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# **CURRICULUM GUIDE TO FIRE SAFETY**

**For Elementary Schools**

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## Foreword

WHEN TEACHERS as members of the community realize that every day in these United States 10 children of school age or under lose their lives by being burned to death, no effective effort should be considered too great to prevent such tragedies.

Those who work constantly in the fire-prevention field say frankly that adults are not easily educated to the need for action in seeing that fires do not occur. On the other hand, children of elementary school age especially will take responsibility for checking fire hazards at school, at home, and in the community, and for developing a plan of action. They are doers with ideas that have sparkle and the workability that is sometimes lacking in programs developed entirely by adults.

This curriculum guide has been prepared with the purpose of giving a bird's-eye view of what can be done to help children of elementary school age acquire proper attitudes, correct information, and some skill in preventing and controlling fires. The material was prepared by members of a working conference held at the U. S. Office of Education in August 1945, in cooperation with Safety Research Institute, Inc. and the National Fire Protection Association. Throughout the preparation of the manuscript the following conference members served as consultants:

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Dr. Mackintosh, who served as chairman of the conference, has been responsible for the preparation of this report.

It is the hope of the individuals and the groups concerned with the preparation of the manuscript, that it will be used as an overall guide by State departments of education and by local school systems in developing the type of fire-safety program which is suited to the needs of an individual State, a county system of schools, an independent school district, or a town or village school. Such a curriculum guide can give only a bird's-eye view of a field which although one of many to be considered in relation to the elementary school program, has no equal from the standpoint of cruciality. Fire safety is not a problem that can be pushed aside until a convenient time arrives for re-thinking the curriculum. Pick up any daily newspaper. It is almost impossible to read it through without finding at least one, possibly more items describing fire tragedies affecting children of school age and under.

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The time is now and the school has an equal responsibility with other agencies to see to it that every available means is used both to prevent and reduce the social and economic wastes that result from fire. What is required is careful planning followed by vigorous action that will bring results which everyone can see and measure.

**BESS GOODYKOONTZ**  
*Assistant U. S. Commissioner of Education*



## A Curriculum Guide to Fire Safety



**How important is fire-safety education? We can measure it in lives! We can measure it in homes! We can measure it in natural resources! We can measure it in money! By any standard our fire loss is the equivalent of an annual national catastrophe.**

**To those who live in the United States—teachers, boys and girls, parents, and other citizens, these are fire facts about yourselves and your country.**

### **Do You Know That**

**Fire kills 10,000 persons each year and leaves many other thousands with physical or emotional scars?**

**Thousands are trapped in burning buildings, or are seriously injured because they do not know what to do when a fire breaks out?**

**There is a fire every minute of the night and day?**

**Most fires occur in the home—1,000 a day?**

**Most of the people killed in these fires are women and children?**

**Fires kill more than 10 children every day?**

**About 40 fires a day are started because electric irons are left in circuit?**

More than 75 fire tragedies a day are caused by children playing with matches?

Six fires occur in schools every day?

School fires cause a property loss of more than 8 million dollars a year?

Fires in automobiles account for about 11 percent of the alarms received by fire departments?

10 lives are lost in farm fires every day?

More than 40,000 farm buildings are destroyed annually by fire?

Over 150,000 forest fires are reported every year?

A forest area the equivalent of the New England States was destroyed by fire in the past 5 years?

About one-third of the fires extinguished by municipal fire departments can be put out with hand extinguishers?

Fire causes half a billion dollars' worth of destruction each year, a greater loss, per person, than in any other country?

## Why the School Should Teach Fire Safety



1. To promote an aspect of wholesome child growth and development by making child fire-safety-conscious.
2. To ensure happiness and security to the child in the home through his contribution to home fire safety.
3. To contribute to good community living through child's participation in the local fire-safety program.
4. To build a strong nation by helping to conserve the country's resources through fire-prevention education.
5. To conserve world resources for common use by taking leadership in fire prevention.

### **To Promote an Aspect of Wholesome Child Growth and Development by Making Child Fire-Safety-Conscious**

The modern school recognizes that its responsibility does not stop with the four walls of the building or with the limits of the school grounds. It must combine forces with home and community to aid the child in developing attitudes, knowledges, and skills that will enable him to live healthfully and safely in a complex society. He must learn to protect himself and others from the destructive force of fire.

The child will need to know and understand those elements in his environment which require special care. He must acquire the skill to handle these properly. He must develop a safety consciousness and a sense of responsibility for his own safety as well as for the safety of others. These needs can be met through a curriculum in which fire-safety experiences play an important role.

**To Ensure Happiness and Security to the Child in the Home Through His Contribution to Home Fire Safety**

The home is more secure when children have been taught how to avoid danger from fire. The attitudes, knowledges, and skills which they acquire in school make them good salesmen of fire safety to the entire family. When the child himself takes responsibility as a member of a family group for eliminating or checking certain fire hazards, parents feel less anxiety for that boy or girl, at home or at school.

**To Contribute to Good Community Living Through Child's Participation in the Local Fire-Safety Program**

Communities in which fire safety is successfully included in the school curriculum find that fire losses have been considerably reduced. The child can be a fire safe member of his community; it is only on such a personal relationship basis that a fire-safety program can have any meaning for a boy or girl.

Communities which experience a serious fire suffer losses extending considerably beyond the immediate property destruction. The loss of a large factory, for example, sometimes results in serious unemployment and reduction in the school and tax rolls. The loss of a major industry has left entire towns destitute.

