

FW 6.

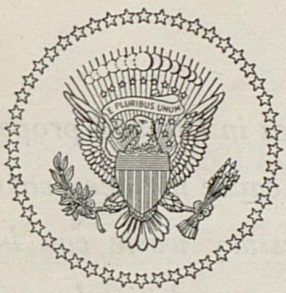
9:

R31/  
1947

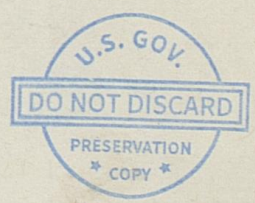
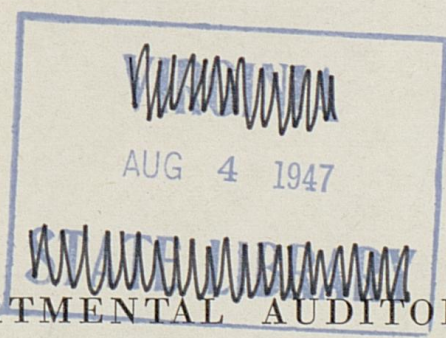


*The President's Conference on*

**FIRE  
PREVENTION**



*Report of the Committee on  
Research*

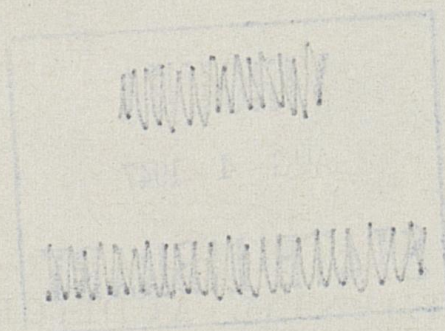


DEPARTMENTAL AUDITORIUM  
WASHINGTON, D. C.

May 6, 7, and 8, 1947

*"The serious losses in life and property resulting annually from fires cause me deep concern. I am sure that such unnecessary waste can be reduced. The substantial progress made in the science of fire prevention and fire protection in this country during the past forty years convinces me that the means are available for limiting this unnecessary destruction."*

HARRY S. TRUMAN



## TABLE OF CONTENTS

	Page
1. Bibliography-----	1
2. Human Behavior-----	1
3. Fires on Shipboard-----	5
4. Aviation-----	6
5. Industrial Research-----	8
6. Fire-Fighting (Extinguishing) Equipment-----	10
7. Forest, Brush, and Wild-Land Fires-----	12
8. Mine-Fire Prevention-----	12

(III)

TABLE OF CONTENTS

1	Introduction	1
2	General Introduction	1
3	Local Introduction	1
4	Local Introduction	1
5	Local Introduction	1
6	Local Introduction	1
7	Local Introduction	1
8	Local Introduction	1
9	Local Introduction	1
10	Local Introduction	1
11	Local Introduction	1
12	Local Introduction	1
13	Local Introduction	1

Responsive to the objectives of the conference and pursuant to the scope assigned it by the Coordinating Committee, the Conference's Committee on Research submits the following report.

## 1. BIBLIOGRAPHY

An essential tool for planning, and for the conduct of both fundamental and applied research, is means for reference to results of past experience, to experimental data, and to conclusions that have been competently arrived at in view of them.

The Committee concurs with the saying that:

"Facts hidden away in a filing cabinet" (or hidden in our minds) "are of little practical value; only when they are made available to people can they be translated into action." (Author unknown.)

Loss of life, waste of property, and interference with private and public affairs by fire have been and are within the experience of all mankind. Organized fire fighting was practiced when history was first written. Fire prevention, in its modern aspects, is more than an art; but scientific application of most of its branches is sadly hampered by lack of bibliography and contributions from all sources thereto.

