimum, but we must try for the best we can envision. Representative Steele's bills strike me as excellent, and would not preclude later, broader measures.

RESEARCH

Agencies that spend Federal funds for research generally do a good job. But they suffer from two handicaps. First, they run the risk of duplication of past or ongoing work sponsored by somebody else. This happens despite the excellent repositories of data provided by the Defense Documentation Center, the Department of Commerce National Technical Information Service, and the Science Information Exchange of the Smithsonian. None of these three worthy groups is able to garner all the needed information, so even a file search there does not guarantee full coverage.

Second, each agency must conduct research to meet its own needs, and does so. But it has been my experience that a modest investment in an ongoing effort can bring major returns. For example, my agency has responsibility for certain communication networks: the Army does a lot of communications research; by having my communication people watch what the Army does, I can buy into an Army-sponsored, million-dollar study for say \$25,000 and get my answer, reaping the benefit of the ground-work laid for the million-dollar effort.

Mr. Goldwater this morning mentioned infrared in connection with spotting forest fires. I sponsored the first work that was done in the sixties, we scrounged for Army infrared gear and flew it out of Missoula, Mont. We were able to take advantage of somebody else's program and for a modest investment reap a large benefit. The International Association of Fire Chiefs is conducting a study on the use of helicopters for the Fire Service. They are not buying them. They are seeing who had them, how they are being used, seeing what the basics are and attempting to structure this so it can be of maximum benefit. There should be a lot more of this "hitchhiking" as we call it, or buying into a lot more of other programs.

There should be a lot more of this, and a central, Federal repository would help. I am not suggesting a central manager, for that would be too cumbersome, but rather a repository for information, with mandatory reporting by Federal agencies and mandatory search before initiating studies.

Another major menace to good research is lack of continuity of funding. Legislation, whether enabling or appropriation, usually follows bad news, rather than good. That is, disasters dramatize the need for funds, and funds are provided. Successful completion of research, with identification of an optimal approach and perhaps the solution that would have presented a disaster, does not get the attention (or funds) it deserves. We go through the process of building up a research team, they produce results, we start to use their product, money gets tight, the team starts to dissolve, a disaster focusses attention on their work, some more money appears, and we have to rebuild the team. Once we have paid the tuition to develop a grade-A research outfit, we should be able to keep them producing for us.

SELECTION OF OBJECTIVES

Most agencies must keep their attention on applied research, not basic. When there is no obvious application for the expected result, how can one justify support for a study of cellulose structure, or the chemistry of combustion products? Yet, when after a few years our laboratory tells us how cellulose burns and which parts of its combustion products cause fire deaths or even cancer, we are glad somebody was smart enough to fund the very basic chemistry and physics and math that had to be done first. How can we be sure somebody is smart enough to cover all our needs? One measure, which has my full approval, was the initiation of the National Science Foundation's Research Applied to National Needs program. With their first funding they support a number of diverse studies. Now they are in the process of homing in on the most pressing needs and the areas where their first steps showed the greatest likelihood of payoff. This must continue, and we must (and are doing so) help RANN choose its ground wisely.

One of the areas mentioned this morning is the breathing apparatus. I recently had the privilege to represent the National Academy of Sciences in Germany at the largest fire exposition ever held. I made it a point to check on breathing apparatus. There were a dozen or so different European manufacturers of this type of equipment. It turns out that compressed air is getting the most attention. There are various means of getting the air from the bottle into the fireman's

lungs. It always boils down to how much compressed air can you get into the bottle and the given amount of weight that the fireman has to lug for any given amount of time. There is just a certain amount of tensile strength one can have in the materials. I am pleased to report how many people are concerned and are bearing down hard on that subject.

To put it very simply, we have almost no idea how to cope with the biggest problem of all: the single death—single family dwelling fire. Early detection, yes. Sprinklers, yes. Citizen training, yes. Retrofit improvement of all the buildings in the United States, yes. But enforcement of any such program boggles the mind, and behavior of even a well-trained, well-motivated adult citizen in his burning bedroom is less predictable than left turns at rush hour. If a single manager were given this job and the means to study it, we would reap peripheral benefits in all areas of fire prevention and control. Behavior is the key, not toxicology or pathology or all the other "goodologies"—though these must not be neglected—but rather individual and small group behavior in small fires in small buildings.

A FIRE ACADEMY

Last week while appearing as a witness at hearings of the National Commission of Fire Prevention and Control I was asked for my reaction to a fire academy. There being no working definition for such an academy, I had a hard time responding. Let me address the same question here, by listing some Federal-level activities I believe should be carried out at a focal point, by whatever name, and some more activities that could be.

Training

There must be a standardized program of training for each level of the fire service, including the citizen. We must prescribe the content and supervise its teaching. There are 100 or 150 community colleges giving fire-type training. The coordination there is again to a large extent voluntary. We could carry out the training at a Federal Fire Academy. If all this leads to a single, nationwide fire service as in England or Scotland, so be it.

Technical guidance

Graduates of the course postulated above, and others already now in the fire field, must be kept up to date on advances in technology. We must have a single place that gets all the word on all the work there is, collates it, and publishes simple papers for use by the fire service; these must include guidance on how to apply the information. We must have a place everyone can telephone or write with technical questions, where an answer will be given, and not an bureaucratic shrug. Such technical guidance should be broad enough to help in city planning, a well-tested method of fire prevention, and in operational planning, a field now showing rapid progress, and in integrating urban and forest fire capabilities.

Funding

Aside from the more obvious needs there must be a program of Federal support for upgrading equipment in the hands of users.

Advancing technology can make well-functioning hardware obsolete, and few localities can afford to replace well-functioning hardware. A central agency must certify such changeovers and support for implementing improvement.

I am thinking here, for example, of rather the horrendous experience of riding on the end of the tailgate of a fire engine on an icy road. We have got to get the men off the tailgate. We have got to have closed fire trucks, not open. A lot of countries have done this. Assisting someone to upgrade their equipment is one thing. A traumatic event such as discarding all fire trucks that have open cabs and open tailgates is a tremendous prospect. No municipality could cope with that. If we go that route, then a major type of assistance has to be confronted. I would endorse your comments as you expressed ably, earlier, the idea that a dribble of money is not effective. As a lifelong infantryman, I would say one must aim before one pulls the trigger. A proper funding approach would be one where one chooses his ground and aims the shots.