**To Build a Strong Nation by Helping to Conserve the Country's Resources Through Fire-Prevention Education**

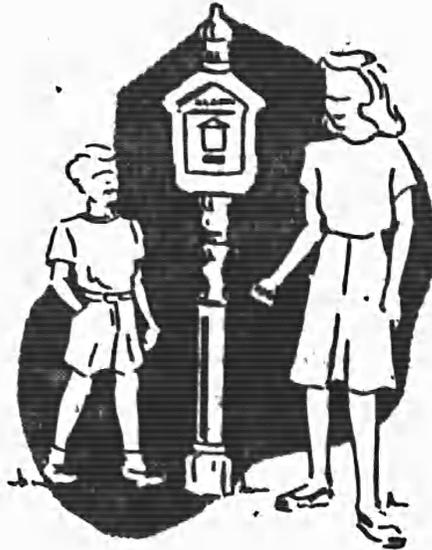
Fire strikes at our national strength through an annual destruction of lives, homes, places of business, and forest areas. By teaching fire safety to the child and, through him, to the community and the entire country, the school can make a valuable contribution to national well-being.

**To Conserve World Resources for Common Use by Taking Leadership in Fire Prevention**

The whole world relies to a certain extent upon the human and material resources of our Nation. These resources are required for the production of food, for industrial rehabilitation, and for leadership toward a higher level of living for all peoples. The school has the responsibility of contributing to the conservation of our material and human resources through the teaching of fire safety.

*The basic cause of fire losses is public ignorance or indifference. With our present available information, fire-safety experts estimate that about 80 percent of our fires could be prevented or controlled in their early stages. It is a function of the school to educate for an action program in fire safety.*

## Where the School Can Teach Fire Safety



1. Integration within the curriculum.
2. Cooperation with the home.
3. Utilization of community resources.

### Integration Within the Curriculum

Education in fire safety is most successful when it is an integral part of the curriculum. Under this plan fire safety is studied throughout the school year at points where it is a natural outgrowth of problems or experiences. Fire-safety education can be woven into any type of curriculum. A recent publication of the University of the State of New York entitled "Fire Prevention Education," well demonstrates this point of view. In the curriculum which is based upon planning by subject fields, fire safety naturally fits into such subjects as science, health in its broad aspects, and social studies, and can be a basis for work in the language arts—reading, language, spelling, and handwriting.

Schools in which the curriculum is organized and developed around an area of experience, or where the child-development approach is used, will find similarly that the problem of fire safety offers a wealth of constructive activities, some of which are listed in a later section of this bulletin.

Whatever plan is used, frequent check-ups should be made to see that children have experiences in the field of fire safety, with some degree of continuity and in terms of their maturity levels.

### **Cooperation With the Home**

To be successful, the school program must have the understanding and cooperation of parents. Every effort should be made to interest parents in fire safety as both an educational and a practical program. The child has much more opportunity to practice fire safety at home than in school, because such major fire hazards as smoking, accumulated rubbish, open match boxes, and other hazards are 24-hour-a-day problems. For this reason, many activities should be planned to carry over from the school into the home where the assistance of parents may be enlisted by the children, and then be reported back to school for further planning and action. Activities proposed in a later section should be evaluated with this point in mind.

### **Utilization of Community Resources**

A workable fire-safety program in the school involves the needs and resources of the community. Usually numerous community organizations are able and willing to cooperate with the schools in developing practical fire-prevention plans. The administrator who wishes to include fire safety in the program of his school should capitalize on the possibilities of using every such medium, including parent-teacher organizations, the fire department, the local Chamber of Commerce, Junior Chamber of Commerce, Boy Scouts, Girl Scouts, Camp Fire Girls, Future Farmers of America, Future Homemakers of America, 4-H Clubs, and other groups.

## How the School Can Teach Fire Safety



### Techniques of Learning

There are steps in the educational process of meeting and solving problems which apply to fire safety as well as to other fields:

1. Developing recognition and understanding of fire hazards as problems.
2. Discovering fire facts and studying their implications.
3. Applying fire-prevention knowledge to the problem through planning and doing activities.
4. Evaluating methods used to attack fire-safety problems.

### Developing Recognition and Understanding of Fire Hazards as Problems

The educational program should be so designed that the children themselves develop the ability to recognize fire-safety problems and to suggest means of solving their problems. Such a method of work calls for cooperation between teacher and children. The teacher is the guide; the children are free to offer ideas and suggestions. Together they plan how they will carry on their study.

In planning the fire-safety education program, administrators and teachers can start with the immediate circumstances surrounding the child. The teacher and children can keep a diary record of their experiences together during one school day. By using this record, they can identify the day's experiences involving fire safety. Thus they may recognize as problems: The importance of keeping halls and doorways clear of play equipment,

milk bottles, school furniture, or any other materials that would block exits; the need for using caution in lighting the oil stove in rural schools, or in handling cooking utensils in preparing the school lunch; the significance of prompt response to fire drills, regardless of what they are doing.

#### **Discovering Fire Facts and Studying Their Implications**

After recognizing a problem, the children should participate in deciding what facts are needed to solve it and what the available sources of information are. Then they can use these sources to obtain the necessary facts. Fact finding and study go on in a wide variety of ways: Observing, demonstrating, experimenting, using pictures, taking excursions, reading books, and interviewing people.

#### **Applying Fire-Prevention Knowledge to the Problem Through Planning and Doing Activities**

After obtaining the necessary information, the teacher and children are able to discuss: What needs to be done to solve fire-safety problems? Who should assume the responsibility? What activities are suitable? How can they be carried on? When is the work to be done in relation to all the activities of the school day? After an initial experience in solving a fire-safety problem, the child gains further experience by applying his information in similar situations as they arise, and on his own initiative. Only planning that leads to action will make fire safety function in the school program.

#### **Evaluating Methods Used to Attack Fire-Safety Problems**

The teacher and pupils can evaluate their handling of fire-safety problems by using the following questions as a yardstick:

How did we discover the problem?

What information did we need?

What reading, observations, and experiments did we carry on?

How did we act to solve the problem?

What did we accomplish?

How was our own behavior changed?

In addition to problems discovered in the school environment, various out-of-school situations can be evaluated by the group.

