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ABSTRACT

This curriculum guide, developed in cooperation with the State Advisory Committee on Fireman Training for Post-High School Preparatory Programs, summarizes the need for formal training programs in fire protection and offers guidelines for their establishment. It is also a practical handbook for the planning of fire protection curriculums and teaching facilities. Contents include steps in planning the training program, a 2-year fire science curriculum, knowledges and skills for fire fighters, course descriptions, recruitment standards, and a bibliography of books, pamphlets, and films. The curriculum offers a 2-year pre-employment course of study leading to an associate of science degree in fire protection and also provides options for employed persons who may wish to enroll in an occupational extension course. (MF)

FIRE SCIENCE CURRICULUM GUIDE

Revised

Developed in cooperation with the State Advisory Committee on Fireman Training for Post-High School Preparatory Programs

OREGON BOARD OF EDUCATION

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FOREWORD

This manual summarizes the need for formal training programs in fire protection and offers guidelines for their establishment. School administrators and vocational educators will find it an introduction to a challenging occupation in which there is a growing demand for more highly trained personnel. It is also a practical handbook for the planning of fire protection curriculums and teaching facilities. For members of the fire protection profession, it should provide a better understanding of how administrators in this field may work with public education authorities to establish a realistic base for determining the number of people who need to be trained for fire departments and related fire protection occupations and the function of education in implementing this training.

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INTRODUCTION

More effective use of fire protection manpower is one of the most crucial of public safety needs. Underlying this need are a number of seemingly unrelated factors which, however, upon closer scrutiny prove to contribute to the increasing complexity of fire protection. Two of these major contributing factors are population growth and industrial expansion. There are now being offered to the public more new and different consumer items in a week than there were in a year prior to World War II. Each such product must be examined and tested to determine its potential fire hazard properties. Not only the products of industry, but industry itself, as it modernizes and expands, continually challenges those responsible for fire safety to keep abreast of sophisticated processes and equipment. Coupled with this is the problem of heavily built-up areas. With increase in population density, a corollary increase in building density sets the stage for potential conflagration situations.

Here are certain apparent implications to education and training for fire protection occupations. Industrial expansion and population growth increase the need for numbers while new technological processes and products demand that the individual be better trained and informed in respect to potential hazards. The need for specialization in various aspects of the occupations is becoming pronounced. It is no longer just the "big city" department that has fire prevention bureaus, training divisions, central dispatching, and equipment maintenance facilities. This type of organization is becoming common to most departments. Also, within divisions, staff are being developed with specialized knowledge and skills to enable them to guard against or cope with emergencies involving radioactive materials, space age fuels, pesticides, new chemicals and plasticizers, and a multitude of additional potential hazards unknown to fire protection personnel a decade or two ago.

Many of the products of science and technology have been developed for, or converted to, the advantage of fire protection. Better extinguishing agents are available. New and improved hand and power tools are in use. Mechanized equipment now includes aerial platforms and other apparatus with improved design for specialized purpose. Even the smallest departments are radio equipped, many of them with pocket or helmet sets and dual frequencies. In the building industries, improved fixed fire protection systems and fire resistant materials are reducing potential hazards.

The products of technology may be a boon to fire protection but their use implies a need for additional training and education. Up-to-date schooling is required to use new tools and machinery. New maintenance techniques must be learned. Constant study and evaluation of combustion characteristics of materials must be made. New tactics must be developed in anticipation of changed fire behavior in modified structures. In brief, the day of the general practitioner in fire protection is drawing to a close just as in medicine or business or industry. The fire protection occupations of today, whether they are municipal, industrial, forestry, or other related, are looking for highly skilled individuals who are willing and able to master specialized fields.

If the full potential of the fire protection employee is to be realized, greater numbers should be trained and the quality of the training improved. Most of the persons presently employed, including over 1,900 paid firemen active in Oregon today, have learned their skills on the job, a system which seldom provides the depth and scope of training required for the occupation's changing role and means an expenditure of time costly to the employer. At present, there are no formal public education programs in the state which provide occupational training for fire protection personnel other than short courses designed for the volunteer firemen.

In respect to the personnel of paid fire departments, the community college is in a position to provide at least two educational needs. Because of previously discussed factors, the demand for occupational extension courses is becoming more pronounced. This is particularly true in the metropolitan areas of Portland and the Willamette Valley which account for approximately 80 percent of the state's paid firemen. A common practice in areas where opportunities are available is to require candidates for promotion to complete prescribed courses of study.

The second need concerns the providing of pre-employment education for entry positions. A five-year projection of occupational opportunities recently completed by the Oregon State Employment Service anticipates a need for 494 firemen to fill vacancies left by expansion and turnover of personnel. There is an additional need for personnel for fire protection in related industries such as insurance, forestry, and manufacturing, which will add a substantial but as yet undetermined number to the total figure.

It is intended that this guide to a fireman training curriculum will furnish information helpful to community colleges in organizing programs to fill these two educational needs and to guidance persons in counseling desirable students into the program.

Leonard Kunzman
Director
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PRELIMINARY STEPS IN PLANNING THE PROGRAM

Meeting the needs for trained firemen will require the concerted and concentrated effort of public education and the fire protection profession. The following pages discuss some of the steps to be taken preliminary to establishing a preparatory "pre-employment" curriculum or occupational extension courses.

DETERMINING THE NEED FOR TRAINING PROGRAM

The decision to offer a training program in a community should be based upon evidence of need. As a first step, school administrators considering the establishment of fire protection courses should determine both present and projected requirements of area occupations for trained personnel. A steering committee representing public education and the fire protection profession might conduct the necessary study.

Adequate information on which to base a decision can be obtained from a survey which may cover local and district fire departments, forest protection, and other industries or agencies employing fire protection personnel. Employment agencies may be able to provide additional information on the number of trained fire protection personnel needed by municipal agencies and private firms.

It should be determined whether the needs are for new personnel and/or whether those persons now employed as fire protection workers need education and training to improve their occupational competency.

ESTABLISHING AN ADVISORY COMMITTEE

After a decision to offer fire protection training programs has been made, a formal advisory committee should be established to assist and advise school officials in planning or organizing and conducting the program. The fire protection curriculum includes highly specialized content and the advice of persons knowledgeable in various fire protection fields is essential.

Generally, the local administrator of the educational instituion or a designated staff member, frequently the person responsible for the administration of the training program, may assume responsibility for organization of the advisory committee. He might also serve as ex-officio member of the committee.

Composition and Size

Each of the groups concerned with the training and employment of fire protection personnel--fire service organizations, forestry service, insurance companies and other industries, State Fire Marshal's Office--may be represented on the committee. It is also desirable to include an experienced training officer as well as lay persons interested in the community and its

schools. These persons will be familiar with local placement and employment opportunities for fire protection personnel.

A committee of seven to ten persons is usually large enough to include a cross section of the fire protection disciplines in most communities, yet small enough to permit each member to participate in the discussion of problems and the formulation of recommendations. Additional consultants may be brought in to advise on special needs as they arise.

Function

The advisory committee may make recommendations for and assist the school administrative personnel with the following:

1. Conducting surveys to determine present and projected needs for trained fire protection personnel.
2. Identifying skills and related technical material to be taught.
3. Establishing program standards.
4. Planning training grounds and laboratory facilities.
5. Developing criteria for selection of students.
6. Recruiting qualified staff.
7. Placement of graduates.
8. Evaluating effectiveness of program.
9. Securing financial support for program.
10. Stimulating organization of extension classes to upgrade skills and technical knowledge of employed fire protection personnel.
11. Developing a public information program and interpreting fire protection training to the community.

OTHER RESOURCES--FINANCIAL AND ADVISORY

The professional organizations of the fire service as well as the state agencies concerned with fire protection education may be consulted in planning fire protection programs and the securing of financial support.

Professional Organizations

The Oregon Fire Chief's Association is the major professional organization composed of fire officers of the fire departments throughout the state. It concerns itself with all aspects of municipal and rural fire protection.

Special subcommittees deal with education and training standards for the state fire service organizations and recommend adoption of texts, references, and training aids and facilities. Other committees of the association are excellent sources of technical and general fire protection education information. The Oregon Fireman Instructor's Association includes in its membership training officers and other persons from governmental agencies and private industry interested in firemen training. Their particular concern is with instructor training and standards. Since these persons are associated with the total education and training needs of the profession, they are in a position to offer valuable advice and counsel in organizing and conducting the fire protection training program.

State Fire Fighter's Council represents organized labor in the fire protection field in Oregon. By their constitution they are committed to furthering firemen training in the state's uniformed fire services. They can offer valuable assistance in program planning as well as supporting legislation deemed necessary to improve and finance educational efforts.

The Oregon Fire Equipment Dealer's Association derives its membership from companies dealing in fire equipment sales and service. They carry sustaining membership in other professional organizations and cooperate by offering technical information and training relevant to equipment supplies and procedures of the industry. This association is also a service of advice on program development.

The Oregon Fire Action Council incorporates in its membership representation from all federal, state, and local organizations and agencies, organized labor and industries which are concerned with fire protection in the state. Their function is to act in an advisory capacity in matters pertaining to state fire safety and to coordinate the efforts of the organizations it represents. It is in a key position to act as a sounding board for occupational opportunities in the state, and offer other statistical information.