**The Committee on Research recommends, therefore, that:**

*The Conference seek to have made available a central library facility, to which reports on all aspects of fire fighting, fire prevention, and fire loss can be made, and which shall make available the bibliography of fire, past and present; abstracted and indexed. Thereby source material for public information, news service, and the like will become available; enforcing authorities and managers of properties can reach decisions upon factual bases; and finally, research on fire problems will be so guided as to avoid duplications of planning and experiment.*

## 2. HUMAN BEHAVIOR

This Committee is confident that the Committee on Fire Prevention Education of the Conference will devise constructive plans for combating the crime of carelessness in which we Americans so freely indulge. It is also confident that the Conference's Committees on Laws and Law Enforcement and on Building Construction, Operation and Protection will not fail to consider the economic and other factors

that have been and continue to be responsible for so many little fires in which life is wasted and essentials to decent living standards are destroyed each day throughout the land. Therefore the Committee on Research discusses only the following few characteristics of human behavior.

#### A. Causative Factors of Panic Behavior

The Cocomanut Grove Night Club fire and the circus disaster in Hartford are but two examples (comparatively recent) of the appalling waste of life which results, at least in part, from panic behavior induced by fear of fire.

Panic behavior, as contrasted with rational behavior, is more likely to be the action of the individual and the group, when the individual or the group has insufficient information. In other words, rational behavior is a greater possibility when individuals placed in situations of stress are familiar with the possible results of the situation and the means to overcome the difficulties. Knowledge, then, through education, is a means to combat panic behavior. On this basis, and since panic is expressive of fear and lack of confidence, with an emotional coloring, serious consideration should be given to initiating a program of public education. Such a program, conducted through the medium of the press and radio, should be very beneficial. The public should be informed of modern advances in fireproof construction; of the present-day use of the various type of fire extinguishers; of the various means utilized to evacuate burning buildings; and of other matters having to do with the restoration of individual confidence in an emergency. The public, and especially the occupants of large buildings such as hotels, hospitals and office structures, should be taught to familiarize themselves with the means of escape from the building, or parts of it, prior to the development of an emergency; and they should be taught how to safeguard themselves within it if escape is blocked.

#### **The Committee on Research accordingly recommends that the Conference:**

*Take steps sponsoring additional programs that will utilize known facts, so as to indoctrinate the public in the essentials pertaining to the conduct of the individual and of the group in the stress of an emergency created by fire.*

#### B. Fireman Evaluation

Psychological selection methods are well-enough advanced and of sufficient accuracy to promise the development of selection techniques that will pick out the most desirable type of man to receive training as a fireman. The desirability of applying our knowledge of normal

psychological reactions in selecting and training personnel cannot be questioned. The military, during the recent war, very satisfactorily applied this principle in creating screening methods to eliminate individuals who were believed to be incapable of making a satisfactory service adjustment. This method was used also to select personnel for designation to specialized duties involving unusual danger. Experience with the procedure revealed the fact that it was very satisfactory in directing attention to individuals with borderline personality defects, as well as to those who were frankly abnormal. There appears to be no good reason why the utilization of this principle would not be successful in determining the proper type of individual to be assigned to fire departments.

Before a screen can be applied, of course, it is necessary to make a job analysis, to determine the type of personality best suited to meet the needs. Ordinarily, in a fire-fighting force, or in any group selected to function without confusion in an emergency, special consideration should be given to the stability of the individual, his ability to think clearly under adverse circumstances, his judgment, his initiative, and his ability to function quickly without reservations. In the application of such a screen, it would be necessary to eliminate the inferior types of personality—the psychopath, the introvert, the individual with marked manic-depressive tendencies, and others exhibiting evidence of instability.

**It is the recommendation of the Committee on Research that:**

*Standard means of selecting and training firemen and other persons whose work makes them responsible for fire safety should be determined. These means should be applied through the adoption of a screen based on known psychological and psychiatric determinations made by the military and other authorities and appropriate for use by properly qualified examiners. It is essential that trained examiners apply these screening tests, and where available, State agencies should be called upon for assistance in the selection of tests and in the evaluation of their results.*

### C. Pyromaniacs

Pyromania is another type of human behavior that is of significance in fire prevention.

Apart from persons guilty of arson or of incendiarism, fire setters may be classified under three general headings:

1. *Accidental fire setters*, including normal persons, mental defectives, psychopathic personalities, and psychotic persons.
2. *Occasional fire setters* would include normal persons, mental defectives, psychopathic personalities, and psychotic persons.
3. *Habitual fire setters* would include psychopathic personalities, mental defectives, and psychotic persons.