Research

There must be a central point where research objectives are formulated, and all the other tasks associated with research management are facilitated. Rank-ordering of priority objectives is subject to institutional bias, and properly so; a single agency might achieve impartiality. It is not feasible for a single agency to exercise veto rights over all Federal fire-related studies.

Codes

We must have a single source for codes, a source that provides guidance for application and enforcement. An academy could train inspectors or at least a cadre for local upgrading. Code changes to reflect new technology must be coordinated; this has always been a local option and we have the dead bodies to prove it.

In summary, I favor creation of a central, Federal-level focal point for fire affairs, subject to the foregoing caveats. Somebody must have both responsibility and authority.

Finally, let me reiterate the goal the Committee on Fire Research has gone on record as believing to be reasonable and achievable: a 50 percent reduction in the morbidity, mortality, and property loss attributed to fire, over the next 5 years. RANN is a good start, so is the Fire Commission, whose present recommendations I certainly endorse as far as they go, but their work isn't done yet—so is Representative Steele's package of legislation, but they are only the start.

Chairman MILLER. Thank you. We got started last year with the Fire Commission. That was a step in the right direction, but the field is wide and many of the things that you say here resolve themselves into the fact of the jealousies that exist between different political agencies in the Government and the way that works. The fact that there is no overall control means we can't get too far into it, we can't establish a national agency that can crack down on all of these things. We wouldn't get very far if we tried, but I think we are starting. I think that men like yourself and the other men who have come here have now had an opportunity of expressing yourselves, which is very helpful, and I am confident we can go a very long way in the future.

It is going to take a long time to catch up, but we have to start some place.

Thank you very much, sir; I appreciate your coming here.

I want to recognize Mr. Roussetot, my colleague from California. Have you a paper on file?

(A biographical sketch of Hon. John H. Roussetot follows:)

HON. JOHN H. ROUSSELOT, U.S. REPRESENTATIVE FROM CALIFORNIA

Born in Los Angeles, Calif., November 1, 1927; attended grammar, junior, and high schools of San Marino and South Pasadena, Calif.; graduated from Principia College, Elsau, Ill., 1949, with an A.B. degree; majored in political science and business administration; additional courses in specialized subjects with American Management Association, New York N.Y.; president and owner, John H. Roussetot & Associates, public relations consultants, 1954-58; Director Public Information, Federal Housing Administration, 1958-60; management consultant in the fields of marketing, management systems, and government relations, 1967-70; member, Public Relations Society of America, National Press Club of Washington, D.C., and honorary life member Yale Political Union; First Church of Christ, Scientist, San Marino, Calif.; married Marilyn W. Cooper; three children: Craig, Robin, and Wendy; elected to the 87th Congress by California's 25th Congressional District 1961-63; reelected to the 91st Congress by California's 24th Congressional District, by special election, June 30, 1970; reelected to the 92d Congress; member, Committee on Banking and Currency, and the Committee on Post Office and Civil Service.

STATEMENT OF HON. JOHN H. ROUSSELOT, U.S. REPRESENTATIVE FROM CALIFORNIA

Mr. ROUSSELOT. I don't have a paper on file, but I will submit an addendum to my remarks. Let me resume because I know time is very short.

First of all, I would like to compliment both the chairman and the full committee for what they have done. A recent report published in October entitled "For the Benefit of All Mankind" has been released by your committee. I think it is of tremendous benefit to the general public in making better known some of the fine developments that have come out of the space program. This is especially true in the field of fire protection. The October report will be a splendid aid for those of us who believe that this committee, NASA, and the entire space effort be properly communicated to a broader segment of the public. Especially in the field of fire protection and safety, several things were mentioned.

We are grateful to have this report as a tool to communicate to the general public the great value that has come out of the space program.

Chairman MILLER. Thank you very much. We appreciate that, but, after all, may I direct your attention to the fact that this committee is a Committee on Science and Astronautics. A lot of it has to do with the field of science. Unfortunately, it is not as dramatic as the field of astronautics; but we sometimes use astronautics to try to get some of the basic facts to the people.

Mr. ROUSSELOT. A good point. Let me resume some of my points.

I regret that I was late. It was important for me to be a pallbearer at a funeral, so I was unable to be here sooner.

I feel there is a real justification for the committee to pursue further in the field of fire research if for nothing else than for the vast interest of protecting our national forests that are managed by the Depart-

ment of Interior and the Department of Agriculture. This is a tremendous national resource and more and more people are beginning to appreciate it.

The tremendous problem we have had in California is with fighting fires once they start. How we can have more expertise in dealing with them has become a substantial challenge.

I would like to review several points.

1. The problem of fuel management to prevent wildfires in the first place should be given greater attention. This effort should be expanded and undertaken more intensively. The accumulation of fuel materials is a real problem in our U.S. forests and parks especially in the area of southern California. We need to know precisely the rates at which fuels accumulate in certain temperatures and climates and the rates at which they decay to determine the management alternatives related to forest fires. The U.S. Forest Service Research Center might now well benefit from technology that has come out of the space program through use of research now cataloged and put on computers.

2. Further consideration should be given to expanding techniques to determine conditions under which forest fires burn more intensely.

3. The detection techniques that have been mentioned in the October 1972 report of the Committee on Science and Astronautics entitled, "For the Benefit of All Mankind" with the subtitle, "The Practical Returns From Space Investment," must obviously be fully utilized. Of special interest is the Earth Resources Technology Satellite (ERTS) which monitors the globe's natural resources and maintains a constant survey of our timber resources. This system which was rocketed into orbit last July, is able to warn of fires, signs of fires, insect infestation, tree disease, make long-range weather forecasts and mount a continuous watch over vast wooded areas. Once fires are detected it is extremely important to have established a quick-react program to the point of the fire.

4. Information that is now accumulated in the vast number of reports from NASA which have come out of the general space effort can certainly be applied to improve our aerospace and aircraft equipment. Present systems can be updated and even redesigned. Infrared techniques can be utilized to give firefighting aircraft greater capability and flexibility.

5. We must, of course, continue to improve retardants used in fire-fighting efforts. Even more important, we must improve the capability of delivering present retardants in more massive amounts.