Fire Protection Agencies

By state statute, the State Fire Marshal's Office is charged with the general responsibility of enforcing laws and lawful ordinances and making rules and regulations relating to the prevention of fires, storage and use of combustibles and explosives, overseeing human safety by directing the means and adequacies of exits from places of public assembly, etc. By act of the 1965 Legislature--see ORS 1269--the powers of the office were extended to include basic as well as advanced fire protection training.

The Fire Marshal and his staff of deputies have been recruited because of their depth of knowledge in fire protection. They are professional firemen who have made a career of fire prevention and suppression, and collectively represent a vast store of occupational information equalled in no other agency in the state. The office's annual "Statistical Report" contains a wealth of information pertinent to fire protection, insured losses, and fire department operation.

Oregon State Forestry

The Department of Forestry, under the authority of the Board of Forestry and the State Forester and in cooperation with forest landowners, is responsible for the establishment and maintenance of a coordinated forest land fire protection system and for the enforcement of rules and regulations pertaining to forest land fire protection.

The Department protection organization is staffed by a combination of professional foresters and Department trained personnel. In addition to training its own personnel, the Department aids in training programs for industry and other organizations concerned with forest land fire protection.

Oregon Insurance Rating Bureau

The Oregon Insurance Rating Bureau is a nonprofit rating organization licensed under the State Insurance Laws. It was organized to provide service relating to construction, public and private protection and related fire insurance subjects for its member and subscriber companies and their agents as well as property owners, architects, municipal officials and others interested in fire prevention, protection and insurance.

The grading of fire defense facilities in nearly all Oregon municipalities is a part of the service provided. Fire department, fire alarm and fire prevention equipment and operations are included in the fire defense evaluation. Representatives of the Bureau could offer valuable assistance in organizing and conducting firemen training in the community colleges or local schools.

The National Fire Protection Association

The objectives of the NFPA as stated in its articles of association are "To promote the science and improve the methods of fire protection and prevention. To obtain and circulate information on these subjects and to secure the cooperation of its members in establishing proper safeguards against loss of life and property by fire."

Membership is divided into two classes: organization and association. Organization members are national or international societies, institutes, or associations interested in the protection of life and property against loss by fire; regional associations, whose principle object is the reduction of fire waste and insurance boards and insurance associations having primary jurisdiction over inspection and rating matter.

Associate members include firms, corporations, libraries, colleges, and thousands of individuals throughout the world such as fire chiefs, firemen, fire protection engineers, insurance inspectors, insurance agents, architects, safety engineers, etc. Any concern or individual interested in any phase of fire protection or fire prevention may apply for associate membership.

The NFPA is international in character. As of 1962, the organization had more than 19,000 members in all parts of the world. It is a noncommercial and nonprofit-making organization and is a clearinghouse for all that is

authoritative on the subject of fire waste, fire prevention, and fire protection. It publishes a wide variety of educational materials in the form of books, pamphlets, fire records, leaflets, folders, posters, and bulletins. It currently lists some 500 different publications, and among its other activities, the association sponsors spring cleanup campaigns and fosters fire safety by means of a copyrighted symbol known as "Sparky" which has become a byword for fire prevention education, particularly to children throughout the United States.

The scope of the activities of the NFPA is so broad and its membership so diversified that they are in a position to offer authoritative consultation and advice in almost any area of fire technology. Of particular value to an educational institution organizing a firemen training program would be their recommendations for a firemen training library and reference material pertinent to education and training in fire protection.

The American Insurance Association (National Board of Fire Underwriters)

The National Board of Fire Underwriters was established in 1866 as an engineering, statistical and educational organization maintained by the Capitol Stock Fire Insurance Companies. In 1964, the National Board merged with two other organizations to form the American Insurance Association. This merger neither changed the staff nor the services offered under the old organization.

Theoretically, the service of the National Board or the American Insurance Association is rendered to its membership. Practically, the organization has become a public service institution for its efforts in the direction of fire prevention, essentially a public matter, have constituted an increasing part of its work. Its activities are conducted through committees under the general supervision of an executive commitee under the direction of the general manager and his permanent staff. The most important of these committees from the fire protection standpoint are: the Actuarial Bureau, which collects, collates, and tabulates statistics on fire losses and furnishes this information to supervising officials; state fire marshals, and others interested in lessening loss of life and property by fire; the Fire Prevention and Engineering Standards Committee which concerns itself with three major fields, municipal surveys, codes and standards, and research; the Building Construction Committee concerned with encouraging the adoption of suitable laws and regulations by states and municipalities to control construction and equipment of buildings in a manner to provide reasonable standards of safety to life and property; the Incendiarism and Arson Committee, who cooperate with state and local officials in investigating suspicious fires; and the Public Relations Department which handles the board's educational and informational advertising, general program of public service and publicity. It prepares booklets for the general public. It also circulates educational and informational films.

Of particular significance to a school conducting a fire protection program are the publications and fire training films available through the American Insurance Association.

PLANNING THE TRAINING PROGRAM

Initial planning of a fire protection training program encompasses curriculum and facilities design, staffing, program evaluation, and student recruitment and placement.

STAFFING

An instructor employed full-time with professional experience as a fire officer in a paid fire department or its equivalency in related agencies of industry who satisfies State Department of Education requirements for vocational instructors might head the specialized staff required to teach the fire technology and skills that comprise the fire protection curriculum. He will probably be assisted by part-time instructors from local fire departments, forestry, and related industry. Although the advisory committee for the program will be of great assistance in planning, it is advisable to employ the fire training staff early enough for participation in this activity.

THE CURRICULUM

The curriculum for the basic pre-employment program is designed for young men desiring to prepare for employment in fire departments and related occupations of government and industry. It offers a two-year pre-employment course of study leading to an associate of science degree in fire protection, and also provides options for employed persons who may wish to enroll in an occupational extension core. This extension core will be made available as needed to provide training for employed individuals. Such courses may be scheduled as either evening or extended day programs and will provide opportunities for upgrading and skill improvement. Options include single courses in specialized areas of study, a one-year core of selected subjects from a two-year pre-employment curriculum and advanced courses at the company officer level.

FIRE SCIENCE CURRICULUM

First Year

TERM I		CLASS	LAB	CREDITS
1.606	Introduction to Psychology	3	0	3
4.200	Mathematics I	2	2	3
1.101	Communications Skills I	3	0	3
5.100	Introduction to Fire Protection	3	0	3
5.110	Firefighting Skills I (Work Experience)	0	9	3
				15

TERM II				
4.202	Mathematics II	2	2	3
1.104	Communication Skills II	3	0	3
5.103	Elementary Science for Firefighters	3	2	4
5.104	Fire Service Hydraulics	3	2	4
5.102	Fire Apparatus & Equipment (Work Experience)	1	6	3
				17

TERM III				
1.---	General Education Elective	3	0	3
6.995	Fire Science I	3	2	4
5.105	Pump Operation & Practical Hydraulics	2	2	3
5.120	Rescue & Emergency Care	3	2	4
5.111	Firefighting Skills II (Work Experience)	0	9	3
				17

Second Year

TERM IV				
6.996	Fire Science II	3	2	4
5.119	Blueprint Reading for Firemen	3	0	3
5.101	Fundamentals of Fire Prevention	3	0	3
5.108	Hazardous Materials I	3	0	3
5.151	Natural Cover Fire Protection	3	2	4
5.---	(And/or Work Experience)	0	9	3
				16 to 20

TERM V				
1.---	General Education Elective	3	0	3
5.109	Hazardous Materials II	3	0	3
5.272	Fire Protection Systems	3	0	3
5.112	Fire Department Organization and Management	3	0	3
5.---	(And/or Work Experience)	0	9	3
5.---	Elective			3
				15 to 18

TERM VI		CLASS	LAB	CREDITS
6.126	Technical Report Writing	3	0	3
5.107	Fire Investigation	3	0	3
5.282	Fire Codes and Ordinances	3	0	3
5.113	Firefighting Tactics and Strategy	3	0	3
5.117	Water Distribution Systems	3	0	3
5.---	(And/or Work Experience)	0	9	3
				15 to 18

Total: 95 to 105 hours

The curriculum is structured in such a way that the first year will provide a body of knowledge with a broad base common to the various occupations of fire protection. Second year options and specialized areas may be provided if the enrollment is sufficient in number and the interest of the students warrants it.

CONTENT

Program content is divided into four broad areas: general education requisite to an associate degree, allied supporting courses, related fire protection theory, and fire protection skills. The following outline further identifies subject matter which may be included.

I. General Education Subjects

A. Communication Skills I & II

B. Introduction to Psychology

C. Two General Education Electives

II. Allied Supporting Courses

A. Mathematics I, II

B. Technical Report Writing

C. Fire-related Chemistry and Physics

III. Related Fire Protection Theory

A. Introduction to Fire Protection

B. Fire Apparatus and Equipment

C. Fire Department Organization and Management

D. Elementary Science for Firefighters

E. Blueprint Reading for Firemen

F. Firefighting Tactics and Strategy

G. Fire Investigation

H. Water Distribution Systems

I. Fire Service Hydraulics

J. Fire Protection Systems

K. Hazardous Materials I & II

L. Fundamentals of Fire Prevention

M. Fire Codes and Ordinances

N. Natural Cover Fire Protection

IV. Fire Protection Skills

A. Pump Operation and Practical Hydraulics

B. Firefighting Skills I & II

C. Rescue and Emergency Care

V. Four Electives in Fire Protection Theory or Skills.

Details of course descriptions and curriculum may be found in Appendix B.