A newspaper report of a fire in some home in the community can be used as an example: What caused the fire? Could anything have been done to prevent it? Suppose it had been your house, what do you think you would have done? The group will perhaps decide as they evaluate behavior that there can be advance planning to meet various types of situations by discussing such a question as, What would *you* do if your clothing caught fire? you smelled gas? a spark shot out from a newly built fire? you smelled smoke? The best answers can be pooled and used in a matching game where the questions and answers are placed on separate cards. When the leader asks the question, players scan their cards to locate the best answer, and the first one to reply receives the card. In such ways the importance of proper habits and attitudes in unexpected situations can be stressed.

The group might also make a study of some major fire of obvious significance to the community—a hotel, factory, store, or some other such fire—to show the resulting loss of lives and jobs, financial loss to the community, or loss of service to the community. An upper-grade group could study and discuss the fire laws which could help prevent other such tragedies.

#### **Activities for a Fire-Safety Education Program**

These activities are intended to suggest the variety of experiences which can be used in a fire-safety program. Alert teachers and groups of children will develop many others to meet the needs of their own environment. It is essential, however, that some such activities become a part of each child's regular school work, whether his curriculum is organized around subject-matter areas, or around areas of experience. Since the school program is incomplete unless it is a part of a broader program including the home and community, some adult activities are also listed. For material and information to implement these suggested activities, reference may be made to later sections, and to the bibliography which follows.

As indicated in an earlier section, activities that are successful depend upon such steps as the following: Recognition and understanding of the problem, fact-finding and study, planning and doing, and evaluating the worthwhileness of the experience. These steps need to be taken by teacher and children working together cooperatively.

The method of demonstration is one which is especially suited to the fire-safety field. Because of State and local fire regulations the

teacher will need to check her proposed activity with the local fire department, if there is any question involving safety. She herself will take the responsibility of demonstrating safe practices, using simple equipment and materials.

#### Activities for Children

1. Fire safety in the school.
2. Fire safety at home.
3. Fire safety in the community.

*Fire safety in the school.*—Check the school and grounds for fire safety (forms for school inspection are available free of charge from the *National Board of Fire Underwriters*, 85 John St., New York City). Include in the evaluation such questions as, What are the fire hazards? How can we eliminate them or protect ourselves against them?

Keep a record of all experiences in one school day which have some connection with fire safety. Include in the evaluation such a question as, Were we safe? Could we have been more careful or skillful?

Keep a cumulative record of fire-safety precautions in chart form.

Plan a program for making the school more fire-safe in terms of what children themselves can do, and put it into operation.

Build a mimeographed book of children's own stories about fire safety.

Discuss the school fire drill, its purpose, reasons for the procedure used in the local school with each group of children, and adopt a plan by school-wide agreement.

Make cooperatively a list of safety rules to put above the cooking stove used for preparing school lunches.

Cooperate with the annual fire-prevention and clean-up weeks by giving an assembly program based on demonstrations.

Use movies, slides, pictures, or other available visual aids in all activities where they can point up the problem.

Maintain a bulletin board of pertinent fire facts.

Make a study of fire-extinguishing equipment (sprinklers, hose, extinguishers, etc.) in the school in relation to specific hazards. Have certain of them demonstrated where practicable, and give children an opportunity to demonstrate with those they can handle.

Ask the high-school science teacher to carry out some of the demonstrations suggested in the publication, *Selected Demonstra-*

*tions for Use in Fire-Safety Education* (National Fire Protection Association). Discuss applications of these to fire-safety problems.

*Fire safety in the home.*—Survey the home (forms for home inspection are available from the National Board of Fire Underwriters).

Discuss and demonstrate good housekeeping procedure for: Proper disposal of rubbish and ashes; safe storage of fuel; and correct installation and care of stoves, furnaces, and their pipes.

Make posters on the subject of fire safety in the city or small town home, on the farm, in the forest or park, at the various seasons.

Make a floor plan of a fire-safe home, indicating the location of fire extinguishers.

Plan and carry out a home fire drill, and report the results to the group.

Dramatize what to do when there is a fire: How to escape from a smoky room; what to do when clothing catches fire; how to test a door to see if it is safe to open; how to give the alarm by telephone and by means of a fire alarm.

Prepare and take home different reminder tags to be hung on the door knob, for example: Is the electric iron turned off? Is the toaster disconnected? Has the light been turned off in the basement?

Examine your home fire extinguisher; copy the Underwriters' label of approval and the directions for operation which appear on the front of the extinguisher. Could a child use it if occasion arose? Have children compare the various types of extinguishers and the directions.

Prepare an instruction card for calling the local fire department, and place it near the telephone.

Demonstrate with home-made equipment and simple materials certain principles involved in the use of fire as an aid to man, but as something that must be controlled.

*Fire needs oxygen.*—Set a lighted candle on a table. Invert a large drinking glass over the candle. When the candle goes out help children to draw conclusions showing the "why" and the application to safe living.

*Certain materials burn easily.*—Place pieces approximately the same size, of cotton, paper, cloth (cotton, silk, wool), wood, and coal on individual asbestos pads set on a metal top table or in a zinc lined sand table. Set fire to each as nearly as possible at the same moment. Which burns first? last? What reasons can children suggest for differences in time? How should these results influence our own living?

**Use Care and Caution with Such Demonstrations!**

Discuss the handling of matches such as storing in a metal can, playing with them, keeping them out of reach of small children, striking them away from the body, breaking before discarding, using for light in clothes closet.

Bring electric toys to school. Examine them for the Underwriters' label. Discuss possible fire hazards in connection with using toys that do not have a label.

Devote an issue of the school newspaper to home fire-safety, writing articles on such topics as the dangers involved in amateurs' working on electrical circuits, replacing a defective fuse with a penny, leaving the electric iron or toaster turned on, using frayed electric cords, using electric cords under a rug, using rubber tubing for gas appliances, searching for a gas leak with open flame.

Design a cabinet in which to house your fire extinguisher for placement in the kitchen, hallway, or garage entrance.

Culminate the activities of the year by use of the Home Inspection Blank for school children furnished gratis by the National Board of Fire Underwriters.