In these categories so-called normal persons are for the most part not informed regarding fire hazards and are without instruction and training in mechanical and technical means of fire prevention and fire fighting. Management in industry and other fields must concern itself with educational measures that will eliminate fire setting by normal persons. Brief mention is made earlier in this report of carelessness as a cause of fire, and in which, it must be assumed, normal persons, with others, generously indulge.

In the past, considerable publicity has been given to the fact that pyromaniacs have been responsible for starting a high percentage of fires. Studies have revealed that certain abnormal individuals have actually been responsible for a certain percentage; but it is not believed that the problem with relation to these individuals is insoluble. Statistics currently available point to the fact that about 48 percent of pathological fire setters are imbeciles or morons, and another 22 percent are "dull normals" or borderline, while 17 percent are of superior intelligence. These same studies have pointed to the fact that among 1,145 male fire setters, the highest rate occurred around the age of 17. Pyromania is outstandingly the crime of the adolescent or young adult. Occupational or mental adjustments have a considerable bearing on the problem; and it has been found that alcoholic complications are frequent in those fire setters past the twentieth year of age.

In approaching this over-all problem, it is important to keep in mind the fact that no normal person sets fires habitually; that psychotic, habitual fire setters usually do so for delusional reasons; and that they constitute a fairly large group.

Psychotics, psychopaths, and mental defectives deliberately set fires for one or more of the following motives:

- a. As a reaction against a social order which they believe is operating against their interests.
- b. To wreak vengeance against an employer.
- c. As a revenge for injured vanity.
- d. As a jealous rage reaction.
- e. As an opportunity to perform heroic endeavors as a fire fighter.
- f. As a perverted sexual pleasure, in the nature of a conversion of the sexual impulse into a special substitutive excitement.

**This Committee on Research recommends that the Conference take steps so that:**

*All individuals legally charged with originating fires of the pyromaniac type will be subjected to a detailed mental examination by competent persons, and when it is determined an individual is abnormal, he be hospitalized to protect the public. In this connection, the policies for determining the release of habitual fire setters, or those suspected of being so, from various public hospitals, reformatories,*



*State schools, and prisons throughout the United States, should be reviewed and standardized.*

### 3. FIRES ON SHIPBOARD

Fires on board ship too frequently have demonstrated their menace to life and property. Nevertheless this committee is agreed that existing law and regulations with respect to the marine fire hazard are adequate, according to the present state of the art of fire protection, but should be reviewed from time to time in the light of experience and research.

The basic understanding of these hazards, both on board ship and at shoreside, and the best methods of their control and extinguishment, are well known.

The dissemination of this knowledge, of experience with respect to fire prevention and extinguishment, is inadequate. An appropriate educational program should be devised and applied. All available results of experience from research and of statistical studies should be pooled to become a part, perhaps, of the Bibliography Organization heretofore proposed.

The joint investigation of marine fire detection and extinguishment started by the Army, Navy, Maritime Commission and the United States Coast Guard has promise of substantial contribution to safety to life at sea and to safety to ships and their cargoes.

#### **The Committee on Research recommends that:**

*There be established an organization in which Maritime and allied industries and Government agencies may cooperate on a permanent basis, providing*

- (1) A National Marine Fire Conference
- (2) A clearinghouse for all information relating to marine and shoreside fires.

*The Army, Navy, Maritime Commission and the United States Coast Guard should use every effort to complete their investigation of marine fire detection and extinguishment. Failing this, the Coast Guard should prepare instructions for public use based upon the principles thus far determined.*

#### **Navy Fire-Fighter Schools**

The success of the Navy fire-fighter training schools developed during World War II is well known and is commended by every fire-prevention and fire-fighting official. During peace times, the Navy will be, to a great extent, dependent upon outside fire-fighting aid in controlling large fires at its shore stations and on board ships in port. Experience in the use of Navy fire-fighting equipment and knowledge

of the fire-fighting technique as taught in the Navy schools is essential if civilian firemen and Navy personnel are to coordinate their efforts efficiently.

The Navy accomplishment to which we refer was the reward of research. Its duplication for application to fire-loss prevention generally should be unnecessary.