6. NASA has developed and advanced concepts in fire-prevention, fire-retardant materials and fire-fighting techniques that offer greater protection to individuals. We now need to know how to mass produce fire-resistant and flame-free equipment and apparel so that it can be readily and practically available for all hot shot crews sent on an emergency basis. NASA research has compiled complete data banks on the burning characteristics of most materials and they have developed protective clothing and accessories, but the fabrics and materials affording the type of protection necessary at present costs as much as 10 times more than the inefficient and dangerous types in general use. Encouraging the acceptance and promoting greater use of these more protective materials could bring these costs down considerably.

7. There must be more ongoing programs incorporating research and development technology of NASA, the private sector, and regional and local fire departments. The private sector, the Federal Government and local fire units must combine their information to make sure that it is better utilized.

Chairman MILLER. I may say just in passing, we have always looked to use surplus military equipment in these fields and this is fine. It is available and it is cheap, but I think we are reaching the place where in our air efforts, if it is worthwhile using them, it is worthwhile using those vehicles that are especially designed for the work you are going to do.

Mr. ROUSSELOT. I couldn't agree with you more and I think that is a good point.

Chairman MILLER. We have had knocked out of the budget the money for five airplanes to be used in Antarctica. Just now we have the National Science Foundation coming in and telling us that it has some money. We are going to reprogram and they are going to own the airplanes and not the Navy. They can now get planes that are designed for the very work that they want to do and not those things that are hand-me-downs from the Department of Defense.

I realize what the Department of Defense has done, but I hope maybe we can get planes that can be designed and equipped for doing the things that you want. You have to get the equipment on them.

Mr. ROUSSELOT. Correct. The point is a good one. Though we can make more efficient use of the aircraft coming out of use from the Air Force and Navy, we also want to develop our own equipment that is especially designed to attack these problems quickly, and we are also very grateful, too, for the helicopter aerospace science that has come and that we can use in firefighting techniques.

I also want to express my full appreciation to the committee chairman and the subcommittee chairman for pressing ahead and not resting on our laurels in the field of firefighting techniques, equipment and capability, and we are grateful to the committee for having these hearings.

Chairman MILLER. Most of the people who were here connected with some of the fire services have left, but I can tell you that they have kept the pressure on to get some of this work done.

Mr. ROUSSELOT. Yes; and my colleague from Connecticut, Mr. Steele, has been in the forefront of bringing legislation to our attention in other areas of firefighting. All of this pressure is good. The American people want to see the technology we developed in space applied here on earth. This is certainly one area where it can be done. Done, now.

Thank you.

Chairman MILLER. I made a statement yesterday, and I will repeat it for your benefit: The American people get horribly excited when you talk about the number of people that were killed in Vietnam. Do you realize we kill that many people every year in fires?

Mr. ROUSSELOT. Yes; also on the highways.

Chairman MILLER. Highways are another problem, but no one goes out and demonstrates against that.

Mr. ROUSSELOT. Good point, Mr. Chairman. Anyway, we are very grateful to this committee and subcommittee for pressing ahead in this area. I want to join with my colleague, Congressman Goldwater,

and Congressman Steele, who have previously testified, to make sure we continue to press on these issues.

Chairman MILLER. Mr. Goldwater was here earlier today.

Thank you, Mr. Rousselot. The committee will stand adjourned until the call of the Chair.

(Whereupon, at 12 noon, the subcommittee adjourned subject to the call of the Chair.)

Mr. ROUSSELOT. I couldn't agree with you more and I think that is a good point.

Chairman MILLER. We have had knocked out of the budget the money for five airplanes to be used in Australia. Just now we have the National Science Foundation coming in and telling us that it has some money. We are going to reorganize and they are going to own the airplanes and not the Navy. They can now get planes that are designed for the very work that they want to do and not those things that are hand-me-downs from the Department of Defense.

I realize what the Department of Defense has done, but I hope maybe we can get planes that can be designed and equipped for doing the things that you want. You have to test the equipment on them. Mr. ROUSSELOT. That is a good one. I thought we can make more efficient use of the aircraft coming out of us from the Air Force and Navy. We also want to develop our own equipment that is especially designed to attack these problems quickly, and we are very grateful too for the helicopter research center that has come and that we can use in firefighting techniques.

I also want to express my full appreciation to the committee chairman and the subcommittee chairman for pressing ahead and not resting on our laurels in the field of firefighting techniques, equipment and capability, and we are grateful to the committee for having these hearings.

Chairman MILLER. Most of the people who were here connected with some of the fire services have left, but I can tell you that they have kept the pressure on to get some of this work done.

Mr. ROUSSELOT. Yes, and my colleague from Connecticut, Mr. Steele, has been in the forefront of bringing legislation to our attention in other areas of firefighting. All of this pressure is good. The American people want to see the technology we developed in space applied here on earth. This is certainly one area where it can be done. Done, now. Thank you.

Chairman MILLER. I made a statement yesterday, and I will repeat it for your benefit. The American people get hardly excited when you talk about the number of people that were killed in Vietnam. Do you realize we kill that many people every year in this country?

Mr. ROUSSELOT. Yes, also on the highways.

Chairman MILLER. Always we murder people, but no one gets all that excited. I am sure that you will find that the committee and subcommittee for passing and in the area I want to join with my colleague, Congressman Steele, and

APPENDIX

STATEMENTS FOR THE RECORD

STATEMENT BY HON. JACK EDWARDS, U.S. REPRESENTATIVE FROM ALABAMA

FIRE PREVENTION AND SAFETY

Mr. Chairman, members of the Committee: I come before you to testify in favor of H.R. 13239, a bill which I am cosponsoring. This bill is entitled, "the National Fire Education and Training Act of 1972." This legislation would establish a National Academy of Fire Prevention and Control to provide a national focus and direction to fire research with emphasis on educating the public and the firefighter. Functioning like any public or private college or university, the Academy will train top leaders in fire prevention and control. Along with many other services, the Academy will assist States, counties and local communities in the development of training programs for firefighters.

Mr. Chairman, one American home catches fire every 56 seconds. More than 12,000 men, women and children have perished in fires for each of the last six years, with about 480,000 injuries per year. 1971 property losses have been placed at about \$3 billion. These figures and others like them provide stark evidence to the fact that ours is a combustible society, that many precious lives and much valuable property is literally going up in smoke every year.

