

LEG. FINANCE - BILLS 1979 - 1980 1141

XZ CSHB 645 1091



RECORDS CERTIFICATION



I, the undersigned, an employee of the State of Alaska, do hereby certify that the microfilm images on this microform are accurate reproductions of the original records of the State of Alaska as accumulated during the regular course of business, and that it is the established policy and practice of this State to microfilm its records and to dispose of the original records after microfilm reproductions have been made.

James O Smith
Signature of Camera Operator

3/20/90
Date

Original sponsor: Rules/Governor

Offered: 4/1/80

Funding Information

| | |
|--------------|------------------|
| General Fund | \$616,000 |
| Other Funds | -0- |
| | <u>\$616,000</u> |

1 IN THE HOUSE BY THE RULES COMMITTEE

2 SENATE CS FOR CS FOR HOUSE BILL NO. 645

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 ELEVENTH LEGISLATURE - SECOND SESSION

5 A BILL

6 For an Act entitled: "An Act amending and transferring appropriations made
7 in 1979 and appropriating for a short-term loan for a
8 communications system for the Swan Lake hydroelectric
9 project; and providing for an effective date."

10 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

11 * Section 1. Section 4, ch. 49 SLA 1979 is amended to read:

12 Sec. 4. The sum of \$2,000,000 is appropriated from the general
13 fund to [THE POWER PROJECT REVOLVING FUND OF] the Alaska Power Authority
14 [AS 44.56.170] for costs associated with the Tye Lake hydroelectric
15 project.

16 * Sec. 2. The sum of \$616,000 is appropriated from the general fund for
17 payment as a short-term loan to the City of Ketchikan for a permanent
18 microwave communications system for the Swan Lake hydroelectric project. The
19 terms of the loan made by this appropriation shall be determined by the
20 Alaska Power Authority.

21 * Sec. 3. Section 25, ch. 80, SLA 1979, page 64, line 18, is amended to
22 read:

| | APPROPRIATION | OTHER FUNDS |
|--|---------------|-------------|
| | ITEMS | |
| <u>Eklutna Power Plants, Paint River and</u> | | |

| | | |
|--|--------|--------|
| Six Mile Creek Study Grant - Anchorage | 50,000 | 50,000 |
|--|--------|--------|

27 * Sec. 4. The appropriation of \$1,010,000 from the general fund made to
28 the Department of Transportation and Public Facilities for purchase and
29 construction of the Anchorage skill center in sec. 25, ch. 80, SLA 1979, at

1 page 56, lines 16 and 17, is transferred to be paid as a direct grant to the
2 Municipality of Anchorage for purchase and construction of the skill center.

3 * Sec. 5. This Act takes effect immediately in accordance with AS 01.10.-
4 070(c).

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COMMITTEE REPORT
SENATE

FURTHER: None

3/17/80

Date: 3/21/80

Mr. President:

The Committee on FINANCE has had CSHB 645
amending and transferring appropriations made in 1979

under consideration and (a majority of the committee) (the committee)
reports it back with the following recommendations:

- do pass do not pass
- do pass with attached amendments(s)
- replace with CS for _____ same title
 new title
- and recommends _____
- AND attaches a "Letter of Intent" New Fiscal Note
- reports it back ^{without} without recommendation *a. amended.*
- referred to the _____ Committee

MEMBERS SIGNING
DO PASS

MEMBERS HAVING
OTHER RECOMMENDATIONS:

John Dickett
William
John Hackney

Eric Kay
John Dickett

John Dickett
 CHAIRMAN

A M E N D M E N T

OFFERED IN THE SENATE:

By: Senate Finance

To: _____ SENATE BILL No. _____

HOUSE BILL No. CSHB 645

PAGE: _____

LINE: _____

Page 1, Line 20:

After "* Sec. 3." insert "\$500,000 of", and after
"appropriation" delete "of \$1,010,000"

Page 1, Lines 23 & 24:

Delete "be paid as a direct grant to the
Municipality of Anchorage for purchase and
construction of the skill center." and insert
"the Department of Education to be used for
initial operating costs at the Anchorage
Skill Center."

Original sponsor: Rules/Governor

Offered: 2/22/80

Referred: Rules

Funding Information

| | |
|---------------|--------------|
| General Fund: | - 0 - |
| Other Funds: | - 0 - |
| | <u>- 0 -</u> |

1 IN THE HOUSE

BY THE FINANCE COMMITTEE

2

CS FOR HOUSE BILL NO. 645

3

IN THE LEGISLATURE OF THE STATE OF ALASKA

4

ELEVENTH LEGISLATURE - SECOND SESSION

5

A BILL

6

For an Act entitled: "An Act amending and transferring appropriations made in 1979; and providing for an effective date."