***Accordingly the Committee on Research recommends that the Conference endorse the use of these Navy facilities under appropriate conditions, whereby:***

*Training in Navy fire-fighting schools is available upon request to the personnel of organized public fire departments, whose increased skill will be in the interest of the public generally.*

*Also that this training be made available upon request to civilians from industrial and other enterprises wherein ability in fighting fires is a vital necessity.*

*And further, that these Navy fire-fighting schools be open to all personnel in every rank and rating in the American Merchant Marine, since merchant ships, auxiliaries to the Navy in wartime, must in peace have every possible facility for assuring safety to life and to property.*

***The Committee on Research further recommends that the Conference arrange, through the Committee on Fire-Fighting Services, or otherwise:***

*So that waterfront fire-fighting forces employ methods and equipment that will make unnecessary, so far as possible, use of such quantities of water that the stability of the vessel is endangered.*

#### 4. AVIATION

Because safety is a prime consideration in the operation of aircraft, fire prevention and extinguishment have been and continue to be the subject of research by the industry and by both civil and military units of the Government.

Three main phases of this research activity are apparent:

*Design, construction, and operation of aircraft.*

*Design, construction, and operation of airports and airport buildings.*

*Crash fire protection.*

In the design and construction of aircraft, much has been done to insure against the occurrence of fire, to control its spread, to provide the pilot with warning, and to enable prompt extinguishment. The new Civil Air Regulations are definitely a step in the right direction. A program is under way which, within a year, will make mandatory on any aircraft in commercial air transportation the use of, and full compliance with, the safeguards stipulated in the new regulations.

Test and research work is now being done by the Civil Aeronautics Administration. Much development work is constantly being carried on by the military services and by individual manufacturers of aircraft and aircraft equipment. This development should be encouraged.

Many air lines have undertaken extensive programs for the training of pilots, stewards, stewardesses, and other flight crew members in practical emergency procedures. These procedures have been developed largely as a result of experience, and there appears to be lack of uniformity. *It is recommended that an industry-wide committee be appointed to make a study of the procedures currently in use and to properly evaluate their effectiveness.*

The problem of fire protection and fire prevention at airports is one of particular importance, and has always been so recognized by fire protection engineers. The tremendous impetus that war gave to the industry created many problems, because of the larger planes and larger hangar buildings in which to repair, service, and maintain them. *Every progressive community must analyze its facilities, with the object of creating airport facilities that are modern. The committee recommends that this should be done at once.*

Both the National Board of Fire Underwriters and the National Fire Protection Association have prepared standards for hangar construction and protection. They also have committees at work on various phases of the problem, dealing with the construction and protection of hangars and other fixed airport installations, crash fire fighting and rescue work, provision for fire-detection and extinguishing systems, and other associated matters.

Fire experience at airports and in hangars points to the following factors as principally contributing to serious fires; dependence on distant public fire departments; deficiencies in water supplies, mobile equipment and installed interior protection at airport facilities; inferior construction, with failure to segregate hazards; substandard heating equipment; and improper storage of aircraft.

Hangars are the main problem from a fire-protection standpoint, as in most instances they are structures distinct from types of buildings in general use. They are, however, subject to most of the time-honored and accepted principles of fire protection and prevention.

Recent surveys have shown that crash protection at airports is woefully inadequate. While it is recognized that no field could possibly support a crash crew that would take care of every conceivable contingency, any airport, no matter how small, should make some provision for such protection. The military services during the war did considerable work in the development of practical crash equipment and the training of crash crews. This work should not be lost, but rather should continue so as to keep abreast of new developments.

The larger airports will be able to provide full-time crews, while at smaller fields it may be necessary to train all airport personnel in crash procedures. *It is recommended that the requisite studies should be made promptly.*

As to equipment, the present thinking is that the maximum practical size in apparatus has been reached and perhaps passed. Smaller, more maneuverable units that can get to the scene in a hurry, with a reasonable extinguishing capacity and that can be backed up by larger tank units that do not have the same speed, appear to be a practical solution.

In the event of a crash, rescue of personnel is of prime importance. Extinguishing the fire is secondary until this has been accomplished. Crash equipment and crash procedures should be planned with this in mind.