*Fire safety in the community.*—Keep a record of all fires and fire losses in the community. Discuss such question as: What are their causes? How could they have been prevented? Was prompt action taken? What was the loss in money? in lives?

Put a street map of the community on the bulletin board. Mark with red crosses places where fires occur. Try to determine causes. Discuss such questions as: Do fires occur more frequently in certain areas? Can this be blamed on poor construction, crowded living conditions, presence of industry, or other causes? Make this record continuous throughout the year. Discuss things both children and adults can do to reduce fire hazards.

Visit the fire department. Interview firemen. Write a picture-story summary.

Demonstrate how to give a fire alarm by telephone and by means of a fire alarm. Discuss how false alarms hurt the community.

Help to plan a fire-safety program for the community in which children can have a part. Make this an all-school activity.

Conduct an inspection tour "hazard hunt" of the neighborhood, to list fire hazards. Dramatize this experience in an assembly program to which parents and neighbors may be invited. Include a demonstration to show why no one should smoke at a gasoline station. Put a little gasoline (2 or 3 tablespoons) into an alcohol lamp. Light the wick and let it burn for a minute. Then put the

flame out. Hold a lighted match about an inch above the wick. The vapor of the gasoline ignites. Why is this true? What does it demonstrate? Follow up with a discussion of how corrections can be made in smokers' behavior at gasoline stations.

Invite local firemen to demonstrate the use of fire extinguishers.

Conduct a fire-safety column in the school paper or the local paper, or publish a "Fire-Safety News" for home distribution. This could be hand-written and illustrated if there are no printing or mimeographing facilities available.

Demonstrate how to build and extinguish a campfire, using real materials on the school grounds. Emphasize at the same time principles involved in extinguishing fires such as (1) cooling by pouring on water or (2) cutting off the supply of oxygen by smothering with sand or dirt.

Discuss the "fire safety" of such neighborhood buildings as theaters, halls, skating rinks, restaurants.

Both locate and count the number of exits in the neighborhood theater and choose the two, either of which you could use.

Cooperate with the community *Fire-Prevention Week* campaign which is observed early in October. Prepare posters, draw cartoons, arrange an assembly program, give demonstrations on fire prevention and control in local store windows.

Organize a Fire-Safety Club in school to help make the community fire safe, or make this activity a responsibility of the school council if there is such an organization, or cooperate with groups such as the Junior Red Cross, 4-H Clubs, Camp Fire Girls, Boy and Girl Scouts.

#### Activities for Adults

1. Fire safety in the home.
2. Fire safety in the community.

*Fire safety in the home.*—Cooperate with children in surveying the home and eliminating hazards. This is essentially a job for parents.

Plan and carry out a home fire drill, discussing all details with the entire family.

Conduct a safety campaign in your home, stressing the elimination of major fire hazards.

Cooperate in Clean-Up Week, by removing rubbish, and other hazards which might cause a fire.

.Cooperate in Fire-Prevention Week by discussing home fire safety.

Inspect fire extinguishers annually. Clean and refill them if necessary, according to directions supplied by the manufacturer.

*Fire safety in the community.*—Discuss with your fraternal club, businessmen's organization, fire department, and other groups, the possibility of setting up a local Fire-Prevention Council..

Investigate the provisions and enforcement of your local fire-safety laws.

Invite local fire chiefs to speak to the Parent-Teacher Association.

Organize a committee, with the cooperation of the fire department, to survey fire hazards of the community, to suggest corrections, and to follow up to see that corrections are made.

Bring local fire hazards to the attention of the authorities.

In rural areas, encourage the organization of a volunteer fire department.

## How the School Can Measure Results of Fire-Safety Teaching



1. Performance of the pupils.
2. Results in the community.

### Performance of the Pupils

In judging the effectiveness of the fire-safety program, curriculum builders will naturally place major emphasis<sup>o</sup> on the performance of the pupils in their daily living and in unexpected situations. Children may know the facts of any given accident situation, and may be able to enumerate the procedures to be followed to prevent fire, yet may disregard these procedures in actual practice. This is an indication that, while knowledge of the problems of fire safety may be adequate, the proper attitudes, habits, and skills which will result in the correct automatic response in an emergency have not been developed. The fire drill is one type of recurring situation which can be used as a yardstick for measuring children's ability to do.

### Results in the Community

In the same way the effectiveness of the fire-safety program can be measured by its practical results in the community:

- How many fire hazards have been corrected?
- Has the fire loss decreased?
- Has the number of false fire alarms been reduced?
- How many instances are there of the prompt use of hand fire extinguishers, plus a fire alarm, to avoid conflagrations?

## What the School Can Teach About Fire Safety



An exhaustive survey of the subject of fire safety would require an extended text and is beyond the scope of this Guide. The material in this section is therefore intended to be used merely as a suggestive outline of the subject, upon which curriculum-planning groups and teachers may draw in developing programs of fire-safety education suited to their local needs. Experience has shown that a made-in-advance outline has less value than group study of the problems involved. It is only for the latter purpose that the information has been assembled here. It can be considerably expanded by any group which secures from the sources listed at the end of the Guide, the currently available materials on fire safety.

### History of Fire

1. Uses of fire.
2. Fire-making.

### Uses of Fire

To early man *fire*<sup>1</sup> was a fearful thing which could only be explained by myths and legends and had no apparent purpose. Slowly, man learned to make use of fire to cook his food, warm his cave, fell trees, hollow canoes, make pottery, and work metals. He learned that fire properly controlled is a friend, and that out of control it is a deadly enemy. Today fire is an essential part of our industries and of our comforts at home, but must still be controlled.

<sup>1</sup> The words italicized are those which are listed in the "Dictionary of Fire Safety Terms" which follows.

**Fire-making**

At first men found it difficult to start a fire and kept their fires alive carefully, carrying them from one place to another as a precious possession. The earliest method of starting a fire was through the use of *friction*, by rubbing dry sticks together or striking sparks from stones or flint. It was not until the nineteenth century (1827) that men learned enough about chemistry to invent the match. The *safety match* is a recent development.