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BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

9

* Section 1. Section 4, ch. 49 SLA 1979 is amended to read:

10

Sec. 4. The sum of \$2,000,000 is appropriated from the general fund to [THE POWER PROJECT REVOLVING FUND OF] the Alaska Power Authority [AS 44.56.170] for costs associated with the Tyee Lake hydroelectric project.

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* Sec. 2. Section 25, ch. 80, SLA 1979, page 64, line 18, is amended to read:

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APPROPRIATION

OTHER FUNDS

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ITEMS

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Eklutna Power Plants, Paint River and

19

| | | |
|--|--------|--------|
| Six Mile Creek Study Grant - Anchorage | 50,000 | 50,000 |
|--|--------|--------|

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* Sec. 3. ^{\$500,000 of} The appropriation of ~~\$1,010,000~~ from the general fund made to the Department of Transportation and Public Facilities for purchase and

21

construction of the Anchorage skill center in sec. 25, ch. 80, SLA 1979, at

22

page 56, lines 16 and 17, is transferred to ^{the Dept. of Education to be used for initial operating costs at the Anch. Skill Center} ~~be paid as a direct grant to the Municipality of Anchorage for purchase and construction of the skill center.~~

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* Sec. 4. This Act takes effect immediately in accordance with AS 01.10.-

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070(c).

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Alaska State Legislature

House of Representatives

M E M O R A N D U M

Pouch V
State Capitol
Juneau, Alaska 99811

Official Business

To: Senator Robert H. Ziegler, Sr.

From: Representative Terry Gardiner *T.G.*

Date: March 19, 1980

Re: Swan Lake

Our local folks have asked us to get a short term loan of \$616,000 for Swan Lake. The funds will be used for the communications system. If they have the funds now the communications system can be integrated to the construction communications system. If not, the construction communications system will be canned at the end of the project. Hence, a waste of good money and equipment. So, if we can get them this money now they save \$616,000 in the end.

The plan is to authorize the Alaska Power Authority to lend \$616,000 out of existing funds appropriated last year. They are not using the funds now. When the \$18 million passes, Ketchikan will repay the \$616,000 to the Alaska Power Authority.

HB 645 has passed the House and is ideal to put an amendment on to solve our problem. The amendment would be:

Insert on page 1, line 14, the following, and renumber the succeeding sections accordingly:

*Section 2. Section 25, Chapter 80, SLA, page 66, line 38 is amended to read:

"There is appropriated from the general fund the sum of \$616,000 for the purpose of a permanent microwave communications system for the Swan Lake hydroelectric project. The amount appropriated for this purpose shall be a short term loan. ~~to be repaid out of the proceeds of the \$18 million appropriated by the Legislature for purposes of constructing the Swan Lake project.~~ *the terms of which to be determined by the Alaska Power Authority.*

(Renumber succeeding sections accordingly.)

Backup pertaining to Sec. 1, CSHB 645

January 30, 1980

The Honorable Terry Gardiner
Speaker of the House
Alaska State Legislature
Pouch V
Juneau, Alaska 99811

Dear Mr. Speaker:

Under the authority of art. III, sec. 18, of the Alaska Constitution, I am transmitting a bill converting a \$2,000,000 FY 80 appropriation to the Power Project Revolving Fund to an appropriation to the Alaska Power Authority (APA) itself.

Last year, the APA received an appropriation of \$2,715,000 for a large number of hydroelectric projects (see ch. 80 SLA 1979, at pages 66 and 67) upon the understanding that the appropriation would be repaid to the general fund from the revenue generated by the projects for which that financial assistance was provided. Similarly, it is intended that, by transferring this \$2,000,000 from the Power Project Revolving Fund to the APA itself, the APA will repay the general fund from the revenue of the Tyee Lake project in accordance with the terms of the project bonds and generally applicable regulations to be adopted by the APA governing that kind of repayment.

I am proposing this advance to the APA in this manner only on a temporary basis pending the enactment of formal statutory guidelines on the subject.

Sincerely,

Jay S. Hammond
Governor

Original sponsor: Rules/Governor

Offered: 2/22/80
Referred: Rules

Funding Information

| | |
|---------------|--------------|
| General Fund: | - 0 - |
| Other Funds: | - 0 - |
| | <u>- 0 -</u> |

1 IN THE HOUSE

BY THE FINANCE COMMITTEE

2 CS FOR HOUSE BILL NO. 645

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 ELEVENTH LEGISLATURE - SECOND SESSION

5 A BILL

6 For an Act entitled: "An Act amending and transferring appropriations made
7 in 1979; and providing for an effective date."