*Consideration should be given to providing adequate regulation of flying over areas of special hazard to life or property.*

## 5. INDUSTRIAL RESEARCH

Since World War I especially, findings from both fundamental and applied research, with respect to established and to new industrial activities, have resulted in great expansion of the national economy and in substantial advance in living standards. The great accomplishments from research in the period of preparedness for, and later in conducting World War II, are not yet fully evaluated.

Much of the technique of fire prevention and fire fighting, developed during this first half of the twentieth century, has been effectively applied to both old and new problems met in the two wartime emergencies and in the 25-year interim. The present industrial pace, however, demands that improved or new facilities and methods be developed, so that newly created resources of national wealth will not be self-destroyed for the lack of fire prevention that safeguards against inherent or byproduct hazards.

Investors, management, and employees have a common obligation to themselves and to the public to provide, by research, basic knowledge of all properties of newly developed raw materials, natural or synthetic; and to investigate toxic and physical hazards that may appear in their processing, application, and handling. Full discharge of this responsibility is part of the price to be paid for the privileges of the free-enterprise system. It is essential, too, that waste of natural resources that are irreplaceable when destroyed by fire has due consideration when assessing the need for industrial fire prevention. Applied, and perhaps fundamental research likewise, is not completed if the impact of its products upon safety to persons and property is not measured and evaluated.

There is warrant for much satisfaction because of the attention that has been and is being given to the problems concerning safety that are connected with storage, handling, and processing by various consumers of raw materials, and by producers of finished goods. Many groups contribute substantially, by joint organized effort in research and self-regulation within the scopes of their respective industries. Their contributions to the objectives of public authorities and of insurance groups, as well as to their own safety, are outstanding.

The following list enumerates (by no means completely) the subjects requiring research in order to further fire prevention in industry's use of materials and processes. It may help toward an appreciation of the extent and variety of safeguarding which research may contribute to safety to life and property and the stability of our economy.

Comparative classification of fire hazard characteristics and properties of materials for building construction.

Contributions to the rapidity of fire spreading and to the toxic hazard of burning coatings and other interior trim and finishes, and of decorative materials, including furnishings of places of public assembly.

Determination and classification of the fire hazards of wearing apparel and costume accessories.

Fire and explosion hazard performances of chemical heat-transfer media while in use or standing by.

Storage and handling of hazardous chemicals in bulk form, during and after handling, or while in use.

Relative dangers or hazards to fire fighters and the public when hazardous materials are burning.

Explosion prevention and emergency safeguards when flammable liquids, gases, and combustible solids are stored, handled, or processed.

Reclassification and color coding of flammable liquid containers for extraordinary environmental conditions, such as high altitude flying cargoes, high oven temperatures, catalytic influences on ignition temperatures.

Compilation of trade-name materials of commerce, with tabulations of their respective fire and safety-hazard properties; identification by package labeling of such characteristics is desirable.

Development of procedures for inspection, counterchecking of automatic instrumentation for safety controls, periodic service tests, and similar factors in maintenance of safety measures.

Development of damage control methods when safeguarding is bypassed by unusual happenings.

The occurrence of spontaneous ignition—causes and inhibitors.

The control and elimination of static electricity.

The control and elimination of corrosion and its impairment of materials and devices.

The significance of mechanical factors, vibration pressure, friction rupture, etc., with respect to the fire hazard.

**The Committee on Research recommends that:**

*The Conference invite the continued cooperation of all concerned in our industrial affairs, in the exchange of findings from research and from field experience, whether good or bad, so that fire prevention may add to its accomplishments in safety of persons and conservation of created resources.*

## 6. FIRE-FIGHTING (EXTINGUISHING) EQUIPMENT

An earlier section of this report discussed Human Behavior as a factor in fire prevention. Man's use of fire as his servant has developed his individual mastery of fear of fire, controlling the panic impulses, and prompting his taking appropriate steps for fire fighting. Various measures and tools, useful in such individual efforts, have been devised. Aside from those employed in the organized and professional fire-fighting services, many forms of fire-fighting equipment now serve to reduce fire's toll of life and property.