**Nature of Fire**

1. Nature of fire.
2. Requirements of fire.
3. Products of fire.

**Nature of Fire**

Fire is the rapid combination of the burning material with oxygen of the air. This rapid *oxidation (combustion)* produces heat and light (*flame*), and *smoke (products of combustion)*.

**Requirements of Fire**

A fire requires: (a) A substance which can burn (*flammable substance*), (b), oxygen to support the fire, and (c) a temperature high enough to start the fire (*ignition temperature*).

Most ordinary materials around us are flammable: paper, clothing, curtains, buildings, furniture. There are also *flammable liquids*: oil, gasoline, benzine (*cleaning fluids, flammable solvents*). There is usually sufficient oxygen in the air around these flammable substances to support a fire.

The necessary element which must be supplied is heat, so that the flammable material will reach its ignition temperature. There are various methods of supplying this heat. It may be done deliberately, as by the application of a lighted match, or accidentally, as in the case of a discarded cigarette.

Some materials, such as oily rags and damp hay, ignite without any outside source of heat (*spontaneous ignition*). These materials combine with oxygen even at ordinary temperatures to produce some heat. If such materials are kept in a pile so that the heat accumulates, they will warm up until they reach their ignition temperature, and then burst into flame.

**Products of Fire**

Fire produces heat. Therefore, once a material has reached its

ignition temperature and starts to burn, the fire can sustain itself by the heat which it produces.

The heat produced by one burning substance can also be transmitted to other flammable materials in the vicinity, causing the fire to spread (*radiation, convection, conduction*).

Fire also produces smoke. Smoke, is composed of carbon and water vapor formed as a burning material combines with oxygen. The smoke often contains dangerous vapors and gases, including *carbon monoxide*, and may be harmful when breathed. Because smoke and hot air rise, it is safer in a smoky room to sit on the floor, or to crouch near the floor, than it is to stand up. Since fire consumes oxygen, it may also deplete the air, making it unfit for breathing.

#### Causes of Accidental Fires

1. General *fire hazards*.
2. Hazards in the home.
3. Farm hazards.
4. Forest fire hazards.
5. Holiday hazards.
6. Hazards in motor vehicles.

#### General Fire Hazards

People in the United States must hold themselves responsible for many fires with such causes as the following which are listed in relative order:

Greatest single cause of fire is careless use of cigarettes and matches.  
Misuse of electricity, resulting in fires from *sparking, arcing, and overheating*.

Sparks on flammable roofs.

Defective or overheated chimneys, flues, and heating equipment.

Use of flammable liquids.

Poor housekeeping.

Lightning, open flames, and misused lamps and stoves are other causes.

In connection with some of these fire hazards, it is important to note that improper building construction is a contributing factor toward most serious fires.

#### Hazards in the Home

As applied to the home, these general hazards occur:

Careless smoking; smoking in bed; dropping lighted cigarettes and matches on the floor, furniture, or out of windows onto awnings; and children playing with matches.

Electrical fires in the home result chiefly from makeshift electrical wiring, frayed cords on appliances, electric irons and other appliances left in circuit, overloaded circuits, pennies in fuse boxes, and inferior electrical equipment.

Improper housekeeping causes fires to result from accumulations of flammable rubbish in closets, attics, and basements; improperly stored oily rags; loose curtains in the kitchen; and improperly stored coal.

Flammable liquid fires in the home result from dry cleaning. Although there are nonflammable cleaning fluids, there are no "safe" ones for home use.

Other home hazards include flammable building materials and improper construction of the building.

#### **Hazards on the Farm**

In addition to the hazards listed for the home, special farm hazards include:

- Kerosene lamps, oil stoves.
- Improperly stored hay.
- Lightning.
- Improperly stored flammable liquids.
- The burning of leaves or other vegetation near buildings.

#### **Forest Fire Hazards**

Major causes of forest fires are:

- Camp fires.
- Careless smoking and improper disposal of matches.

#### **Holiday Hazards**

The Christmas tree represents a major fire hazard. When it becomes dry it is highly flammable. Most Christmas tree decorations are easily ignited.

The use of open candles for Christmas trees or Hallowe'en lanterns is a serious hazard, as is the use of poor quality or defective electrical decorations.

Fireworks and bonfires are also holiday hazards at various times of the year.

#### **Motor-Vehicle Hazards**

Major fire hazards in automobiles, tractors, trucks, and other motor vehicles are due to:

- |                       |                    |
|-----------------------|--------------------|
| Improper maintenance. | Flammable liquids. |
| Improper operation.   | Electric wiring.   |
| Careless smoking.     |                    |

### How We Can Prevent Fires

1. In the home.
2. On the farm.
3. In forests.
4. During holidays.
5. In motor vehicles.

#### Preventing Fire in the Home

Fire hazards in the home may be eliminated through proper construction, good housekeeping, and careful practices.

With proper construction, some fire safety may be built into the home by means of:

- Correctly designed heating systems.
- Spark arresters installed in chimneys.
- Fire-resistant building materials.
- Safe electrical equipment, approved by Underwriters' Laboratories.

Good housekeeping which must be fire safe includes attention to such practices as:

- Keeping attics, closets, and basements free of rubbish.
- Using metal containers for oily rags and for hot ashes.
- Tending the furnace carefully.
- Using sufficient ash trays.
- Keeping kitchen curtains tied back.
- Replacing frayed electrical wires.
- Keeping heating equipment and electrical appliances in good repair.

Fire-safe practices are important in preventing home fires. Such practices include:

- Care in handling cigarettes and matches.
- Not smoking in bed or when drowsy.
- Using a flashlight, not matches, for temporary illumination.
- Keeping matches out of the reach of children.
- Using *nonflammable* liquids only for home dry cleaning.
- Disconnecting electrical appliances when not in use.
- Never placing pennies in fuse boxes.
- Keeping fireplaces screened.