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9 * Section 1. Section 4, ch. 49 SLA 1979 is amended to read:

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11 fund to [THE POWER PROJECT REVOLVING FUND OF] the Alaska Power Authority
12 [AS 44.56.170] for costs associated with the Tye Lake hydroelectric
13 project.

14 * Sec. 2. Section 25, ch. 80, SLA 1979, page 64, line 18, is amended to
15 read:

| | APPROPRIATION | OTHER FUNDS |
|---|---------------|-------------|
| | ITEMS | |
| 18 <u>Eklutna Power Plants, Paint River and</u> | | |
| 19 Six Mile Creek Study Grant - Anchorage | 50,000 | 50,000 |

20 * Sec. 3. The appropriation of \$1,010,000 from the general fund made to
21 the Department of Transportation and Public Facilities for purchase and
22 construction of the Anchorage skill center in sec. 25, ch. 80, SLA 1979, at
23 page 56, lines 16 and 17, is transferred to be paid as a direct grant to the
24 Municipality of Anchorage for purchase and construction of the skill center.

25 * Sec. 4. This Act takes effect immediately in accordance with AS 01.10.-
26 070(c).

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MINUTES
ALASKA STATE LEGISLATURE

B U D G E T A N D A U D I T C O M M I T T E E

September 7, 1979
Bethel City Hall
Bethel, Alaska

Chairman Duncan called the meeting to order at 9:30 a.m.
Members of the Committee present were:

| | |
|----------------------------|----------------|
| Rep. Duncan, Chairman | <u>PRESENT</u> |
| Sen. Hohman, Vice Chairman | |
| Rep. Bettisworth | |
| Sen. Bradley | |
| Rep. Carney | |
| Rep. Montgomery | |
| Sen. Sturgulewski | |

Representative Schaeffer and Senators Kertula and Sackett were not present.

Also in attendance were: Representative Terry Martin; J.H. Hogan, Director, Legislative Finance Division; Jerry Wilkerson, Ken Bischoff, Roger LaVine and Deborah Caonette, Legislative Audit Division; Jim Stey, Division of Budget and Management; Gary Gross, Association of Village Council Presidents Housing Authority; Floyd Heimbuch, Cook Inlet Aquaculture Association; Mavis Waarvik, Department of Transportation and Public Facilities; David Canterbury, Department of Health and Social Services; Dr. John White, DDS, Bethel; Rosey Porter, Tundra Drums, Bethel; and Ron Witcraft, Administrative Assistant to Representative Duncan.

Chairman Duncan stated the first order of business would be to hear from the Bethel contingent.

Senator Hohman gave a brief description of the problem confronting Bethel's senior citizen housing project. He advised the current holdup in the State's processing of the \$334,000 grant contract would result in a six-week delay in project construction, which involves 23 units scheduled for completion November 1. He stated the contractor (Tom Gitton Construction Company, Anchorage) has submitted a second request for payment of approximately \$200,000, and the Association of Village Council Presidents Housing Authority, which is in control of the project, cannot meet this request without interim financing from United Bank.

BETHEL SENIO
CITIZEN
HOUSING
PROJECT

Senator Hohman introduced Gary Gross, controller of AVCP Housing Authority, who testified the contractor has given notice he will stop construction within seven days if his request is not met. Mr. Gross stated the problem is the bank will not provide interim financing without a firm commitment from the State.

Senator Hohman stated they need \$250,000 to keep the contractor on the job and requested the Budget and Audit Committee contact the Governor's office to obtain a loan from the Governor's contingency fund for that amount and to expedite the contract processing. Chairman Duncan suggested, as an alternative, the Budget and Audit Committee could request the Governor's office give indication to the bank of the state's commitment. There being no objection to these suggestions, staff was directed to look into this matter and report back to the Committee.

After a telephone call to Juneau, Jay Hogan, Legislative Finance Division, reported a contract was being delivered to Bethel that night, which will be signed and given to the Department of Community and Regional Affairs Saturday. He added a draft will be cut on Monday, and Bethel should have the funds on Wednesday, September 12.

Senator Hohman introduced Floyd Heimbuch, director of Cook Inlet Aquaculture Association, who presented a request (memorandum attached) to redirect remaining funds from a state grant for a feasibility study of Six Mile Creek to two other projects--Eklutna and Paint River.