I submit that it is high time that we began pulling together the fragments of our fire prevention and safety programs into a stream-lined, effective, unified program. A problem, much like fire itself, can be stamped out easily if detected and controlled at an early stage. But if allowed to grow, the solution and eradication of the problem becomes more and more difficult as time passes.

The massive problem of fire prevention and safety is growing in America. H.R. 13239 will allow us to begin work toward bringing it under control. I urge your favorable consideration of this legislation.

STATEMENT BY W. F. ELDRIDGE, BUREAU CHIEF, DEPARTMENT OF COMMUNITY AFFAIRS, FIREFIGHTERS STANDARDS COUNCIL, TALLAHASSEE, FLA.

DEPARTMENT OF COMMUNITY AFFAIRS,
FIRE FIGHTERS STANDARDS COUNCIL,
Tallahassee, Fla., October 3, 1972.

Mr. JOHN W. DAVIS,
Chairman, House of Representatives, Subcommittee on Science, Research, and Development, Washington, D.C.

DEAR SIR: The Fire Fighters Standards Council of the State of Florida is a state agency with specifically designated responsibilities for training and education of fire fighters, evaluation of the level of fire protection throughout the State, and recommendation of state laws relating to fire protection.

During the course of the two years we have been in existence we have found most of the fire departments of this state highly receptive to the programs we have established.

However, in common with most other cities of this nation, they are severely handicapped for funds with which to provide adequate total resources for an acceptable level of fire protection, particularly in smaller communities, and those having a low ad valorem tax base.

We are working through the Vocational-Adult training agencies of the county boards of education in making some training available. However, even this does not fully solve the problems for many.

Therefore, we urgently request your favorable consideration of the proposed legislation (HR 13239-13245) which has been referred to your sub-committee on science, research, and development.

If we can offer additional information, please do not hesitate to call on us.

Yours very truly,

W. F. ELDRIDGE,
Bureau Chief.

STATEMENT BY HON. BILL FRENZEL, U.S. REPRESENTATIVE FROM MINNESOTA

Mr. Chairman: I appreciate the opportunity to submit this statement to you as a co-sponsor of H.R.'s 12892, 3, 4, 7, 8. These are some of the major pieces of legislation which comprise the "Omnibus Comprehensive Fire Protection Package" first introduced by Congressman Robert Steele on February 2, 1972. This legislation has subsequently gained the support of 59 co-sponsors, including 4 from your own Committee, along with numerous professional and citizen groups.

In response to my request of October 2nd, I have received numerous community endorsements for this package. To avoid overburdening the Committee, I am offering only one of these as an example and am additionally enclosing an article from *The Minnesota Fire Chief*. This article is a preliminary report on fire protection for the State Advisory Council on Fire Protection Education and Research.

BROOKLYN PARK FIRE DEPARTMENT,
October 6, 1972.

Re Fire Safety Legislation—H.R. 12892, 93, 94, 95, 96, 97, 98, 99, 12900.

Hon. BILL FRENZEL,
House of Representatives,
Washington D.C.

DEAR MR. FRENZEL: I would like to go on record as supporting this legislation in its entirety. I feel that the fire service has long been ignored in its attempt to professionalize and modernize our techniques. The gains that we have made and the present state of the art have mainly been brought about through the personal dedication of the people in the fire service in spite of the continual dollar shortage. The future gains that these bills will support are long overdue.

I would like to see it specified that the members of the board for the National Fire Academy must be fire service oriented.

I would like to commend you for your intense interest in this vital issue. It's not just for the good of the fire service, but for every man, woman and child; every homeowner, renter, businessman; every type of institution.

Thank you.

Very truly yours,

LYLE C. ROBINSON,
Fire Chief.

FIRE PROTECTION, A PRELIMINARY REPORT

(By Antona Richardson, Research Associate, F.I.R.E. Center, U of M)

Four major fire problems, facing Minnesotans, were defined at a March 30 meeting of the State Advisory Council of Fire Protection Education and Research.

Sub-committees, named by Council Chairman LaVern Freeh, will make detailed studies and submit recommendations on Fire Protection in Non-Forested areas; Fire Protection in Forested Areas; Fire Protection for Institutions and Fire Protection Education and Training.

The accompanying article is part of a preliminary report on Fire Protection in Non-Forest Areas that will serve as a basis for study by one of the committees. Similar preliminary reports were prepared by the University of Minnesota F.I.R.E. Center from information and data it compiled as research arm for the Council.

Council member Marvin Schubring, immediate past president of the Associated Firefighters of Minnesota, was named to chair the committee considering nonforested areas. Barbara Gosen, Crow Wing County civil defense director, chairs the committee on forested areas. The committee studying institutional fire protection is headed by Dr. Paul Belau, Mayo physician and Rochester fire commissioner. Howard Bergstrom, presi-

dent of Metropolitan Junior College, is chairman of the education and training group.

The accessibility of fire protection to the residents of Minnesota varies from never to immediate, while its quality ranges from excellent to minimal, to worse than minimal, where residents rely on protection which in fact will not be forthcoming.

Fire Insurance Underwriters grade the fire defenses of a community for purposes of establishing insurance premium rates within it. In the grading, maximum attention is given to the water supply, the fire department, and the fire alarm system. The grades of different communities, therefore, provide a basis for comparison of the level of fire protection available within them.

Insurance ratings range from ten, equivalent to unprotected from fire, to one the ultimate in protection. During this preliminary study, grades for 586 Minnesota communities were studied and tabulated. Included were all communities outside the seven county metropolitan area, except St. Louis County. About 11% (89 municipalities) are rated 10; about 20% (166 communities) are rated 9; and about 45% (357 communities) are rated 8. That is, almost one-third carried ratings of 9 or below, and almost 80% are 8 or below.

That 89 communities carry the 10 rating, indicating no fire defenses, does not mean that those communities do not have fire departments—rather that the effectiveness of the fire department in combination with the community water supply and other factors is not sufficient to justify a reduction in insurance premium rates below those of properties in other communities which do not have a fire department. As might be anticipated, the ratings follow population size very closely, with the smaller communities having the poorer ratings.