#### Preventing Fire on the Farm

Most of the safety measures in urban homes also apply on the farm, but, in addition the following precautions should be taken:

- Particular care should be given to kerosene lamps and oil stoves.
- Defective flues caused by poor construction or age-holes in mortar joints should be repaired.
- Lightning rods should be installed on main buildings.

Hay and other roughage should be thoroughly cured and stored in a dry place.

Rubbish and leaves should be burned in metal containers at a safe distance from buildings and foliage.

Flammable liquids should be stored in safety cans at a safe distance from the house and barn, and should be kept where they cannot be exposed to heat or sparks.

Kerosene should not be used to quicken fires.

#### Preventing Forest Fires

Carefulness is a most important safety measure in preventing forest fires:

Cigarettes should be thoroughly extinguished and matches broken before they are thrown away.

The campfire should be built carefully away from dried vegetation, and should be completely extinguished and cool before it is left.

#### Preventing Holiday Fires ✓

Christmas trees can be coated so that they become fire-resistant for several days. The tree may also be kept fire-resistant by setting it up in a basin or container of water, so that it does not become dry. So-called *flame-proofing* will not completely prevent fires.

All holiday decorations should be fire-resistant. No open flame should be used near trees or decorations, and all electrical equipment should bear the label of approval of Underwriters' Laboratories.

Bonfires should be built carefully. Fireworks should never be handled by children. A number of States now have laws prohibiting the general sale and use of fireworks except for authorized public displays, supervised by fire department or other competent local authorities.

#### Preventing Motor Vehicles Fires

Fires in automobiles, tractors, and other motor vehicles may be prevented by careful maintenance, including checking of the ignition, adjustment of the carburetor, and removal of accumulated grease and oil from the motor assembly. Brakes should be used carefully and brake linings replaced when worn.

Care in smoking is another important safety factor. No one should smoke while the gas tank is being filled or while any repair work is being done on the car.

Greasy rags should not be allowed to accumulate in any part of the vehicle.

### What We Should Do in Case of Fire

1. In the school.
2. In public places, such as the theater.
3. At home.
4. In a motor vehicle.

#### In the School

Local practices determine instructions for behavior in case of a fire in school. In case of fire, every teacher and member of the school staff should know how to sound the alarm and every child should be taught to report to the nearest teacher if he discovers a fire in school.

When the alarm sounds, every person in school should be well acquainted with the course of action to be taken, since fire drills are understood to be a regular part of all school schedules. (*See Fire Exit Drills published by the National Fire Protection Association.*)

#### In Public Places

When there is a fire in a public place, such as in a theater, it is very important to keep calm. Generally theaters are comparatively fire-safe, and there is usually enough time in an emergency to leave a theater safely. In fact, there is more danger from panic than from a fire itself, in a theater.

If there is a fire in a public place, walk quietly to the nearest exit. Never run, push, or shout.

#### At Home

Since any home may have a fire, all should be prepared with a plan of action in any emergency. The family should discuss giving the alarm, extinguishing small fires, and escaping from the house in case of serious fires.

As in school, practice fire drills are a valuable means of preparing for emergencies, and may be recommended as a useful home activity. Children should practice rolling in a rug in case clothing should catch fire. Testing doors to see whether they are warm before opening and covering the face with a damp cloth (when available) in case of smoke are other details which could be included in a home fire drill.

#### In a Motor Vehicle

In case of fire in a motor vehicle, the vehicle should be stopped as soon as possible, since the wind created by a moving car will fan the fire. The ignition should be turned off and everyone should

get out without delay. The fire should be fought from the outside of the car, and no one should enter again until the smoke has been cleared out.

### How Fires Are Extinguished

1. Principles of fire extinguishing.
2. Types of fires.
3. Common types of fire extinguishers.
4. Fire extinguishers in the home.

### Principles of Fire Extinguishing

Fires are extinguished principally by:

(a) *Cooling*.—Sufficient heat is removed from the burning material so that it is brought below its ignition temperature. Water or water containing chemicals is usually used for this purpose.

(b) *Smothering*.—The fire is covered with some material which does not burn and which blankets the fire so that air is cut off.

(c) *Cooling and smothering combined*.

### Types of Fires

The best method for putting out any fire depends, chiefly, upon the type of material which is burning. Fires are classified for this purpose as follows:

*Class A fires*: Fires in ordinary combustibles, such as paper, wood, textiles. Such fires may be put out by any means, but cooling is usually the quickest method.

*Class B fires*: Fires in oils, greases, and flammable liquids. A stream of water does not put out the fire and it may spatter the burning liquid, spreading the fire. Instead, such fires must be extinguished with smothering agents.

*Class C fires*: Fires in electrical equipment. Water in any form must not be used on such fires, since water conducts electricity and may ruin the equipment and endanger the fire fighter. Such fires are extinguished by smothering with materials which contain no water.

### Types of Fire Extinguishers

Fire extinguishers have been developed for each of these types of fires. Extinguishers are tested by the Underwriters' Laboratories. Those which are found adequate are given a label of approval and marked according to the class of fire on which they may be used.

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Common types of fire extinguishers are:

*Pump tank* which contains plain water and is therefore used on Class A fires only.

*Soda acid* which contains water and chemicals and is used on Class A fires only.

*Foam* which contains two chemical solutions in water that mix to produce a foam-like substance which has both a cooling and smothering action and may therefore be used on both Class A and Class B fires.

*Vaporizing liquid* which is a chemical that turns into a heavy vapor on contact with heat and thus smothers fire; it may be used on any class of fire, but is most effective on Class B and Class C fires.

*Carbon dioxide* which is an inert gas used to smother fire. Like the vaporizing liquid type, it may be used on any class of fire. It is most effective, however, on Class B and Class C fires.

Common household equipment which may be used to smother fires when approved extinguishers are not available include rugs, blankets, salt, and baking soda. Sand can also be kept available. It should be recognized, however, that such makeshifts may bring the user dangerously close to the flames.