OBJECTIVES

In developing the training program, instructors should have four basic objectives.

1. To provide the student with a knowledge of fire protection theory adequate for understanding the significance and implications of those procedures to be performed at the entry level of the fire protection occupation he elects to pursue.

2. To provide the student with sufficient skills to make a desirable employee for one or more fire protection occupations.

3. To provide the student with knowledge, understanding, and skills in communications, record keeping, and other duties and procedures peculiar to fire protection occupations.

4. To impress upon the student the importance of professional ethics and conduct and of good public relations.

LABORATORY EXPERIENCES

The practice of individual and team skills is an essential part of the training and should be carefully correlated with instruction. As the cost of equipment and facilities to provide this training would be in most instances prohibitive, the facilities of the Forestry Department and local fire departments should be utilized. All student practices in outside facilities should be supervised and evaluated by the school's fire protection training staff.

INTEGRATING RELATED SUBJECT MATTER

Specialized instruction is the responsibility of the fire protection training staff. Whenever possible the services of other faculty members should be utilized for subjects such as communication skills, psychology or human relations, records and report writing, business practices, etc.

Faculty conferences will suggest ways of relating academic subjects directly to the fire protection training program. A communication skills course, for example, would give the student the foundation required for written communications. Mathematics might stress hydraulic problems, handling of fire insurance forms, purchasing and business practices, and other problems related to the fire service.

The division of teaching responsibilities insures the student of adequate instruction in academic subjects and permits the fire training staff to concentrate on specialized instruction. The latter are often assisted by guest instructors representative of industry and the fire protection occupations.

PROGRAM EVALUATION

In the initial planning of the training program, provision should be made for its evaluation. Only through continuous and objective assessment of the program can a school maintain a curriculum which is coordinated with the demands of the fire protection occupations and the needs of individual students.

Advisory committee members should take an active part in evaluation. Their opinions often reflect those of employers and the community. Frequent visits to the schools will enable the committee to assess training standards, program content, and instructional equipment more objectively. Follow-up studies on graduates are an effective method of evaluation. Through personal interviews or mail surveys, the school can obtain the opinions of both employers and graduates as to the strengths and weaknesses of the training program. Follow-up studies offer an additional advantage: the opportunity to improve relationships with potential employers by furthering their understanding of the program.

THE TRAINING FACILITY

An effective fire training program demands access to highly specialized and expensive equipment, as well as physical facilities designed to fit the particular needs of the profession. The components of a firemen training facility, the purpose for which they are used, and their basic equipment are discussed below.

Small Tools and Minor Equipment

The use of small tools and minor equipment could probably be best taught in a laboratory situation on the campus, part in the classroom and part in a training area set aside and designed for this purpose. Hoses, nozzles, ladders, fire axes, forcible entry tools, fire extinguishers, masks, etc., would be required.

Apparatus

In order to provide the student with the necessary individual and team skills entailed in operating engine and truck companies, a cooperative arrangement would necessarily be made with one or more of the local fire departments. Through the cooperative effort and flexible scheduling, it should be possible to enroll the students in one of the local department's regular routine training programs which would provide the needed training in these various practical skills.

Outdoor Training Area

In the near proximity to the classrooms, yet far enough removed that objectionable noise and smoke will not disturb the campus routine, training grounds should be established. Facilities should be provided for small flammable liquid fires; pits and tanks for the use of extinguishers; a framework for rope, hose, and ladder practices and other outside drill activities. A fire hydrant would be required and attention should be given to the topography in reference to drainage.

Classroom

The classroom should be equipped with adequate storage space to accommodate the various small tools, minor equipment, and other training aids required. Typical classroom tables and chairs would be adequate. There should be a chalkboard, projection screen, and outlets for audio-visual equipment. Also, provisions might include a library area.

RECRUITMENT[1/]

Because formal training programs are relatively new and generally unavailable in firemen training, a strong public information program may be needed to stimulate student interest and community support.

1/ For minimum recommended standards for employment in fire departments in Oregon, see Appendix D.

In planning the information program, primary consideration should be given to reaching local high school students. High school counselors should be fully informed about the program, the qualifications required of students, employment opportunities, and scholarships. In addition, many of the techniques used in recruiting students for other vocational training programs will be effective.

After the training program is in operation, counselors and small groups of senior students might be invited to the training facility. The advisory committee can aid in planning the recruitment campaign and in publicizing the training program in the civic groups with which its members are associated. Members from the fire service might speak at high school career day assemblies and at students' career guidance conferences. Local fire departments and county associations should be urged to participate in the campaign by providing additional speakers and by giving added publicity and information about opportunities. During the Annual Fire Prevention Week, most schools are contacting their local fire organizations for programs aimed at explaining fire protection activities. This would be an excellent time to publicize the training program.

Selection of Students

The selection of students who possess a high degree of potential for successful careers in fire protection is a major responsibility of the training institution. Fire protection requires technical competence and human relation skills. Trainees must have the educational foundation, aptitudes, and personal qualities necessary to their development.

The general admission policies of the school and the testing procedures routinely used in the selection of students may well apply to fire protection applicants. In addition, a carefully selected aptitude or personality test is desirable and helpful in screening students. Testing should be conducted in conjunction with the guidance department of the school system.

Requirements for Admission

Selection of students should be based upon their fulfillment of the following requirements.

Academic - Students admitted to the program should have a high school diploma or equivalent education.

Personal Interview - The program director should interview each applicant as a means of evaluating motivation, suitability for work in the fire protection field, personal appearance, personality, and maturity.

Physical - Applicants should be at least 17 years of age and in good mental and physical health and meet minimum requirements for height and weight if their intent is to be in the paid fire department ranks.

Reliability - The applicant must have a high standard of personal conduct, integrity, and dependability. Previous school records of attendance and instructor's ratings will be helpful in evaluating the applicant.

For the preparatory program, in addition to the regular application for admission into the institution, a special application should be used which indicates that the student understands the specific requirements for fire department personnel as they relate to minimum physical and intellectual requirements, emotional and moral standards, evidence of good citizenship, and the understanding that a character investigation will be made. A statement concerning the requirement for satisfactory conduct during the program should be a part of this understanding.

OCCUPATIONAL EXTENSION TRAINING COURSES

Research in fire science and technology constantly produces new equipment and materials and different processes and techniques of protection. There is need for short term extension training courses to permit employed personnel to remain up-to-date in their field. These courses serve also as a means of upgrading skills.

The local fire department, county association, or other group should submit a request for an extension training course to the local director of vocational education.

The educational agency, with the assistance of the advisory committee and the organization or group requesting the training, should plan the course to meet the requirements of the trainees.

BIBLIOGRAPHY

AMERICAN INSURANCE ASSOCIATION
85 John Street, New York, New York 10038

Fire Department Salvage Operations. (62 pages)
Discusses salvage operations that can be performed by fire departments. It covers the care, maintenance and handling of salvage covers; essential salvage equipment for fire departments; and suggested specifications for salvage covers.

Fire Prevention Code. (264 pages)
A recommended code for legal adoption. Prescribes provisions for fire prevention and protection in connection with hazardous materials and processes. Complete and abbreviated editions.

Special Interest Bulletins. (Mostly single pages)
Subjects covered include fire department equipment and activities, building construction and protection, control of fire hazards and various fire prevention matters. Furnished without charge to fire department chief officers, including training officers and fire marshals, with enough additional copies to provide one set in each fire station.

BATTLE AND WESTON
201 E. 57th Street, New York, New York 10022

Arson. (287 pages)
A handbook on detection and investigation of suspicious fires.

GLENCOE PRESS - FIRE SCIENCE SERIES
8701 Wilshire Boulevard, Beverly Hills, California 90211

Fire Company Apparatus and Procedures. (352 pages, $7.50)
Profusely illustrated and describes adaptations of technological advancements to firefighting methods, equipment and apparatus. Outlines practices and procedures which permit the most efficient utilization of appliances and vehicles. It acquaints the fireman with the many factors which affect the production and application of effective firefighting streams of water. The book begins with a history of fire apparatus and ends with a glossary of terms.

Flammable Hazardous Materials. (308 pages, $6.95)
Primarily concerned with materials which burn and what to do about it. Describes the properties of new industrial materials - plastics, combustible metals, cryogenic materials, insecticides, radioactive substances and rocket propellants. Points out the major hazards of materials and discusses methods of extinguishing the fires they cause and how such materials may combine hazards such as flammability and corrosiveness.

Explosive and Toxic Hazardous Materials. (408 pages, $7.95)
Emphasizes two sides of the fire triangle; reactivity (why materials explode, why they are unstable, and how they react with water, air and each other) and toxicity. Points out the relationships among groups of materials with similar characteristics, shows how and where they are used in our modern world, and discusses the fires and explosions these substances have caused. Gives suggestions on how to tackle intelligently the fire situations which involve them. New and dangerous products of our modern civilization are covered in detail.

Introduction to Fire Science. (396 pages, $8.95)
A broad overview of fire science, this book covers not only those fire suppression activities which appeal because they are immediately dramatic but also a variety of other topics which are equally interesting and exciting when thoroughly studied. Among the fields of study included are historical and scientific background, kinds of fire protection services and department organizations, equipment, extinguishing agents, tactics and strategy, sprinkler and detection systems.