The problem is compounded where the municipal fire department contracts with surrounding rural areas to provide protection for them, and 520 of the 586 fire departments do. It is obvious that where the grading of the municipal situation is 10, 9, or 8, the quality of outside protection is necessarily lower where municipal water supplies are no longer available and where distance of runs becomes important. About 95% of these departments contract to protect seven townships or less, or areas of less than 252 square miles. However, 31 departments have contracted to protect areas ranging from 252 square miles up to and including 612 square miles!

Some of these departments are contracting with townships so far distant that for practical purposes they cannot protect them, yet the residents believe they are protected. Removing the false sense of security, might increase the resident's personal efforts at fire prevention and control.

Fire Department which meet certain very minimal standards are eligible to receive from the state, reimbursement of 2% of a portion of the fire insurance premiums sold in those areas which the fire department protects under written contract. To claim reimbursement, the department files an annual certificate with the state, in which, among other items it lists the areas it has contracted to protect. These certificates have been reviewed, and queries sent to town clerks of areas not listed as protected. Returns indicated that some of the "unprotected" areas are in fact protected by one of the almost 70 fire departments which are so minimally manned and equipped as to be ineligible for the 2% reimbursement. Other areas are unprotected because protection would "be too expensive" or because the "nearest fire department is too far away." (Some giving this as the reason mentioned distances which were far less than the distances involved in contracts by other townships.)

Other town clerks reported that they had no contracts, but were sure that the nearest fire department (named) would report in the event of an emergency. Other clerks reported that they had contracts with certain departments, but a check of the records indicated that such departments did not list those towns as being under contract.

AREA PROTECTED BY 586 MINNESOTA FIRE DEPARTMENTS¹

| Area protected (square miles) | Number of fire departments | | | |
|-------------------------------|----------------------------|------------|----------------|--------------------|
| | Actual | Cumulative | Percent actual | Percent cumulative |
| Number of townships: | | | | |
| 1..... | (2) | 137 | 23.3 | 23.3 |
| 2..... | 37-72 | 135 | 272 | 46.3 |
| 3..... | 73-108 | 117 | 389 | 66.2 |
| 4..... | 109-144 | 89 | 478 | 81.3 |
| 5..... | 145-180 | 41 | 519 | 88.2 |
| 6..... | 181-216 | 22 | 541 | 91.9 |
| 7..... | 217-252 | 14 | 555 | 94.2 |
| 8..... | 253-288 | 6 | 561 | 95.2 |
| 9..... | 289-324 | 7 | 568 | 96.3 |
| 10..... | 325-360 | 7 | 575 | 97.4 |
| 11..... | 361-396 | 4 | 479 | 99.0 |
| 12..... | 397-432 | 1 | 580 | |
| 13..... | 433-468 | 1 | 581 | |
| 14..... | 469-504 | 1 | 582 | |
| 15..... | 505-540 | 1 | 583 | |
| 16..... | 541-576 | 2 | 585 | |
| 17..... | 577-612 | 1 | 586 | |

¹ All departments except St. Louis County and Metro Area (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties): 147 departments.

² 36 or less.

³ Includes 56 which protect own village or city only.

Fire departments obviously have no responsibility to respond to areas which are not under contract, and in fact, may face serious legal problems if they do so. Yet these responses received from township clerks clearly indicate some confusion on this point, as well as some feeling that departments should protect them, with or without contracts—and in fact, some departments do.

This belief that municipal fire departments have a "moral" responsibility to respond to a fire within any reasonable distance, regardless of contract obligations, is reflected in the payments made to departments where contracts exist. For years, fire departments have protected their rural neighbors for token or no reimbursement, in effect subsidizing rural residents through municipal taxes. A sampling of annual reports received at the University of Minnesota F.I.R.E. Center show that in most instances departments in smaller communities respond to more rural than municipal fires. Recently, however, with the increasingly stringent municipal financial situation, more and more local governments are attempting to re-negotiate rural contracts at a more realistic level. (In the metropolitan counties, contract arrangements range from payment of \$2.25/man/hour to \$200/run plus \$200/hour.

INSURANCE CLASS NUMBERS OF MUNICIPALITIES BY POPULATION GROUP

| Population | Municipal insurance class numbers | | | | | | | | | |
|---------------------------------|-----------------------------------|-----|------|------|-------|------|-------|-------|--|--|
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | |
| Over 100,000..... | 2 | 1 | | | | | | | | |
| 50,000-100,000..... | 1 | 1 | | | | | | | | |
| 20,000 to 50,000..... | | 2 | 4 | | 9 | 1 | 1 | | | |
| 10,000 to 20,000..... | | 1 | 2 | 17 | 1 | 3 | | | | |
| 5,000 to 10,000..... | | | 1 | 17 | 17 | 1 | 1 | 1 | | |
| 2,500 to 5,000..... | | | | 3 | 35 | 9 | 3 | 2 | | |
| 1,000 to 2,500..... | | | | 1 | 5 | 70 | 4 | 4 | | |
| 500 to 1,000..... | | | | | 8 | 127 | 10 | 6 | | |
| 250 to 500..... | | | | | 1 | 120 | 62 | 8 | | |
| Under 250..... | | | | | | 26 | 86 | 68 | | |
| Number per insurance class..... | 2 | 5 | 8 | 47 | 118 | 357 | 166 | 89 | | |
| Percent of total..... | .25 | .63 | 1.01 | 5.93 | 14.89 | 45.7 | 20.95 | 11.23 | | |

In many cases, township response has been negative, and in some cases vindictive, to attempts to raise contractual payments. Some townships have "shopped around" and contracted with fire departments at greater distance which offered more favorable rates (but because of distance, less favorable protection). Some sizable towns have voted against contracting for fire protection, and have none. Such was the case in Eckles Township immediately adjacent to Bemidji, in Beltrami County, in which a college student recently died in a fire.¹ Residents had voted

¹ Since this episode Eckles Township has signed a fire protection contract with Bemidji.

against contracting with the Bemidji Fire Department because of the expense involved. Yet apparently some felt that protection should have been provided, despite the lack of contract. There are 372 residents of Eckles Township where the residents were unwilling to contract for reasonably priced fire protection. On the other hand, 370 fire departments are operated and totally financed by municipalities of less than 500 population.