For Class A fires, a pail of water, the garden hose, and farm sprinkling apparatus may be used.

Fire in a person's clothing can be put out by rolling in a blanket or rug.

### Fire Extinguishers in the Home

A fire extinguisher is a valuable means of protecting the home against serious loss in case of fire. Such extinguishers, if used properly and in time, can put out small fires before the fire department arrives, thus saving the home from destruction.

Extinguishers are also useful in keeping fires under control, so that they do not spread, until the firemen arrive to "clean up" any remaining fire.

If an extinguisher is to be effective in an emergency, it must be properly constructed. Dependable extinguishers bear the label of approval of the Underwriters' Laboratories. Directions for operating the extinguisher appear on its face.

Extinguishers in the home should be placed where they can be reached easily and will not be cut off by a fire. Such places may be:

At the entrance to the kitchen.

At the head of the basement stairs and on all stairway landings.

Just inside the entrance to the garage.

### **What the Community Can Do About Fire Safety**

1. Community fire losses.
2. The fire department.
3. Community laws giving protection against fire.
4. Community safety programs.

#### **Community Fire Losses**

Detailed information about the special fire problems and fire losses of the local community can become a valuable part of the curriculum, if they are interpreted in terms that children can understand.

#### **The Fire Department**

Basic to fire safety in any community is a well-organized, efficient fire department. A study of the local fire department, including its history, methods of operation, and training program is worth while.

#### **Community Fire Laws**

An indication of the degree of fire-safety consciousness of any community is the kind of laws it has set up to protect its citizens against fire.

A discussion of such laws will give children and their families some understanding of their rights in apartment houses and public buildings with regard to fire-safe construction, exits, and other safety features.

The school fire-safety education program can help the community to recognize the importance of laws which provide proper protection when properly enforced, and may aid in securing such laws.

#### **Community Fire-Safety Programs**

The school program can be made more vital if the children recognize it as part of a larger, community program in which their parents and other citizens have a part. Various organizations with a stake in fire safety should be asked to join school groups in a cooperative effort. However, the school should take the initiative in becoming a part of any program already in effect.

## Dictionary of Fire-Safety Terms

These words represent a basic vocabulary in fire safety summarized from the preceding pages of this pamphlet, plus several terms common to fire-safety literature. This section is designed for ready reference use, and to ensure accuracy in teacher-pupil discussions and interpretation of informational material on fire safety.

**Approved:** Inspected and tested and declared safe by proper authorities. Fire extinguishers and electrical equipment should be approved by Underwriters' Laboratories.

**Arcing:** The discharge of electrical current across a gap or break in an electrical circuit, either by intermittent or continuous sparking.

**Arson:** The willful or malicious destruction of property by fire.

**Carbon Dioxide:** Gas used to smother fires. In fire extinguishers, carbon dioxide is stored as a liquid, under pressure. When the pressure is released, by operating a valve, the carbon dioxide escapes as a gas, expanding to 450 times its volume in the extinguishers, and forming an inert blanket over the fire. Since gases cool as they expand, some of the carbon dioxide freezes to form "dry ice."

**Carbon Monoxide:** Poisonous gas formed during fire under certain conditions, especially when there is not enough oxygen for complete combustion.

**Class A Fires:** Fires in ordinary combustibles.

**Class B Fires:** Fires involving flammable liquids, oils, and grease.

**Class C Fires:** Fires in live electrical apparatus.

**Cleaning Fluid:** (*See* Flammable solvent.)

**Combustibles:** Materials which will burn.

**Combustion:** Burning. Combining rapidly with oxygen. (*See* Fire.)

**Conduction:** Means of transmission of heat by direct contact, spreading fire (i.e., a hot iron can set fire to the ironing board).

**Convection:** Means of transmission of heat by drafts and currents, spreading fire (i.e., a fire in the basement can be carried to the roof by an upward draft of air).

**Cooling:** Removing heat, so that burning material is brought below its combustion temperature and the fire is extinguished. Water is ordinarily used as the cooling medium.

**Electric Sparks:** *See* Friction; *also* Sparking.

**Fire:** Rapid combination of a substance with oxygen, producing light, heat, and usually smoke, and various chemical compounds. (*See* Products of combustion.)

**Fire Hazard:** A condition which is likely to start a fire or cause fire to spread rapidly.

**Fire Prevention:** Activities or measures which aim at preventing the start of fire.

**Fire-Prevention Week:** A week commemorating the great Chicago Fire of 1871, observed the week of October 9, the day on which that fire occurred. Fire-Prevention Week is used as a means of calling public attention to the importance of fire safety,

- Fire Protection:** Activities or measures which aim at preventing the spread of fire or putting it out, once it has occurred.
- Fire-Resistant, Fire-Retardant:** A fireproof material, technically a noncombustible material, such as glass, steel, etc. Combustible materials cannot be made entirely noncombustible, but they can be treated so that, for a certain length of time, they do not catch fire readily. This treatment may be known as flameproofing, fireproofing, fire retarding.
- Fire Safety:** This term is often used to cover both fire prevention and fire protection.
- First-Aid Fire Appliance:** A portable appliance designed to cope with fire in its early stages.
- Flame:** A body of burning gas or vapor containing some of the products of combustion. (See Products of combustion.)
- Flameproofing:** (See Fire Retarding.)
- Flammable Liquid:** A liquid such as gasoline. Capable of giving off vapors which will burn.
- Flammable Solvent:** A flammable liquid used to dissolve grease and dirt, as in dry cleaning. These liquids give off invisible vapors which can travel long distances along the floor—i.e. to the stove or fireplace, and thus cause a serious fire. Such liquids (benzine, naphtha, gasoline) should therefore never be used for dry cleaning at home.
- Flammable Substance:** (Fire-safety experts do not use the term "inflammable."): Substance which can burn.
- Foam:** Material used to put out fires in ordinary combustibles and in flammable liquids. Foam is a thick fluid consisting of minute bubbles, filled with carbon dioxide gas. It is produced by the reaction between two solutions inside a foam extinguisher which mix when the extinguisher is inverted.
- Friction:** The rubbing of one thing against another. This produces heat, and in some cases an electric spark. Friction may produce fire.
- Fuse:** A fusible metal element inserted for safety in an electric circuit. When the current increases beyond a certain strength, because the circuit has been overloaded or for some other reason, the metal melts and interrupts the circuit, thus cutting off the flow of current.
- Ignition Temperature:** The temperature at which a material will catch fire.
- Inert Gas:** Gas which does not burn, for example, carbon dioxide.
- Inflammable:** (See Flammable.)
- International Association of Fire Chiefs:** An organization of international scope composed of chiefs of fire departments, for the purpose of improving and advancing the fire services in fire protection and fire prevention.
- Lightning Rod:** A rod attached to the roof of a building and connected to the ground so that it conducts lightning into the ground.
- National Board of Fire Underwriters:** An organization maintained by stock fire insurance companies, doing engineering, statistical, and educational work in the field of fire safety. (85 John Street, New York City.)
- National Fire Protection Association:** A nonprofit technical and educational organization composed of groups and individuals interested in improving methods of fire protection and prevention and in educating the public in fire safety. (60 Batterymarch Street, Boston, Mass.)
- Nonflammable:** Noncombustible.
- Oxidation:** Combination with oxygen.