COOK INLET
ACQUACULTURE
ASSOCIATION

Representative Montgomery pointed out this was a capital improvement project approved during the last legislative session. Chairman Duncan indicated there is a problem with this in that the Budget and Audit Committee cannot originate revised programs, that they must originate through Office of the Governor, Division of Budget and Management.

Chairman Duncan asked Jim Stey, Division of Budget and Management, if they had seen this. Mr. Stey made the following reply:

No, we haven't seen it in a formal submission. To go along with what you were saying before, I believe the intent was just to do a planning study in the area of Six Mile Creek for certain aquaculture purposes; and if we held at that level, I believe they could just spend the money on another project that they documented. The fact that they have made an attempt at the initial project and decided that it was not feasible, and they wanted to carry it on to

another locale for same basic appropriation purposes, there is no difficulty with that... (tape inaudible).

Chairman Duncan asked if this does not require Budget and Management's approval, and Mr. Stey indicated no, but added that a revised program may be required if the language specifically states the grant is to be used for Six Mile Creek.

Senator Hohman suggested placing Mr. Stey's statement in the record indicating Budget and Management's position. He added that, if this meets with Representative Montgomery's approval, he would move to place Budget and Audit Committee on record in support of these revisions.

Mr. Hogan stated the appropriation to the Department of Fish and Game reads: "Six Mile Creek study-grant, Anchorage"; and the purpose of the appropriation has been met. Mr. Hogan suggested what could be done is to include language broadening this appropriation during the next legislative session. When asked if anything could be done during the interim, Mr. Hogan stated the Committee could write a letter to the Governor indicating its wishes, but that the Attorney General's ruling would probably be that this is still a transfer between appropriations.

Chairman Duncan stated he preferred not to take this type of action as it could be precedent setting and cause future problems. The Committee was in agreement.

Chairman Duncan stated the committee would proceed with the revised programs as listed on the attached Agenda.

REVISED
PROGRAMS

RP 80-46: Mr. Stey gave a brief review of the backup. Senator Hohman moved and asked unanimous consent that RP 80-46 be approved. There being no objection, it was so ordered.

RP 80-46

RP 80-54: Mr. Stey briefly reviewed the backup material. Senator Hohman moved and asked unanimous consent that RP 80-54 be approved. There being no objection, it was so ordered.

RP 80-54

RP 80-55: Mr. Stey commented briefly on the backup. Senator Hohman moved and asked unanimous consent that RP 80-55 be approved. There being no objection, it was so ordered.

RP 80-55



Alaska State Legislature

House of Representatives

M E M O R A N D U M

Pouch V
State Capitol
Juneau, Alaska 99811

Official Business

To: Senator Robert H. Ziegler, Sr.

From: Representative Terry Gardiner *T.G.*

Date: March 19, 1980

Re: Swan Lake

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(Renumber succeeding sections accordingly.)

Funding Information:
General Fund: \$2,000,000
Other Funds: -0-
\$2,000,000

Introduced: 1/30/80
Referred: Finance

1 IN THE HOUSE

BY THE RULES COMMITTEE BY
REQUEST OF THE GOVERNOR

2 HOUSE BILL NO. 645

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 ELEVENTH LEGISLATURE - SECOND SESSION

5 A BILL

6 For an Act entitled: "An Act transferring an appropriation to the Alaska
7 Power Authority for costs associated with the Tye
8 Lake hydroelectric project; and providing for an ef-
9 fective date."

10 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

11 * Section 1. Section 4, ch. 49 SLA 1979 is amended to read:

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13 fund to [THE POWER PROJECT REVOLVING FUND OF] the Alaska Power Author-
14 ity [(AS 44.56.170)] for costs associated with the Tye Lake hydroelec-
15 tric project.

16 * Sec. 2. This Act takes effect immediately in accordance with AS 01.-
17 10.070(c).

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THE LEGISLATURE OF THE STATE OF ALASKA
ELEVENTH LEGISLATURE

FISCAL NOTE

I. REQUEST
 Bill/Resolution No. HB 645
 Title Transfer of \$2 Million approp. to APA for costs assoc. w/ Tyee Lake hydroelectric project.
 Requested by Milt Barker Date 1-31-80

II. FISCAL DETAIL
 Agency Affected Alaska Power Authority
 Program Category Affected Development
 BRU, Program, or Subprogram(s) Affected Alaska Power Authority
 (Note: If more than one budget component is affected, separate line-item amounts and funding for each component in the analysis section.)