Part of the confusion arises because in Minnesota there is no clearcut delegation—or assumption—of responsibility for provision of fire protection. Municipalities “may” provide fire protection, they are not required to do so. If they do, fire departments “may” meet the minimal standards for reimbursement of the 2% insurance premiums. If they do not, they remain as operating departments. Municipalities “may” levy taxes and raise monies to support volunteer fire departments, or they may refuse, or feel unable, to do so. The volunteer departments then depend on private funding for purchase and housing of apparatus and equipment and payment, if any, to members for runs and for pension benefits.

While forward looking departments and communities insist on rigorous training for effective fire-fighting and for protection of the firefighters, others do not. A volunteer who refuses to train can be dropped from the department—if a recruit is available. If not, he must be kept on.

Efforts at up-grading the fire service which rest on increasing the demands on volunteer time and energy, or financial contributions, create the serious possibility that volunteers may simply stop volunteering, unless their dedication and motivation can somehow be reinforced. And fire protection for the vast majority of Minnesota residents rests on this very fragile base of the volunteer service.

There are 24 full-paid departments in the state, about 22 part-paid, and the approximately 680 remaining departments are full volunteer.

Townships in Minnesota are also authorized to establish fire departments, and over 30 of them have done so. However, all but urban towns are extremely limited in the amounts they may raise for their support—as they are for the amounts which they can pay under contract to a municipal department. State law limits township levies for fire protection to an arbitrary—and low—figure, established many years ago, when perhaps it was realistic. Even where assessed valuation would justify higher levies and town residents approve them, the general law (to which there are exceptions) limits the levy to 5 mills or a maximum of \$6000 annually.

County governments may make arrangements for fire protection in unorganized townships, but otherwise have no jurisdiction in the problem. The state has not taken to itself responsibility for fire protection in cases where none is available locally.

There is little money for fire protection in Minnesota except from tight municipal budgets. But fire protection is an expensive municipal function. Salary costs make up over 90% of budgets in paid departments. In Minnesota almost all “volunteers” are on-call men, paid either token amounts (\$1.00 per run, in some instances) or more substantial amounts (\$5 per hour). Without financial help, some municipalities simply cannot afford more adequate fire protection, even if they believe in the need for it. And there are limits to the amount of private funding which can be raised through volunteers’ efforts, particularly in some slowly-dying, out-state communities.

Recruitment is a major problem in these communities, where the younger men depart for greener pastures. The younger generation that remains is increasingly interested in other more rewarding and relaxing avocations. In some states, state appropriations are available as supplement to firefighters wages. In others, communities wealthy enough to afford it boost the payment to “on-call” firefighters to an hourly rate which makes it an attractive, moonlighting assignment.

But fire protection remains as an essential public service—with even greater importance in the small community that simply cannot afford the loss through fire of the few employers they have.

Its improvement is vital.

STATEMENT BY HON. ELLA T. GRASSO, U.S. REPRESENTATIVE FROM CONNECTICUT

Mr. Chairman, fire is an intriguing substance and has always fascinated man. It is also one of the most destructive forces on earth. In fact, in my Sixth District of Connecticut, in addition to salaried fireman, there are in many communities fire departments that are maintained on a volunteer basis. All do outstanding work. Our brave fire fighters—in Connecticut and across the nation—dedicate their lives to the protection of people and property from the consequences of a

ravaging blaze at high risk to themselves. In 1971, 210 fire fighters died in the line of duty, and over 38,000 were injured during 1970.

Therefore, it is deeply disturbing that our fire fighters should be members of what a recent newspaper editorial called 'the forgotten service.'

Truly, this is the case. Recent technological advances have been used to bring about improvements in business, medicine, and law enforcement. Yet, the application of new technology to fire protection and prevention has seriously lagged. An immediate and definite need exists for improving our methods of fire control and prevention. Toward achieving this end, I believe the Federal government must provide the impetus for assisting our local firemen.

This is why I have cosponsored each of the seven separate bills being considered before this Subcommittee.

This nation does not send a soldier into battle who is poorly trained, clad in armor and bears a spear. No acceptable argument exists for having our firemen risk their lives for the citizens of our communities because of outdated equipment. The bills before us are all geared toward providing the people of this country with the best trained and best equipped fire fighters possible.

For example, the proposed National Fire Education and Training Act of 1972 would establish a National Academy to provide a working knowledge and understanding of the current problems and difficulties facing fire fighters. This Academy would serve as a stimulus for research and would lay a new foundation for the development of new programs in fire protection, prevention, and control.

A second bill establishes a National Fire Data and Information Clearinghouse to collect in one place all available fire information and data. It would process data relating to incidents of fires in the United States with statistics on death and injury, property loss, causes, locations and numbers of fires. The Progress Report of the Presidents' National Commission on Fire Prevention and Control noted that "national fire reporting and analysis" ranked among the top priorities facing this country.

The other bills all provide some type of direct federal support to improve fire fighting operations. The Progress Report lists personal protective equipment as another national priority. Recent technological advances—especially in the space field—have presented us with modern equipment to replace the bulky coat and mask. One of these bills would pay up to 90% of the cost of fire fighting suits and self-contained breathing apparatus.

Another vital priority is improved equipment designed to meet recent architectural changes in buildings of various types. One bill provides up to 50% of the cost of purchasing new equipment.

Training for fire fighters is a vital area that requires immediate attention. Just as our law enforcement officers need to be trained in the latest criminal procedures, so, too, our firemen deserve special training in their field. Two bills would pay for up to 50% of the costs of firemen training programs and fire science programs at institutes of higher education.

The final bill I am cosponsoring extends through Fiscal Year 1975 fire research and safety programs at a cost of \$35 million.

Mr. Chairman, statistics concerning the loss of life and property by fire in this country are appalling and unpardonable. Every two seconds a fire breaks out. Every two minutes a home goes up in flames. Every 40 minutes a person dies in a fire. In 1971, nearly 12,000 people were killed, 330,000 were badly injured, and there was \$2.7 billion in property damage due to fire.

Our position in per capita death rate from fire is disgraceful. The rate in the United States is twice as high as the rate in Canada, four times as high as in the United Kingdom, and six and one-half times as high as in Japan.