First Aid and Emergency Rescue. (424 pages, $5.95)
Includes the latest procedures for first aid and emergency rescue. Incorporates practical information from rescue-squad members, medical doctors, nurses, firemen, policemen, lifeguards, ambulance attendants, and armed forces personnel. Of special interest is the material on radiation problems and wilderness rescue. Drawings, photographs, and diagrams illustrate step-by-step procedures, graphic representation of types of injuries, equipment and its use, and other concepts. Tables for quick reference are included along with a glossary of medical terms.

INTERNATIONAL ASSOCIATION OF FIRE CHIEFS
232 Madison Avenue, New York, New York 10016

Fire Department Pumps, Pumping Equipment and Pumping. (96 pages)
Covers fire pumps and accessories, tests, operation, care and maintenance of pumps and their use in producing effective fire streams.

Manual of Radio Procedures. (16 pages)
Presents recommendations for radio procedure designed for the guidance of persons responsible for fire service communications and for fire department personnel using the radio.

INTERNATIONAL CITY MANAGERS ASSOCIATION
1313 E. 60th Street, Chicago, Illinois 60637

Municipal Fire Administration. (421 pages)
A very good informational text and the only one available giving a broad and comprehensive treatment of the subject from the standpoint of the fire chief as the administrator and manager of the department as contrasted with the fire chief as director of operations at fires. Should not be thought of as a training manual for fire fighting tactics.

Covers general organization of the department; relationship with other city departments and other cities; recruitment, training and promotion of men; department buildings and equipment; location of fire companies and stations; codes and ordinances; inspection and fire investigation work; department records and reports and related material. The text includes the standard grading schedule of the American Insurance Association in its latest revision and other up-to-date reference material. This is one of a series of texts prepared by the Institute for Training in Municipal Administration conducted by the International City Managers' Association as a correspondence course for in-service training. Circular available on request.

JOHN WILEY & SONS, INC.
605 3rd Avenue, New York, New York 10016

Fire Investigation. (255 pages, $8.95)
Provides information on chemistry of combustion, nature and behavior of fire, combustion properties of solid and nonsolid fuels and the role of pyrolysis. Also discusses fire patterns of both structural and outdoor fires, sources of ignition and special types of fires. Covers practical investigation of structural fires, arson and its legal aspect carbon monoxide asphyxiation, explosions associated with fires and building construction materials. Appendices contain profuse illustrations of fire experimentation and fire origins.

NATIONAL FIRE PROTECTION ASSOCIATION
60 Batterymarch Street, Boston, Massachusetts 02110

Life Safety Code. (232 pages, $2)
The purpose of this Code is to specify measures which will provide that degree of public safety from fire which can be reasonably required. It deals with life safety from fire and like emergencies and covers construction, protection and occupancy features to minimize danger to life from fire, smoke, fumes or panic before buildings are vacated. It specifies the number, size, and arrangement of exit facilities sufficient to permit prompt escape of occupants from buildings or structures in case of fire or other conditions dangerous to life.

Fire Protection Handbook - Thirteenth Edition. (2,128 pages, $22.50)
Authoritative information and reference data on all aspects of fire protection, the basic facts, plus explanations of the "whys" and "hows"! Designed to supplement - not duplicate - the National Fire Codes. Covers the subject in logical sequence so that it's ideal for students of the subject, while being so organized that the reference data needed by the experienced fire protection specialist is easy to find and use. Over 500 line drawings and photos, 284 tables designed to give quick, factual knowledge, plus 80 graphs.

National Fire Codes. (ten volumes, $5 each or $40 for the set)
An indispensable reference set for property owners, architects, engineers, public officials, fire equipment manufacturers, transportation specialists - anyone concerned with reduction of fire losses. Revised annually and published in late fall. Ten volumes,

206 NFPA les, standards, recommended practices and manuals in 8,000 pages.

N.F.P.A. Inspection Manual. (352 pages, $6.75)
Tells what to look for in inspecting all types of properties. Describes common and special hazards, building features, exits, inspection of extinguishing equipment, detection systems, report writing and other essentials. Standard plan symbolizes in full color and many other illustrations. Third edition.

Fire Attack 1. (280 pages, $5.50)
Covers fire ground decisions tactics and operations. Designed to help fire department officers obtain a high level of performance on the fire ground with the men and equipment available to them, starting with the initial attack and continuing until the fire is under control. Standard tactics and eighty-nine training evolutions illustrated and described in detail.

Fire Attack 2. (234 pages, $6.50)
Covers pre-fire organization, assignments, and fire ground problems. Designed to help fire officers make good decisions in organizing and operating the fire fighting forces of the department. Shows manpower assignments for stations and for apparatus in various size communities. Covers off-shift and mutual aid response, estimating fire flow for a variety of fires, initial attack operations, guidelines for calling help, using available fire flow, special fire fighting problems of the city and of the rural area. Discusses apparatus and hose.

Fireman's Law Book. (256 pages, $5.50)
A practical legal guide for fire fighters, drivers of fire apparatus, fire inspectors, fire alarm supervisors, arson investigators, and all fire officers. A study of court decisions on fire fighter's rights, duties, liabilities. Fourth edition.

Fighting Rural Fires. (129 pages, $3.50)
Gives vital data for small departments protecting rural areas on organization, training, alarm, response, tactics, and prevention.

Operating Fire Department Pumpers. (180 pages, $4)
Thorough summary of pump operating techniques and requirements. Covers drafting, hydrant operations and relays. Includes charts, diagrams and hydraulic tables. An excellent source for training evolutions. Third edition.

Operating Fire Department Aerial Ladders. (178 pages, $4)
Describes operating techniques, placement on fire ground, maintenance, purchasing, ladder pipe operation, hydraulic formulas, tactical use of aerial ladders, safety precautions and duties of ladder companies. First edition.

Firemen's Training Centers. (88 pages, $2.50)
Suggestion for such centers and reports on fourteen existing facilities.

Fire Officer's Guide to Extinguishing Systems. (112 pages, $5)
Gives facts about automatic sprinkler, water spray, foam-water, foam, dry chemical, carbon dioxide, halogenated, and explosion suppression systems. Tells the need for extinguishing systems, how and why they operate, what to look for when making inspections, how to preplan fireground tactics for protected properties and some fundamentals for maintaining systems in operating conditions.

Handling Hose and Ladders. (revised edition, 144 pages, $5)
Designed to present practical fireground solutions to operational problems. Contains basic hose and ladder evolutions as well as those developed from practical fireground experience. Illustrated with almost 400 photographs showing step-by-step operating procedures. Over 85 original drawings and diagrams of hose appliances, ladder parts, and basic ladder handling techniques.

Fire Terminology. (67 pages, $4)
A handy reference for students and new members of the fire service. About 1,455 fire department words and expressions defined. Many of the usages of terms will not be found in comprehensive general dictionaries but are most definitive of firefighting or fire prevention activities. Fourth edition.

Attacking and Extinguishing Interior Fires. (134 pages, $3.75)
Use of water spray on interior fires by indirect attack method.

Fire Fighting Tactics. (112 pages, $3.75)
Principles of size-up and pre-fire planning.

Fireman's Responsibility in Public Relations. (24 pages, $1)
Focuses on the importance of the individual firefighter to create good public relations for the department.

Fireman's Responsibility in Arson Detection. (28 pages, $1)
Familiarizes the firefighter with arson detection responsibilities in elementary terms. Particularly useful in training programs.

Preventing Rural Fires. (48 pages, $1)
A program for an effective fire prevention program, pre-fire planning.

Your Fire Department - How It Fights Fires. (40 pages, $1)
To familiarize the average citizen and newly appointed municipal officials with the basic types of fire department apparatus and to describe, in a general way, how fires are fought.

Effective Streams for Fighting Fires. (88 pages, $2)
Tells how to get effective fire streams through the use of simple school arithmetic and calculations.

Fire Protection Guide on Hazardous Materials. (912 pages, $5.50)
Designed to give quick, authoritative, accurate data on fire, explosion, and health characteristics of thousands of chemicals and materials. Vital information for inspectors, fire officers, regulatory officials, safety director laboratory personnel. A compilation of N.F.P.A. Standards Number 49, 491M, 325A, 325M, and 704M.

Installation of Portable Fire Extinguishers. (36 pages, $1)
Helpful recommendations on selection, purchasing, installing, approving, listing and designing portable fire extinguishing equipment.

Fire Department Ladders, Ground and Aerial. (22 pages, $.50)
Care, maintenance and testing of ground ladders and testing of aerial ladders.

Care of Fire Hose. (48 pages, $1)
Maintenance of all types of fire hose, testing, hose loads on trucks.

Training Standard on Initial Fire Attack. (10 pages, $.50)
Method of measuring how effective the fire department's evolutions are and how effective the fire attack can be.

Fire Protection for Chemicals. (154 pages, $3)
Outlines methods for prevention, detection, control, and extinguishment of fires likely to occur wherever chemicals are used. 1961 reprint includes data on rocket guided missile propellants.

Radiation Control. (256 pages, $4.75)
How fire departments should handle fires and other emergencies in locations having radiation problems.

Fire Apparatus Maintenance. (136 pages, $5)
For those who inspect, service, or maintain fire apparatus. Covers lubrication, electrical systems, engine maintenance, cooling systems, chassis components, fire pumps, fire ladders, winterizing.