Early discovery and promptly taken steps are jointly essential in preventing little fires from becoming big ones.

Fire detection and initiation of alarms, closing of opening protectives, and similar ways for confining fire to the place of its origin are fundamentals of fire safeguarding. Their automatic operation is generally most effective, overcoming certain aspects of human behavior that cause detection and warning of fire to be too late. Thermally sensitive and heat- or electronically-actuated methods of signaling appearance of fire and its location are products of research now being effectively applied in fire-prevention service.

Early discovery of fire permits application of first aid, so-called, to putting it out, to exiting, and to rescue when necessary.

A multiplicity of types and sizes of hand fire extinguishers are marketed; and the sum total of fires that are extinguished in the incipient stage doubtless greatly exceeds that of fires that grow so as to require action from organized fire-fighting effort. The principles of quenching and of blanketing fire—or cooling and smothering—involve use of water or of a vapor or gas that dilutes the oxygen content of air. Applied research has been productive of equipment applying these principles in a variety of ingenious methods.

For about 75 years the automatic sprinkler system has performed outstandingly as a fire-extinguishing method well adapted to safeguarding life and property in industrial and commercial premises, on shipboard, theater stages, in strategic parts of hotels, and other places of public assembly and housing. Records of the National Fire

Protection Association provide ample assurance of the safeguarding of lives and property of which automatic sprinklers are capable.

There appear to be economic considerations that limit even wider application of the principle of the automatic sprinkler, so that a more general use of it is halted. The relatively large water supplies, the sizes of pipe and pipe fittings, including valves of many sorts for a variety of functions, are prominent among these. The Conference's Committee on Research is informed of studies and experiments now in progress looking to reducing these obstacles.

For the most effective results from the use of a quenching medium in fire extinguishment, absorbing the heat of combustion of a fire's fuel is a fundamental. Water, whether applied by a first-aid appliance, by automatic sprinklers, or from hose streams, is most effective when its latent heat of evaporation, in its conversion to steam, is utilized.

*The committee believes that the conference should go on record endorsing experiments, many now being in progress, that look to an even greater efficiency in the use of water as a fire-loss prevention aid.*

Generally speaking, fire will not persist where the proportion of oxygen in the surrounding air is one-half normal or less. When certain flammables become ignited, petroleum-base liquids being a familiar example, quenching is not practicable, and a blanketing method of extinguishing the fire must be employed. The character and the method of application of the blanketing means to be utilized are variable according to several conditions.

It seems to the committee that experience in tests and in the field, with case records, generously broadcast by the Conference's Committees on the Fire-Fighting Services and Organized Public Support and made a part of fire prevention's formal bibliography, will assure that advantage is taken of the many blanketing facilities now and presently available and promoted.

## 7. FOREST, BRUSH, AND WILD-LAND FIRES

Fire preventing, fire fighting, fire education and fire bibliography are each and all essential in conservation of an important asset of natural wealth. Concern with waste of our created wealth and resources from fire must not result in ignoring the hazard to life and property that exists in preventable forest, brush, and wild-land fires. The products of research in each of these phases of fire prevention are urgently needed, drawing from all fields of technological development and taking many forms. Outstanding categories to which such effort should be directed are:

- Equipment development.
- Weather forecasting.
- Fire fighting from the air.

Field organizations for fire fighting.  
Prediction of lightning fires.  
Fire-extinguishing agents, and  
Fire-prevention methods. (See note.)

NOTE.—The device of reducing the surface tension of water by adding a wetting agent, so-called, has recently appeared and promises to be an effective tool in certain situations in brush and wild-land fire extinguishing. Determination of suitable and effective agents, of methods of storage and of application and in due course, of education of personnel in the fire-fighting services, is indicated.

*The Committee on Research believes it appropriate to recommend to the Conference that it go on record asserting its support and endorsement of national, State, local government and civilian programs for forest fire, brush fire, and wild-land fire prevention and fire control.*

## 8. MINE-FIRE PREVENTION

Fire preventing, fire fighting, fire education, and fire bibliography are each and all essential in conservation of an important asset of natural wealth. Concern with waste of our created wealth and resources from fire must not result in ignoring the hazards to life and property that exist in preventable mine fires. The products of research in each of these phases are urgently needed, drawing from all fields of technological development and taking many forms.