Responsibility for these statistics does not rest with the nation's 2.2 million firemen. Each day they answer the call regardless of the circumstances. But outdated equipment and the inability to receive the best possible training often hamper their valiant efforts.

The type of assistance and new programs contained in the legislation I support here today is vital to the improvement of our fire fighting service. This is not a question of money. It is a question of lives. It is sometimes a question of property—all the worldly possessions of a friend or loved one, or the assets of a business representing the experience and earnings of a lifetime.

Mr. Chairman, this nation must grant direct assistance to its fire fighters. The stakes in this deadly game are too high. To insure that this nation possesses the type of fire protection necessary to the safety of its citizens, I urge the Subcommittee to support the entire package of fire protection legislation before it today.

STATEMENT BY HON. JAMES J. HOWARD, U.S. REPRESENTATIVE FROM NEW JERSEY

I appreciate having the opportunity to submit this written statement for consideration by your Subcommittee as you study this very important series of bills.

As you well know from the statistics presented on this legislation, the devastation of fire in this country, both in lives and property damage, is more than frightening—it is really preposterous.

The bills under consideration in this Subcommittee would go a long way in helping the firefighters of this nation in their jobs of protecting the safety of our communities, and they are supported by firefighting organizations across the country.

As one of the original co-sponsors of this excellent legislative package, introduced by my colleague from Connecticut, Congressman Steele, I would like to add a few brief comments in support of these bills.

With the continuing increase in technology in every field of scientific endeavor, it is amazing that this nation has not already done more about the problem of fire and the methods of combating it.

Yet today, the United States experiences a per capita death rate from fire that is twice that of Canada, four times that of the United Kingdom, and more than six times that of Japan.

When we look around us, it is easy to see why this terrible toll in life and property is so high. All across the country we see supposedly fireproof, highrise buildings going up, which really aren't fireproof at all. They contain wonderful new "miracle" materials, such as fabrics which are durable, wrinkleproof and stainproof; but which emit toxic fumes when burned. Because the buildings are air conditioned and supposedly fireproof, they are built with windows which do not open, making escape nearly impossible for those inside—particularly those on the top floor.

These same factors which make it so difficult for the victims to get out, make it more difficult for the firemen to get in to fight the source of the conflagration.

And what do our firemen have to aid them in these situations? They have old-fashioned equipment and clothing which gives them little more protection in the type of fire they now have to battle than a pair of bluejeans.

We are sending, who have bravely offered to put their lives on the line daily for the safety of their communities, into fires in turnout coats which melt at the high degrees of heat produced by these fires. We are sending them into highrise buildings with breathing apparatus which won't last long enough for them to get to the source of the fire, let alone to put it out.

We look back on the days of the "bucket brigades" and suddenly realize that, despite our shiny firetrucks and long ladders and powerful hoses, and despite the valiant efforts of 2.175 million firefighters, we are more at the mercy of fires and the resultant damage than ever before in our history.

This situation could be drastically changed, however, through the use of the legislation you have under consideration today. There is better technology available—if fire departments had the means with which to purchase it. There are turnout coats, made for NASA, which do not burn or melt at tremendously high temperatures. There are new designs for firetrucks, and a wealth of information on techniques for fighting these "new" fires—if there were a means by which such information could be adequately disseminated.

These bills would provide for a better information system on fire problems, and better research into the causes and cures of this tragic national problem. Additionally, the legislation would provide financial assistance to our fire departments in updating their equipment, their methods of training their firemen, their protective clothing and breathing apparatus; and, further, there would be financial incentives for institutions of higher education in development of fire science programs.

The situation in my own district, I think, is not atypical of many areas across the country. In New Jersey's shore area, which I have the privilege to represent, the majority of our firefighters are volunteers; men who are not being paid for risking their lives, but do so because of their strong sense of civic responsibility and their willingness to serve their fellow men in a nearly thankless job. Indeed, some 2 million of those 2.175 million firemen mentioned above are also volunteers.

As is the case in many other areas, our region heretofore has been one of resorts and farms; but now there is a tremendous increase in building industrial complexes as well as new, modern housing, because we are in one of the fastest growing parts of New Jersey.

As this change has come about, our volunteer firemen are being asked to take on heavier and heavier responsibilities with this increase of new industrial buildings, homes and population; but we have not given them the necessary assistance they need to carry out these responsibilities.

We must provide these brave men with the help they need to reduce the toll taken by fires in this nation, and these bills will do just that.

For these reasons, I would respectfully request the Subcommittee to consider these bills favorably to bring the Federal government into an active role of participation with these men who are performing what is now considered the most hazardous occupation in the country. They need our help.

STATEMENT BY HON. LIONEL VAN DEERLIN, U.S. REPRESENTATIVE
FROM CALIFORNIA

CONGRESS OF THE UNITED STATES,
HOUSE OF REPRESENTATIVES,
Washington, D.C., October 6, 1972.

HON. JOHN W. DAVIS,
Chairman, Subcommittee on Science, Research and Development, Committee on Science and Astronautics, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: Mr. Robert Ely, chairman of the International Association of Fire Chiefs Committee on Standardization of Fire Hose Screw Threads, one of my constituents, is one of the most knowledgeable men in the country on the subject of the standardization of fire hose screw threads. He has devoted many years to the study of this subject, and has been active in efforts to bring about the standardization of fire hose couplings.

Mr. Ely has sent to me a statement and supporting material dealing with the need for such standardization, which I hope you will accept for inclusion in the record of the hearings to be held on October 10th and 11th. I am enclosing herewith the material from Mr. Ely.

Sincerely,

LIONEL VAN DEERLIN,
Member of Congress.

INTERNATIONAL ASSOCIATION OF FIRE CHIEFS, INC.,
Washington, D.C., October 5, 1972.

HON. LIONEL VAN DEERLIN,
House of Representatives,
Washington, D.C.

MY DEAR MR. VAN DEERLIN: Thanks sincerely for your interest in helping the Fire Service to get all fire hose couplings and fittings converted to the recommended National Standard Fire Hose Screw Threads.