Breathing Apparatus for the Fire Service. (Available 1971, $3)
Use, care and maintenance of breathing equipment. Prepared particularly for training programs for firefighters and to assure safe use on the fireground.

OREGON FIRE CHIEFS' ASSOCIATION
1919 Ash Street, Forest Grove, Oregon 97116

Firemen's Basic Training Course. (312 pages)
The official training manual for the State of Oregon published in cooperation with the Joint Oregon Fire Services and the Oregon Board of Education. Covers fire department organization and discipline, small tools, hose and ladder evolutions, fire behavior, forest fire fighting fundamentals. breathing equipment, portable fire extinguishers, salvage, rope and knots, ventilation and fire streams.

UNIVERSITY OF MARYLAND
Fire Service Extension, College Park, Maryland

Firemen's Training Course, Section I, Basic.
A training manual containing the fundamental skills and knowledges needed by beginners in the field of fire suppress.on.

UNIVERSITY OF MICHIGAN PRESS
Office of Vocational Education, Department of Public Instruction, Ann Arbor, Michigan

The Fireman and Electrical Equipment.
A guide to self-protection for firemen prepared by the Office of Vocational Education with the assistance of specialists in the field and reviewed by the Safety Committee of the Edison Electric Institute: Bulletin No. 280, illustrated.

FIRE FILMS

The following films are available through the Audio-Visual Services of Oregon State University, 133 Gill Coliseum, Corvallis, Oregon 97331. Telephone: (503) 754-2911.

AIDEZ A PREVENIR L'INCENDIE - 12 min. - color - s-a - rental $6.50
Causes of home fires. Views of the results. How to prevent home fires. Partially animated. French narration.

ANALYSIS OF A BULK-PLANT FIRE - 25 min. - a - rental $5
Analysis of why a bulk-plant fire became a disaster. Tank explosion scenses. Conditions prior to the fire. Suggestions for effective firefighting procedures and personal safety to firefighters. Uses newsreel footage.

BASIC THEORY OF HEAT, PART I - 15 min. - color - s - rental $6.50
A discussion of the basic theory of heat. Animated brief history of research on heat.

BEFORE THEY HAPPEN! - 15 min. - a - rental $4.50
The work of fire prevention inspectors.

CARE AND MAINTENANCE OF FIRE HOSE - 21 min. - a - rental $4.50
Introduction to types of fire hose, care and maintenance of hose, and correct use of male and female couplings.

COMBUSTION - 15 min. - color - s-c-a - rental $6.50
The physical and chemical properties of combustion. Explanation of the combustion triangle.

COMPANY FIRE PREVENTION - 16 min. - a - rental $4.50
Acquaints firemen with procedures to follow in a house-to house fire prevention and inspection campaign.

COMPANY RESPONSE - 12 min. - a - rental $4.50
Necessity of planning by fire company officers before the fire strikes.

COORDINATED FIRE ATTACK - 25 min. - color - a - rental $8
Fires in various types of structures explain the principles of fire behavior and firefighting. Water requirements, water distribution steam benefits, and timing the shutdowns.

DAMAGE CONTROL: THE CHEMISTRY OF FIRE - 45 min. - a - rental $7
Chemistry and characteristics of fire. Extinction of fire by smothering, cooling with foam, using carbon dioxide gas, water, or water fog.

DONALD'S FIRE SURVIVAL PLAN - 11 min. - color - i-j-s-a - rental $4.50
How the loss of homes and lives by fire may be prevented by developing a fire survival plan.

EMERGENCY RESPONSE - 15 min. - color - a - rental $6.50
Hazards met by apparatus driver, effectiveness of siren under different conditions, and need for controlled speed and defensive driving. Actual traffic scenes.

FIGHTING LP-GAS FIRES - 10 min. - color - a - rental $4.50
How preplanning helped one fire department handle an LP-gas tank-truck fire.

FIGHTING TANK FIRES - 25 min. - color - a - rental $8
An actual fire company attack on large oil-tank fires. How to position crew, choose nozzle size, lay lines, and move in.

FIRE AND OXIDATION - 11 min. - j-s - rental $3.75
Explains oxidation and combustion. Oxidation as a fundamental process of chemistry.

FIRE POWER - 16 min. - a - rental $4.50
Hazards created by gasoline vapors; methods for their control.

FIRE SCIENCE - 15 min. - color - i-j - rental $6.50
The chemistry of combustion; the molecular action of a burning fuel as it releases energy in the form of heat and light. Experiments explain the concept of fuel, oxidation, kindling temperature, and spontaneous combustion. Uses of fire in historical times and today.

FIREMAN - 11 min. - p-i - rental $3.75
A city fire department goes through its daily work about the fire house and its training. It also answers an alarm and subdues a fire.

FIRST FIVE MINUTES - 25 min. - a - rental $5
Importance of industrial fire brigades in plant fire prevention and protection. Location of plant fire hazards, precautions to prevent fires, and what to do if a fire strikes.

FOG AGAINST FIRE - 20 min. - color - a - rental $6.50
Use of fog in fighting fires, particularly in areas without water supply. Scenes from test fires.

GETTING THE MOST OUT OF WATER - 20 min. - color - a - rental $6.50
Use of water fog in firefighting. Theory of heat absorption power of water. Various types of nozzles.

HEAT AND ITS BEHAVIOR - 11 min. - i-j - rental $3.75
Basic concepts concerning the nature of heat, describing its sources, measurements and utilization. What heat is and how it behaves. Conduction, convection and radiation.

HEAT - ITS NATURE AND TRANSFER - 11 min. j-s - rental $3.75
Principles of conduction, convection and radiation. Nature of heat sources.

HOSE EVOLUTIONS (silent) - 15 min. - color - a - rental $6.50
Methods in hose handling and evolutions in firefighting.

HOSE EVOLUTIONS AND HOSE LINE EQUIPMENT - 28 min. - a - rental $5
Methods in hose handling and evolutions. A training film for firefighters.

I'M NO FOOL WITH FIRE - 8 min. - color - p-i-j - rental $4.50
I'm no fool series. Jiminy Cricket demonstrates the safe and unsafe methods of handling fire. Animated.

IN CASE OF FIRE - 18 min. - p-i-j-s-a - rental $4.50
Need for fire drills in schools. How to behave in case of fire in school, home, and theater. Basic safety precautions in all cases of fire.

KNOW YOUR FIRE EXTINGUISHERS - 15 min. - color - a - rental $6.50
Types of hand extinguishers to use with different kinds of fires.

LADDER EVOLUTIONS (silent) - 15 min. - color - a - rental $6.50
Simple and efficient methods of handling ladders in firefighting.

LET'S TRY FOG - 18 min. - color - a - rental $6.50
Actual tests of fires in oil pit, tank truck, oil storage tank, rubber tires, and small arms ammunition. Application of wetting agent from special nozzle, master devices, and fixed foam chambers. The use of water.

LITTLE DROPS OF WATER - 15 min. - color - a - rental $6.50
Principles and results obtainable through the use of water fog in putting out fires.

NATURE OF HEAT - 11 min. - color - j-s - rental $3.75
The effectiveness of various types of materials in the transfer of heat.

NOZZLEMAN - 21 min. - color - a - rental $6.50
The use of the direct, the indirect and the combination approach to fire situations in wooden structures. Thermal balance, nozzle operation, the effect of steam, and final overhaul.

OIL FIRE PROTECTION--THROUGH KNOWLEDGE - 30 min. - color - a - rental $8
Chemistry, sources of ignition, control, prevention, extinguishing, and training for fighting oil fires.

PHYSICS AND FIRE ENGINES - 11 min. - color - i - rental $4.50
On a field trip to a fire station, children in a 5th grade class look for working examples of six basic machines; level, pulley, wheel and axle, inclined plane, wedge and screw.

PUMP OPERATOR - 26 min. - color - a - rental $8
Best usage and proper maintenance of pumper apparatus. Development of apparatus, how it is placed in service, how men are trained to use it. Tips on drafting water. Other fire pumping procedures.

SAFETY WITH FIRE - 11 min. - i - rental $3.75
Potential fire hazards in everyday situations. How to meet such hazards, including how to report a fire, use a fire extinguisher, treat simple burns, and escape from a fire in the home.

SALVAGE - 10 min. - color - a - rental $4.50
Salvage operations at a fire; cover throws.

STRUCTURE FIRES - 31 min. - a - rental $7
Standard operations for extinguishing fires in buildings.

TEMPERATURES AND MATTER - 15 min. - color - s - rental $6.50
Properties of matter under varying temperature conditions, transformation of the physical state; the unusual properties at extremely low temperatures, among them, electrical conductivity of metals and paramagnetism of liquid oxygen; contrast between the effect of increase in temperature on the viscosity of gases and liquids.

TRAIN WE MUST - 20 min. - a - rental $4.50
Need for training volunteer firemen. Suggested training program.

UNDERSTANDING FIRE - 11 min. p-i - rental $3.75
Exploring science series. What the characteristics of fire are and how some objects will burn and others will not. Some of the ways we use fire.

VENTILATION - 25 min. - a - rental $5
How, why, where and when to ventilate at fires. Actual fire scenes.

VISION IN THE FOREST - 5 min. - color - p-i-j-s-a - service fee $2.25
Vaughn Monroe and his family remind us of the common safety precautions for fire prevention in the forest.

WATER FOR FIREFIGHTING - 51 min. - a - rental $9
What water is, how it behaves, and its use in good firefighting. Animated.