**Products of Combustion:** When materials burn, they combine with oxygen to form various gases, liquids, and solids. Most substances contain carbon, which burns to give carbon dioxide and, in some cases, carbon monoxide, which is poisonous. Some carbon is left on the burned material as char. Particles of carbon also rise in the flame, making it yellow, and in the smoke, making it black. In addition to carbon monoxide, other harmful gases may be formed. It is therefore important to leave a room where there is much smoke, or where there has been a fire and not return until after it has been thoroughly aired.

**Pump Tank:** Fire extinguisher which supplies a stream of water and is operated by pumping.

**Radiation:** Transmission of heat through waves (i.e. the waves of heat which may be seen over a radiator).

**Rapid Oxidation:** The rapid combination of a material with oxygen. (See Fire; also Oxidation.)

**Safety Match:** A match which can be ignited only by striking on the match-box cover. An ordinary match can be struck anywhere, since its tip contains all the necessary chemicals. The tip of the safety match is incomplete and the box cover must supply the missing chemicals.

**Self-Inspection Form:** A check list used by the occupant of a home or other property when making inspections to help eliminate fire hazards.

**Slow Oxidation:** The slow combination of a material with oxygen. Spontaneous ignition is the result of slow oxidation.

**Smothering:** Cutting off the source of air. Common smothering agents for fires include foam, carbon dioxide, vaporizing liquid, and sand.

**Soda Acid:** Fire extinguisher which supplies a stream of water expelled by chemical reaction. When the extinguisher is inverted, its contents (a solution of bicarbonate of soda and sulphuric acid) mix and form carbon dioxide gas. The pressure of the gas forces out the stream of water.

**Spark Arrester:** Apparatus which can be installed in chimneys to prevent sparks from flying out on to the roof. Especially important where there is no fire-retardant roofing.

**Sparking:** The formation of a spark, resulting from a sudden break in an electrical circuit.

**Sparks:** Small particles of fire which may be given off by burning materials or may be caused by friction or, by a break in an electrical circuit.

**Spontaneous Ignition (incorrectly called spontaneous combustion):** Self-generation of heat through slow oxidation, producing fire.

**Sprinkler:** A system of water piping with heat-actuated sprinkler heads by which fires are automatically put out.

**"Strike Anywhere" Match:** A match which has all the chemicals necessary in its own head and needs only heat to take fire. The heat is generally supplied by friction, that is, by "striking anywhere." See Safety match.

**Underwriters' Laboratories:** A nonprofit organization which maintains and operates laboratories for the testing of devices and materials to determine whether they are safe and dependable. U. L. approval on fire extinguishers and electrical equipment by means of labels is the only guide by which consumers may know equipment is reliable.

**Vaporizing Liquid Extinguisher:** An extinguisher containing a liquid which consists of specially treated carbon tetrachloride and certain other volatile chemicals. When the liquid is expelled and comes in contact with fire it

turns into a heavy vapor which blankets the burning material, smothering the fire.

**Volatile Liquid:** A liquid which evaporates or gives off vapors. These vapors may be nonflammable (*See above*) or flammable (*see* Flammable solvents).

### And in Conclusion

The approach which the individual school makes to fire safety may well be an objective one in terms of the activities of children. Many of the suggestions of things that children can do with helpful teacher guidance may be included in the school program in a wide variety of ways. Oral expression offers one avenue. Social studies which emphasize community living, safety education, and science are all subject areas which can be utilized if the school is organized on that basis. In the child-centered school where experiences develop from needs and interests, problems of fire safety are a natural outgrowth of discussions about home and family living, democratic school living, and contributions to community living. How the fire-safety program is to be engineered is a matter for each school to decide. The consideration to be emphasized here is that such a program will find its natural place in the total educational program.

### Brief Bibliography of Sources

Since specific materials are not always available, it is recommended that teachers write to the agencies which produce materials, for currently available publications, indicating the age and grade of the children, and the nature of the educational experience that is under way or being planned.

Center for Safety Education,  
New York University, New York, N. Y.

Chamber of Commerce of the United States,  
Washington, D. C.

A single pamphlet.

International Association of Electrical Inspectors,  
612 North Michigan Ave., Chicago, Ill.

A small amount of material for elementary school use.

National Board of Fire Underwriters,  
85 John Street, New York, N. Y.

Pamphlets dealing especially with safeguards against fire.

National Fire Protection Association,  
60 Batterymarch Street, Boston 10, Mass.

Many publications planned with the elementary school in mind.

Superintendent of Documents, U. S. Government Printing Office,  
Washington, D. C.

Publications from various Government agencies.

☆ U. S. Government Printing Office : 1946—695458