*The Committee on Research believes it appropriate to recommend to the Conference that it go on record asserting its support and endorsement of national, State, local government, and civilian programs for mine-fire prevention.*



## COMMITTEE ON RESEARCH

### CHAIRMAN

WOODWARD H. BRENTON, *President, Brenton Bros., Des Moines, Iowa*

### SECRETARY

ALVAH SMALL, *President, Underwriters Laboratories, Chicago, Illinois*

### ASSISTANT SECRETARY

MATHEW M. BRAIDECH, *National Board of Fire Underwriters, New York, N. Y.*

### ASSISTANT SECRETARY

WALTER T. JOHNSON, *American Airlines, Inc., New York, N. Y.*

### ASSISTANT SECRETARY

REAR ADMIRAL DALLAS G. SUTTON (MC) USN (Rt.), *Washington, D. C.*

### ASSISTANT SECRETARY

T. M. TORREY, *Insurance Company of North America, New York, N. Y.*

John A. Arnold, *National Retailers Mutual Insurance Company, Chicago, Ill.*

E. H. Barlow, *Standard Oil Development Co., New York, N. Y.*

Leonard I. Barrett, *United States Forest Service, Washington, D. C.*

Hylton R. Brown, *Bureau of Mines, College Park, Md.*

William T. Butler, *United States Coast Guard, Washington, D. C.*

Harry Campbell, *Bureau of Explosives, New York, N. Y.*

David W. Cook, *General Aniline and Film Corp., New York, N. Y.*

Gordon Davis, *Mutual Loss Research Bureau, Chicago, Ill.*

John H. Derby, *American Fire Prevention Bureau, New York, N. Y.*

Alden H. Emery, *American Chemical Society, Washington, D. C.*

H. E. Hagood, *Chief Building Inspector, Birmingham, Ala.*

Commodore Norman B. Hall, *United States Coast Guard, Washington, D. C.*

Felix Hargrett, *Home Insurance Co., New York 8, N. Y.*

Rex Hieronymus, *Aldis & Co., Chicago, Ill.*

John T. Howell, *Rubber Reserve Corp., Washington, D. C.*

R. C. Iddings, *The Fyr-Fyter Co., Dayton, Ohio.*

S. H. Ingberg, *National Bureau of Standards, Washington, D. C.*

Ira W. Knight, *Grinnell Corp., Providence, R. I.*

Calvin G. Lauber, *National Board of Fire Underwriters, New York, N. Y.*

Commander Lloyd Layman, *United States Coast Guard Reserve, Parkersburg, W. Va.*

Dr. Nolan D. C. Lewis, *Columbia University, New York, N. Y.*

James E. Moss, *American Petroleum Institute, Washington, D. C.*

Robert S. Moulton, *National Fire Protection Association, Boston, Mass.*

Capt. Harry J. Parker, *The Board of Underwriters of New York, New York, N. Y.*

Capt. Roy L. Raney, *United States Coast Guard, Washington, D. C.*

Harry N. Rider, *Automatic Sprinkler Corp. of America, Youngstown, Ohio.*  
 S. H. Rolle, *Civil Aeronautics Administration, Washington, D. C.*  
 N. J. Thompson, *Factory Mutual Research Corp., Boston, Mass.*  
 Rear Admiral A. H. Van Keuren, U. S. N. (Ret.), *Washington 8, D. C.*  
 Hubert Walker, *American La France Foamite Corp., Elmira, N. Y.*  
 Warren N. Watson, *Manufacturing Chemists Association of the United States,*  
*Washington, D. C.*  
 John L. Wilds, *Protection Mutual Fire Insurance Co., Chicago, Ill.*  
 R. C. Woodward, *Civil Aeronautics Administration, Washington, D. C.*  
 Dr. Lloyd N. Yepsen, *Department of Institutions and Agencies, Trenton, N. J.*