YOU BET YOUR LIFE - 25 min. - a - rental $5
Use of protective breathing equipment by firefighters; importance of such protection and the story of one man who neglected to use his equipment.

FIRE ON THE LAND - 28 min. - color - j-s-c-a - service fee $2.25
Disproving of the value of field burning to destroy weeds or insects. Modern firefighting techniques and machines. Importance of grasslands to wildlife for food and cover. Safety precautions with fire in combustible areas.

The following films are available from Association-Sterling Films, 25358 Cypress Avenue, Hayward, California 94544.

FN-101 - ARE WE FIRE SAFE? - 8 min. - color - rental $8
Depicts the fire protection value of firestopping, solid-core doors, non-combustible interior finish and roofing, and properly installed heating and electrical equipment in the home.

FN-102 - CONDEMNED! - 16 min. - color - rental $12
This dramatic home fire safety message points out that 18 people die in fires every twenty four hours; 63 homes burn every hour of the day. Rescues, firefighting and tragic results of carelessness shown.

FN-103 - HAVE A WONDERFUL EVENING - 16 min. - color - rental $12
A must for every teenager who babysits, for every parent who uses babysitters. The importance of knowing life-protecting fire safety measures stressed.

FN-104 - HELP PREVENT FIRES - 12 min. - color - rental $10
Shows the wrong way and the right way to handle objects of everyday use around the house (electric iron, pots and pans, cigarettes, etc.). Animated (French soundtrack).

FN-105 - THE NATURE OF FIRE - 19 min. - color - rental $10
The nature of fire and its control. Behind the film is the idea that if people know what fire is, they will more readily know how to avoid the acts which lead to fire.

FN-106 - READ THE LABEL - AND LIVE! - 9 min. - color - rental $8
This film explains why warning labels should be read; how to distinguish between more and less hazardous flammable and combustible products; safe handling of paint thinners and lacquers, cleaning compounds and hair sprays, insecticides, etc.

FN-107 - YOUR CLOTHING CAN BURN - 13 min. - color - rental $10
Tells which fabrics are safest, which are easily ignited, common causes of clothing fires and how they can be prevented, what to do if clothing catches fire.

FN-108 - ANOTHER MAN'S FAMILY - 25 min. - color - rental $15
Tells the story of an average family which, in a fashion, recognizes the fire hazards in the home but seems unaware of the peril to their lives. Viewers will think hard about their own attitudes and behavior.

FN-109 - HOLDING HANDS - 16 min. - color - rental $12
Made specifically for elementary school children, this film shows how to avoid and how to extinguish clothing fires; shows the dangers of carrying or playing with matches; what to do in case of fire in the home.

S-455 - ABOVE AND BEYOND - 12 min. - service charge $3.50
A dramatic behind-the-scenes story of forces at work to protect you from fire. Presents the many varied services performed for the public by the American Insurance Association and the Underwriters' Laboratories, Inc. (Available to junior high school age level and above.)

S-456 - ALBUM OF PUBLIC SAFETY - 20 min. - color - service charge $3.50
Almost every person in the United States is protected daily against hazards arising from housing, electrical and mechanical equipment, by the safety standards of Underwriters' Laboratories, Inc. This film gives a brief history of the laboratories. (Available to high school age level and adult organizations.)

S-457 - ARE YOU SURE? - 14½ min. - color - service charge $3.50
This safety film portrays the emotional impact an industrial fire has on five employees who feel they may have caused the disaster. (available to high schools and adult organizations.)

S-459 - BEFORE THEY HAPPEN - 14½ min. - color - service charge $3.50
This is the story of one city made safe by the work of the municipal fire prevention bureau. It depicts the problems confronting fire prevention inspectors. (Available to high schools and adult organizations.)

S-460 - THE CHALLENGE - 10 min. - color - service charge $3.50
Destructive fires take an appalling toll in life and property. Most of these fires are caused by simple thoughtless acts - "crimes of carelessness." The film illustrates some of these "crimes." (Available to upper elementary, junior and senior high schools and adult organizations.)

S-462 - DANGER SLEUTHS - 18 min. - service charge $3.50
A fascinating story of "Anytown, U.S.A." and the way a typical family is protected by the precise, exhaustive testing work of Underwriters' Laboratories, Inc. (Available to upper elementary, junior and senior high schools and adult organizations.)

S-465 - FIRE AND YOUR HOSPITAL - 20 min. - service charge $3.50
This film shows the many and varied fire hazards to which hospitals are subject. It emphasizes the importance of fire emergency planning. (Available to hospitals, nursing homes, nursing schools, fire departments.)

S-466 - FIRE IN THEIR LEARNING - 19 min. - service charge $3.50
A teacher helps her fourth grade youngsters understand the nature of fire, providing them with knowledge that one day may save lives. (Available to teachers and adult organizations.)

S-485 - FIRE ON THE FARM - 12 min. - color - service charge $3.50
Fire is one of the farmer's deadliest enemies. This film shows how farm fire protection and prevention may be improved.

S-486 - THE FIRST FIVE MINUTES - 27 min. - service charge $3.50
The importance of industrial fire brigades in plant fire prevention and protection is emphasized in this film. (Available to industrial groups and fire departments.)

S-487 - THE HAPPY CHIEF - 6 min. - color - service charge $3.50
A short Christmas film in which a fire chief makes fire safety suggestions for the holidays.

S-488 - HEATING SAFELY - 6 min. - color - service charge $3.50
Prompted by many recent fire tragedies involving portable oil heaters and oil stoves, this short film aims to save lives by showing safe ways to use these appliances. (Available for upper elementary school age level and above.)

S-489 - HEROINE OF THE WEEK - 6 min. - color - service charge $3.50
A dramatic film showing how a 12-year-old girl saved the lives of two younger children by prompt, cool action in accordance with her fire safety training. (Not available for primary school age level.)

S-519 - THE MAGNOLIA STORY - 20 min. - color - service charge $3.50
Every year, all over the country, American communities invite their state Fire Prevention Associations to conduct inspections for fire hazards. This documentary film shows one such colorful inspection in Magnolia, Arkansas. (Available to civic and insurance groups and fire departments.)

S-520 - PENELOPE CHANGES HER MIND - 9 min. - color - service charge $3.50
Penelope, her brother Timmy and their big dog Ruff learn about the "Fire Triangle" and make other discoveries about the nature of fire and fire prevention. (Available to elementary schools only.)

S-521 - THE SCIENCE OF FIRE - 20 min. - color - service charge $3.50
Here is a scientific explanation of the principles of combustion and how fires can be prevented. (Available to groups of junior high school age level and above.)

S-522 - SEE A PIN - 13½ min. - color - service charge $3.50
"See a pin and pick it up; all the day you'll have good luck." Mr. Luck, summoned by the finding of a pin, spends a day with the Johnson family - and everyone learns that you can't trust to Luck when it comes to fire safety. (Available for upper elementary schools and above.)

S-524 - "STUPID CARELESSNESS," THE FIRE CLOWN - 5 min. - color - service charge $3.50
Fire prevention demonstrations by a clown and his "straight man." For children in the primary grades. (Available to elementary schools only.)

S-525 - A TALE OF TWO TOWNS - 18 min. - color - service charge $3.50
Firefighting scenes in two communities illustrate dramatically how fire department salvage operations can minimize damage and increase public regard for the fire services. (Available to fire departments, civic groups and service clubs.)

S-733 - THREE STRANGERS IN TOWN - 13½ min. - color - service charge $3.50
This film shows fire protection engineers at work in an American community, measuring its ability to defend itself against this deadly threat to life and property. (Available to industrial and business groups.)

S-527 - TONY LEARNS ABOUT FIRE - 16 min. - color - service charge $3.50
A fire involving several sixth grade students starts a chain of events that leads to a fire safety program undertaken by the entire school.

S-528 - THE TORCH - 10 min. - color - service charge $3.50
Intriguing and humorous color cartoon showing that there's a bit of human carelessness in all of us.