There are six primary reasons why *all* fire hose screw threads should be standardized with the least possible delay, and these reasons cannot be repeated too often. Standardization:

1. Permits the utilization of the maximum amount of fire fighting equipment and resources in the event of major disasters.
2. Eliminates the delay and confusion caused by attempted use of non-standard fire hose screw threads and the effort to substitute adapters.
3. Makes possible the stockpiling of reserves of fire hose, nozzles, fittings, etc., ready for use in any area of our country by professional and volunteer Fire Service or those in the Armed Forces, as necessity dictates.
4. Creates a vastly more efficient control and extinguishing force.
5. Reduces the cost of fire hose couplings and fittings.
6. By cutting such costs, while increasing efficiency, standardization of fire hose screw threads helps minimize disaster losses wherever mutual aid is rendered, thereby conserving the nation's natural resources while reducing the drain upon our American economy.

While admitting the economic and other advantages of standardizing fire hose screw threads, many municipal officials, and some Fire Chiefs as well, raise the question of the cost of standardization and believe that the federal government should pay their share of the cost.

It is also true that many do not fully appreciate the importance of undertaking such standardization without further delay. Postponing the issue will only necessitate paying higher prices for the operation later. Material and labor costs are

steadily mounting and, with a war presently in being, strategic materials are daily becoming more difficult to acquire.

How much longer and how many disasters must be faced before the fire hose screw threads are universally alike in all areas!

We must be reminded THERE'S A WAR ON! And, hanging heavy over our heads is the possibility of a cataclysmic atomic attack. Meanwhile, we are being plagued by disasters within our own municipalities from coast to coast. Some of these are orthodox or "expected" disasters—conflagrations. Others are conflagrations of a different sort, exploding out of public rioting with its arson, sabotage and pillage. And, whether we like it or not, we are in this up to our Plimsoll mark.

Today, practically every municipality, large and small, faces engagement in these "wars." Today, mutual aid is being called upon, as never before, to provide the defenses against these real and potential fire disasters. Mutual aid has taken on new vital importance. But its effectiveness is nullified where fire hose threads vary between different neighboring communities. As one Fire Chief expressed it: Fighting a conflagration with off-standard fire hose threads is like fighting a battle with bullets that don't fit the gun. Shall we have to wait for another Blitz to remind us of these facts!

Enclosed are copies of resolutions that have been adopted by the National Fire Protection Association, the American Water Works Association and the International Association of Fire Chiefs, calling for complete standardization of all our nation's fire hose screw threads. Standard dimensions have been adopted and many cities have complied but others need help.

Enclosure No. 2 is a copy of a letter from the president of the International Association of Fire Fighters, concurring wholeheartedly with our thinking that standardization of fire hose screw threads relates to the safety of the nation's populace and should be a responsibility of the Federal Government.

Enclosure No. 3 is a copy of our June 26, 1972 letter to President Richard M. Nixon, asking that funds be provided and legislation adopted to require standardization, and at the same time shifting the responsibility of getting the job done to government where it rightly belongs.

Enclosure No. 4 is a copy of the poem "Tragedy".

It is sincerely hoped that Congress will assist the Fire Service by providing funds and legislation to help get all fire hose screw threads standardized nationwide.

Sincerely yours,

ROBERT ELY, *Chairman.*

[From pp. 204 and 205 of the proceedings of the International Association of Fire Chiefs 92d annual conference]

At the NFPA 1965 Annual Meeting, the following resolution was adopted:

Whereas, the National Fire Protection Association has repeatedly advocated the standardization of fire hose threads since the inception of our organization in 1896, and

Whereas, the nation's large loss fires are increasing yearly with the record showing lack of uniform hose threads as a contributing factor, and

Whereas, the need for standardization can be accomplished at a minimum of labor and cost by the use of hose-threading machines and bushing inserts presently available, and

Whereas, we, as members of the National Fire Protection Association have a responsibility for recommending and maintaining proper standard procedures and equipment to provide adequate fire protection for our citizenry, and

Whereas, notwithstanding the persistent work of the National Fire Protection Association to further nation-wide standardization of fire hose threads, there still remain many areas laboring under the handicap of non-standard threads, therefore, be it

Resolved, That the National Fire Protection Association in convention assembled this 23rd day of May in Washington, D. C., intensify its efforts to accomplish complete standardization of fire hose screw threads throughout the country by asking for aid and assistance from all national Fire Chiefs, fire organizations, industrial organizations, manufacturers and governmental agencies.

Your Committee demonstrated re-threading tools to the American Water Works Association, California Section, and they unanimously adopted the following resolution:

Whereas, the AWWA has worked with the National Fire Association and helped to adopt standards for fire hose screw threads, and

Whereas, the International Association of Fire Chiefs is asking for all possible aid and assistance to help get all fire hose and hydrant screw threads standardized, and

Whereas, the use of standard threads on all fire hydrants will simplify the procurement of fire hydrants and utilization of fire fighting equipment, now, therefore, be it

Resolved, That the California Section of the American Water Works Association, in regular session this 30th day of October 1964, at San Diego, California, hereby records its approval of this program and affirms its intention to aid and assist the Fire Service to get all fire hydrant threads standardized and has instructed its national director to promote this program at the national level.

Governor Otto Kerner, of Illinois, has signed into law a bill which requires that no later than November 1, 1970, all threads on fire fighting equipment of every kind and type shall be in accordance with national standard hose thread as adopted by the National Fire Protection Association.

The Fire Chiefs and the legislators are to be commended on taking steps to get their state standardized.

The following resolution was adopted by the IAFC last year, which stated in part:

Therefore, be it

Resolved, That the International Association of Fire Chiefs in conference assembled this 22nd day of October 1964, in Houston, Texas, intensify its efforts to accomplish complete standardization of fire hose screw threads throughout the country by asking for aid and assistance from all Fire Chiefs, all national fire organizations, manufacturers and governmental agencies, and be it further

Resolved, That copies of this resolution be promulgated to all branches of the federal government, all national fire organizations and other interested parties.

It can be seen that there is a renewed effort being made by all our national fire and defense organizations to standardize all our fire hose threads. It is inevitable that all our fire hose threads will be standardized for one of the following reasons:

1. By the efforts of you progressive Fire Chiefs.
2. Through outside pressure because of the necessity of reducing the cost of our ever-increasing budgets.
3. Through the necessity to extinguish fire to conserve our natural resources or to survive a national disaster such as war.







A11600-766960 ✓