## CONFERENCE ORGANIZATION

### GENERAL CHAIRMAN

MAJ. GEN. PHILIP B. FLEMING, *Administrator, Federal Works Agency*

### EXECUTIVE DIRECTOR

A. BRUCE BIELASKI, *Assistant General Manager, National Board of Fire Underwriters*

### COORDINATING COMMITTEE

#### CHAIRMAN

W. E. REYNOLDS, *Commissioner of Public Buildings*

O. J. Arnold, *President, Northwestern National Life Insurance Co.*  
 Frank Bane, *Executive Director, Council of State Governments.*  
 Paul Betters, *Executive Secretary, United States Conference of Mayors.*  
 Ernest B. Brown, *President, Ernest W. Brown, Inc.*  
 Frank A. Christensen, *President, National Board of Fire Underwriters.*  
 J. H. Craig, *Chairman, Fire Marshals Section, National Fire Protection Association.*  
 Dr. Ned H. Dearborn, *President, National Safety Council.*  
 Charles A. Delaney, *President, International Association of Fire Chiefs.*  
 Robert E. Dineen, *President, National Association of Insurance Commissioners.*  
 Jas. R. Edmunds, Jr., *President, American Institute of Architects.*  
 Wallace J. Falvey, *Chairman, Advisory Committee, National Conservation Bureau.*  
 Hovey T. Freeman, *President, Manufacturers Mutual Fire Insurance Co.*  
 A. V. Gruhn, *General Manager, American Mutual Alliance.*  
 W. K. Jackson, *President, Chamber of Commerce of the United States.*  
 Leroy A. Lincoln, *President, Metropolitan Life Insurance Co.*  
 W. E. Mallalieu, *General Manager, National Board of Fire Underwriters.*  
 Earl D. Mallery, *Executive Director, The American Municipal Association.*  
 James H. Mooney, *President, Building Officials Conference of America.*  
 James H. Park, *President, Pacific Coast Building Officials Conference.*  
 Curtis W. Pierce, *President, National Fire Protection Association.*  
 George J. Richardson, *Secretary and Treasurer, International Association of Fire Fighters.*  
 Mrs. Pearl Wanamaker, *President, National Education Association.*  
 Guy T. Warfield, Jr., *President, National Association of Insurance Agents.*  
 Frank M. Whiston, *President, National Association of Building Owners and Managers.*

## TECHNICAL ADVISORY GROUP

H. R. BASSFORD, *Metropolitan Life Insurance Co.*  
 ROBERT B. BEACH, *National Association of Building Owners and Managers.*  
 JAMES V. BENNETT, *Federal Interdepartment Safety Council.*  
 GEORGE W. BOOTH, *National Board of Fire Underwriters.*  
 A. L. BROWN, *Associated Factory Mutual Fire Insurance Cos.*  
 PERCY BUGBEE, *National Fire Protection Association.*  
 W. C. CLARK, *Federal Fire Council.*  
 THEODORE I. COE, *American Institute of Architects.*  
 JOHN P. COYNE, *International Association of Fire Fighters.*  
 DR. ROBERT W. EAVES, *National Education Association.*  
 HUBERT R. GALLAGHER, *Council of State Governments.*  
 DONOH W. HANKS, JR., *The American Municipal Association.*  
 JULIEN H. HARVEY, *National Conservation Bureau.*  
 A. L. KIRKPATRICK, *Chamber of Commerce of the United States.*  
 WEST SHELL, *National Association of Insurance Agents.*  
 FRED SHEPPERD, *International Association of Fire Chiefs.*  
 J. C. STENNETT, *American Mutual Alliance.*

## CONFERENCE STAFF

A. BRUCE BIELASKI, *Executive Director.*  
 LEWIS A. VINCENT, *Assistant Executive Director.*

William J. Chattin, <i>Technical Assistant.</i>	John B. West, <i>Technical Assistant.</i>
John L. Werheim, <i>Technical Assistant.</i>	Russell R. McGuire, <i>Publicity.</i>
Douglas H. Timmerman, <i>Conference Arrangements.</i>	Hester M. Bell, <i>Secretary.</i>

## STAFF CONSULTANTS

A. C. Hutson, F. C. McAuliffe, R. E. Truman, R. E. Vernor, R. E. Wilson.

MEMORANDUM FOR THE ADVISORY GROUP

DATE DUE

CONTINUED