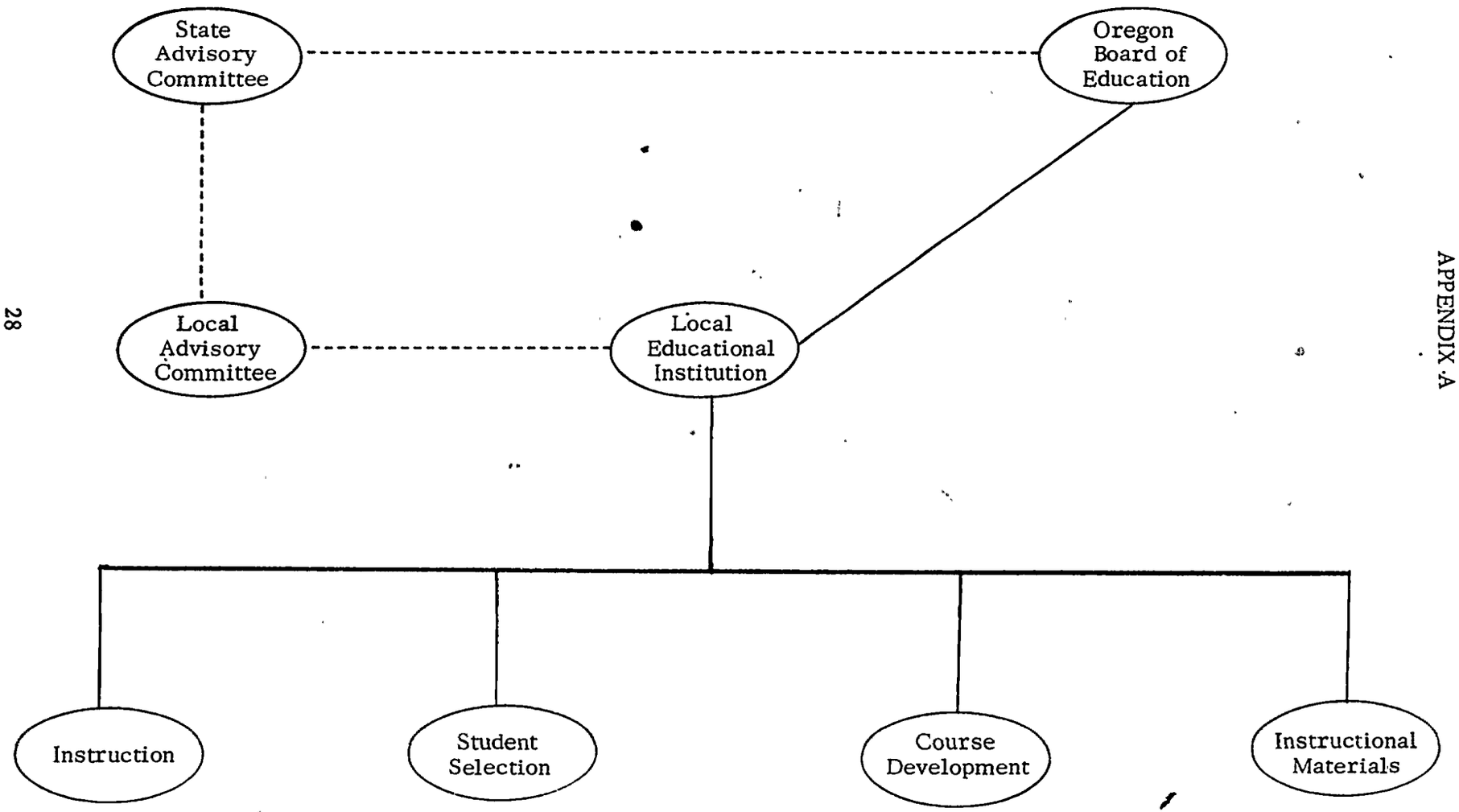
S-529 - TRAIN WE MUST - 20 min. color - service charge $3.50
This film explains the importance of fire department training and shows what comprehensive training program should contain. (Available to fire departments only.)

S-764 - TROUBLE TAKES NO HOLIDAY - 17 min. - color - service charge $3.50
A motivational film depicting how a false alarm sparks a school campaign to reeducate students to be fire-safety-conscious.

F-368 - THE VISITING FIREMAN - 17 min. - color - service charge $3.50
A typical family is paid a visit by an uncle, "the visiting fireman." In a lively discussion he gives them keys to fire safety, good fire prevention habits, what to do when a fire actually occurs in the home, using the phone and fire alarm box properly, staying out of the way, hints on smothering flames shown.

STATE FIREMAN TRAINING PROGRAM

Organization Chart



APPENDIX B

KNOWLEDGE AND SKILLS PERTAINING TO
STRUCTURAL FIRE FIGHTERS

I. General

A. Understanding of the function of the firemen on the fire department team.

B. Appreciation of the basic qualities desired in a fireman; i.e., good appearance, enthusiasm, tact, loyalty.

C. Knowledge of the opportunities and conditions related to a career in the fire service:

1. Municipal fire protection
2. Forestry
3. Industry

D. Acquaintance with rates of income for firemen and persons in related occupations.

E. Knowledge of conditions peculiar to the occupation; i.e., shift-work, station-living, hazards.

F. Ability to work cooperatively with other personnel.

G. Knowledge of the community services rendered by the profession.

H. Realization of the personal conduct necessary at all times to promote a favorable public image.

I. Understanding of the rules and regulations, Civil Service or otherwise, which apply to employees in public service.

II. Personal Health and Physical Condition

A. Knowledge of how to maintain good personal health, with special emphasis on physical condition, strength, and agility.

B. Awareness that continuing employment in certain areas is dependent upon successfully passing medical and physical examinations.

C. Awareness that entry positions in most fire departments require minimum standards of height, weight, and physical agility.

D. Awareness that one of the occupational hazards is the possibility of heart and lung disease due to uncommon stress on these two organs.

E. Knowledge of the special protection afforded against these diseases by the State Industrial Accident Commission and local governments.

III. Personal Appearance

A. Appreciation of the effect which good grooming and proper dress make on the public.

B. Awareness that most fire departments are uniformed organizations with strict regulations as to dress.

C. Awareness of the effect that personal hygiene has on appearance.

IV. Basic Science - Hydraulics and Mathematics

A. An understanding of basic high school mathematics and simple algebra.

B. Ability to solve equations dealing with the roots and squares of numbers.

C. Ability to solve problems dealing with fractions and proportions.

D. Ability to solve simple problems in plane geometry.

E. An understanding of simple hydraulics and its practical application.

F. The ability to solve problems dealing with static and flow pressures and friction loss.

G. An understanding of vacuum and atmospheric pressure.

H. The ability to solve problems of drafting water.

V. Basic Science - The Physical World

A. A general understanding of physical science.

B. Knowledge of the effect that wind has on water streams and fire travel.

C. An understanding of how heat is transmitted.

D. Knowledge of what is meant by conduction, radiation, and convection.

E. Knowledge of the effect that gravity has on water pressure, angles of ladders, and acceleration.

F. An understanding of oxidation as it relates to support of fire.

G. An understanding of the states of matter and conditions under which it changes states.

H. Ability to interpret simple physical reactions as they relate to propagation and extinguishment of fire; i.e., heat absorption as water is changed from liquid to steam, conversion of an incombustible solid to combustible gas by heat, and percentage of oxygen necessary to sustain combustion.

I. Knowledge of the simple laws relating to gases, their characteristics of expansion when heated, and exertion of pressures when confined.

J. The knowledge of the more common by-products of combustion which affect fire control.

VI. Building Construction

A. The ability to read simple blueprints.

B. An understanding of the relative combustion characteristics of different structural materials.

C. A knowledge of how structural design may encourage or prevent fire spread.

D. The ability to analyze the probable route of travel in a given structure.

E. An understanding of the needs for adequate exits in places of public assembly.

F. An awareness of the effect that fixed protection systems such as sprinklers, fire alarms, and other built-in protective devices have on building safety.

G. The ability to use the structural features of the building for its protection; i.e., skylights, vertical shafts, and other natural openings for ventilation, making cuts along supporting joists, and utilization of plumbing for water removal.

VII. Basic Science - Mechanics

A. Understand the laws of levers, inertia, and other fundamentals of mechanics.

B. Skill in the use of tools such as axes, wrenches, saws, cutting torches, and bars.

C. Understanding of internal combustion motors and the ability to do simple repair and maintenance.

D. Skills in operating gasoline-powered generators.

E. An understanding of hydraulic systems and pumps.

F. The understanding and skill necessary to disassemble, service, and reassemble fire extinguishers.

G. A knowledge of the principles of operation of diesel motors.

H. Knowledge of the principles of operation of gasoline turbine motors.

VIII. Care of Station and Equipment

A. Awareness that the care of stations and equipment is a direct reflection of the efficiency of the department.

B. Conscientiously carry out assigned duties in quarters.

C. Willingness to paint, wash, scrape, or clean as directed.

D. Clean, polish, and maintain fire apparatus in spotless condition.

E. Conscientiously check on schedule emergency equipment assigned.

F. Cooperate with other members of the department in carrying out special station and equipment assignments.

G. Wash and hang hose.

H. Clean, check, and replace masks and other equipment after each use.

I. Keep kitchen facilities clean and sanitary.

J. Maintain personal locker and assigned bunk in orderly condition.

IX. Firefighting Skills

A. Recognize that firefighting is a team effort where every man must function in his assigned place at a given time in order that the whole process does not break down.

B. Ability to make quick forced entry into buildings.

C. Skill in placing ladders either alone or as a team member.

D. Speed and skill in making couplings and laying hose.

E. Understanding of nozzles and skill in directing and applying water.

F. Skill and speed in advancing hose lines into buildings and up ladders.

G. Skill in tying knots.

H. Awareness of hazards involved and precautions that must be taken.

I. Ability to enter and make rescues.

J. Skill in climbing and working from ladders.

K. Ability to work with axes and other tools from roofs, ladders, and other high places.

L. Skill in placing and sliding lifelines, the coordination to make safe net jumps.

M. Knowledge and skill in covering with the salvage tarps.

N. Awareness that routine firefighting operations must be practiced until they become automatic.

O. Skill in safely driving engines, ladder trucks, and other fire apparatus.

P. Skill in analyzing the situat[illegible] and spotting fire apparatus.

Q. Skill in operating pump, either at draft, from the hydrant, or remote.

R. Ability to seek out, find, and extinguish hidden fires and hot spots.

S. Ability to analyze fire travel and determine fire causes.

T. An understanding of the principles of use and skill in handling fire extinguishers.

U. Understanding the [illegible]aracteristics of flammable liquids and how to make controls and extinguishments.

V. Recognition of the probable hazards due to building content in different kinds of businesses and industry.

Station Routine

A. An understanding of the need for punctuality in reporting to duty

B. Ability to conduct visiting groups on tours of the station.

C. A high degree of comprehension in receiving messages and dispatching equipment.

D. Reliability in carrying out station assignments.

E. Awareness that individual behavior affects public impression of the department.

F. Willingness to enter into and profit from station training sessions and classes.

G. Awareness of the stress generated when a group of individuals are closely confined as are firemen in a living situation, and the need for minimizing personal habits which may be objectionable.

XI. Emotional Stability

A A realization of the tension that builds within a person who may be called momentarily to respond to an emergency situation.

B. The ability to compensate for and control this tension.

C. The ability to function effectively under conditions of extreme physical discomfort sometimes accompanied by personal danger.

D. The tolerance of being closely confined and living with other individuals over extended periods of time.

E. Tolerance for sudden shifts from routine activities to extreme physical exertion under conditions of stress.

F. The ability to maintain a high degree of self-control while handling burn victims and other first aid emergencies.

APPENDIX C

DESCRIPTIONS FOR SUGGESTED COURSES IN
FIRE SCIENCE CURRICULUM

Building Construction for Fire Prevention - 5.264 Term Units 3

Classification of buildings; structural features affecting fire spread; effect of fire on structural strength; fire stops and ratings of materials; fire retardants; Sanborne maps.

Company Organization and Station Assignment - 5.258 Term Units 3

Fire company organization and operation; company responsibilities in station including record keeping, state communications and watch, housekeeping and house privileges, tours and public relations; company organization for response to alarms; company morale.

Cooperative Work Experience Term Units 3

Observing volunteer and paid company operation; integration as a member of volunteer and paid companies on drill experiences; observe fire prevention and inspection.

Fire Apparatus and Equipment - 5.253 Term Units 3

Familiarization with different types of fire apparatus; principles of application, care, and preventive maintenance; safe operating practices, emergency and non-emergency; National Board standards.

Fire Department Communications and Alerting Systems - 5.267 Term Units 2

Dispatching, receiving, and radio communication procedures; FCC regulations; municipal box alarm; telephone and tone-activated alarm; recording messages; tap-out procedures, running cards, etc.

Fire Department Hydraulics - 5.257 Term Units 4

Review of basic mathematics; hydraulic laws and formulas as applied to the fire service; application of formulas and mental calculations to hydraulic problems; fire ground water supply problems; Underwriters' requirements for pumps and accessories.

Fire Fighting Skills I - 5.250 Term Units 3

Individual skills using small tools and minor equipment, practice in forcible entry, use of masks and other activities generally performed by the individual.

Fire Fighting Skills II - 5.251 Term Units 3

Practice in team skills used in fire ground operation including hose and ladder evolutions, salvage, overhaul, rescue, fire attack and other activities requiring a team effort.

Fire Fighting Skills III - 5.252 Term Units 2

Practice in skills involving multi-company operations including simultaneous activities of ladder, engine and salvage companies, manning large stream appliances, coordinating communications, etc.

Fire Fighting Tactics and Strategy - 5.274 Term Units 3

Response and size-up; fire ground tactics; analysis and post-mortem; pre-fire survey and planning.

Fire Investigation - 5.273 Term Units 4

Effect on fire prevention by isolating cause of fire; interpreting clues and burn patterns leading to point of origin; identifying sources of ignition and materials ignited; preservation of the fire scene.

First Aid - 5.212 Term Units 2

A first aid course with emphasis on respiratory, shock, burns, cuts, cardiac, drowning, fractures, and other emergencies; practice in use of resuscitator and inhalator.

Fixed Systems and Extinguishers - 5.272 Term Units 2

Portable extinguisher equipment; sprinkler system; protection systems for special hazards; fire alarm and detection systems; ventilating systems.

Fundamentals of Fire Prevention - 5.262 Term Units 3

Organization and function of a fire prevention bureau; fire prevention codes; state and local laws and ordinances; familiarization with principles of fire prevention; the inspector's job; public relations.

Hazardous Materials I - 5.260 Term Units 3

Review of basic chemistry; identification of hazardous materials by color, symbol, and marking; recommended safe practices for storage and handling of solids, liquids, and gases; methods for fire control of these materials.

Hazardous Materials II - 5.261 Term Units 3

Methods for combating fires involving hazardous chemicals and other materials; radiation hazards of the fire service; space age fuel; highway transportation, explosives, etc.

Introduction to Fire Protection - 5.254 Term Units 3

Philosophy and history of fire protection, history of loss of life and property by fire; role and responsibility of the fire department in the community; organization and function of local, county, state, federal, and private fire protection agencies and allied organizations; sources of professional literature; survey of professional career opportunities.

Physical Science of Fire - 5.256 Term Units 3

Characteristics and behavior of fire; fundamentals of physical laws and chemical reactions occurring in fire and fire suppression; analysis of factors contributing to fire - its cause, rate of burning, heat generation and travel, by-products of combustion, and to its confinement, control, and extinguishment.

Pump Operation and Practical Hydraulics - 5.263 Term Units 3

Principles of fire apparatus pumping operations; fire ground water supply; construction and operation of fire service pumps and accessories; pump operation under emergency conditions; rule of thumb hydraulics.

Rescue Practices - 5.268 Term Units 2

Electrical; use of rescue tools; common rescue carries; search and rescue procedures; handling nets; care of victim, excavation emergencies; evacuations.

Water Distribution Systems - 5.269 Term Units 3

Main systems; hydrants - size, gridding, valving, distribution; residential and commercial districts; fire flow requirements; pumping stations; high pressure systems; storage tanks and cisterns; mobile supplies.

Fire Pump Construction and Operation - 5.263 Term Units 4

A basic course for pump operators presenting theory of pumps, water supply, principles of driving, drafting and pumping from hydrant. Actual practice using local department's apparatus included.

Fire Codes and Related Ordinances - 5.282 Term Units 3

A thorough study of the fire code, building, exit, flammable liquid and other codes as related to fire prevention. Designed primarily for fire service inspectors.

Blueprint Reading for Firemen - 5.119 Term Units 3

Teaches the fundamentals of blueprint reading and the relationship of the various elements comprising architectural drawings and specifications. Interpretation of standard symbols and drawings used in building construction. Sketching and drawing of building features and layouts for inspection reference and prefire planning.

Fire Science I - 6.995 Term Units 4

A course in practical physics covering matter, measurements, machines and energy. Laboratory time is provided for demonstrations and experiments to help clarify the principles and procedures covered in class.

Fire Science II - 6.996 Term Units 4

The physical and chemical properties of substances; chemical bonds and reactions; ionization; covalent substances. Laboratory time is provided for clarifying demonstrations and experiments.

Fire Department Organization and Management - 5.112 Term Units 3

Teaches the duties and responsibilities of a company officer and the methods of organizing, maintaining, and operating a fire company. Discussed are: company communications, fire equipment, training, fire prevention and firefighting, records and reports.

Fire Insurance Principles and Grading Schedules - 5.286 Term Units 3

Insurance grading schedules and their application. Methods of analyzing fire hazard and the effects of fire hazards on fire insurance rates. A study of the National Board Grading Schedule is made in detail with other schedules covered briefly. The fundamentals of fire insurance rating methods, loss records, municipal gradings, etc.

Fire Training Programs and Techniques - 5.287 Term Units 3

Teaches purposes of fire service drills and training programs. The development and operation of the departmental training program. Facilities and equipment necessary for modern training. Psychology of learning, four-step method, lesson planning, instruction techniques, training aids, tests, workbooks, training objectives and curriculum development, conducting conferences and meetings.

Fire Reports and Records - 5.288 Term Units 3

An overview of fire department record systems and the principles involved in setting up and maintaining them. The application of these systems in the areas of pre-fire surveys, post-fire reporting, research and planning.

Legal Aspects of Fire Protection - 5.289 Term Units 3

The history and background of laws relating to the fire service; tort liability of minicipalities, municipal employees, and members of the fire service; clarification of legal terminology; civil service lays and requirements; pensions, mutual aid, and fire prevention codes.

APPENDIX D

MINIMUM STANDARDS OF RECRUITMENT
FOR EMPLOYMENT IN FIRE DEPARTMENTS[1/]

A. The average minimum standards presently in effect are the following:

1. Citizen of the United States

2. Minimum age of 21 years[2/]

3. A search of fingerprints through local, state and national fingerprint files to disclose any criminal record.

4. Shall not have been convicted, by any state or by the Federal Government, of any crime, the punishment for which could have been imprisonment in a Federal Penitentiary or State Prison.

5. Good moral character as determined by a thorough background investigation.

6. High school education or its equivalent.

7. An oral interview by the hiring authority or his representative(s) to determine such things as the recruit's appearance, background, and ability to communicate.

8. A thorough physical examination by a licensed physician and surgeon to insure that applicants are free from any physical, emotional or mental condition which might adversely affect the performance of his duties as a fireman.

9. Six months probation.

B. It is emphasized that these are minimum entrance standards. Higher standards are applied whenever the availability of qualified applicants exceeds the demand.

1/ With some local modification, these standards are used by most cities in Oregon in recruiting personnel for their fire departments.

2/ Present indications are that this is being lowered to 18 to accommodate graduate students from community college programs. This is indicated by the fact that several cities have taken action. The Fire Science Advisory Committee fully endorses this change.