EXPENDITURES (Thousands of Dollars)

| | FY 80 | FY 81 | FY 82 | FY 83 | FY 84 | FY 85 |
|--------------------------|---------|-------|-------|-------|-------|-------|
| 100 PERSONAL SERVICES | | | | | | |
| 200 TRAVEL | | | | | | |
| 300 CONTRACTUAL | | | | | | |
| 400 COMMODITIES | | | | | | |
| 500 EQUIPMENT | | | | | | |
| 600 LAND & STRUCTURES | | | | | | |
| 700 GRANTS, CLAIMS, ETC. | 2,000.0 | | | | | |
| TOTAL | 2,000.0 | | | | | |

FUNDING (Thousands of Dollars)

| | | | | | | |
|-----------------------------|---------|--|--|--|--|--|
| GENERAL FUND | 2,000.0 | | | | | |
| FEDERAL FUNDS | | | | | | |
| OTHER (Specify Fund Source) | | | | | | |

POSITIONS

| | | | | | | |
|-----------|--|--|--|--|--|--|
| FULL TIME | | | | | | |
| PART TIME | | | | | | |
| TEMPORARY | | | | | | |

III. ANALYSIS (See Fiscal Note Preparation Instructions, Section III)
 Transfer of \$2 Million from general fund to Alaska Power Authority instead of Power Project Revolving Fund.

IV. DATE 1-31-80 PREPARED BY Eric Yould by D.C.
 AGENCY Alaska Power Authority
 PHONE 277-7641
 Original: Legislative Finance
 cc: Budget and Management
 Prime Sponsor (First Legislator Named)

CATEGORY: DEVELOPMENT

AGENCY: ALASKA POWER AUTHORITY

PROGRAM: ECONOMIC DEVELOPMENT

BRU (s): ALASKA POWER AUTHORITY

The goal of the Alaska Power Authority BRU is to promote, develop and advance the general prosperity and economic welfare of the people of Alaska by providing a means of constructing, acquiring, financing and operating power production facilities limited to fossil fuel, wind power, tidal, geothermal, hydroelectric, solar energy, and waste energy conservation facilities.

Due to the escalating costs of fossil fuels and Alaska's dependence on fossil fuels for electric generation, the emphasis of the Authority is to supplant this dependence with renewable sources of energy, principally hydroelectric power. Alaska's lakes and rivers provide numerous potentials for hydroelectric generation. However, many projects that could be economically feasible, when compared to life cycle costs of conventional fossil-fuel generation, cannot be financed. Excess capacity of the projects, which cannot be sold to other utilities for lack of a transmission grid, provides insufficient revenues to retire revenue bonds. To overcome this difficulty and to assure project development, the Authority seeks State assistance in the form of subordinated loans and guarantees of revenue bonds.

The Authority has been allocated \$4,760,000 in the FY 81 capital budget to investigate the feasibility of renewable sources of energy, particularly hydroelectric power, in several regions of the State. The most significant feasibility study is for the Upper Susitna River which was funded at \$8,178,000 in FY 80 and \$3,335,000 in FY 81. In addition, it is recommended that a subordinate loan of \$18,000,000 be funded for the Swan Lake project near Ketchikan.

| COMPONENT DESCRIPTION | 79 AUTH | 79 FINAL | 79 ACT | 80 AUTH | 80 SUPL | 80 RP | GOVERNOR |
|------------------------------------|---------|----------|--------|---------|---------|-------|----------|
| ALASKA POWER AUTHORITY | 470.4 | 513.0 | 487.9 | 347.7 | | 12.6 | 332.1 |
| ** TOTAL | 470.4 | 513.0 | 487.9 | 347.7 | | 12.6 | 332.1 |
| ** CHANGE VERSUS 80 AUTH | | | | | | | -4.4% |
| OBJECT DESCRIPTION | | | | | | | |
| PERS. SERV. | 152.3 | 126.5 | 122.3 | 160.4 | | | 184.2 |
| TRAVEL | 37.0 | 27.0 | 27.4 | 30.0 | | | 32.1 |
| CONTRACTUAL | 277.7 | 331.1 | 309.7 | 151.2 | | 12.6 | 106.9 |
| COMMODITIES | 3.4 | 1.4 | 1.6 | 3.6 | | | 3.9 |
| EQUIPMENT | | 2.0 | 1.9 | 2.5 | | | 5.0 |
| GRANTS, CLMS | | 25.0 | 25.0 | | | | |
| FUNDING SOURCE | | | | | | | |
| GENERAL FUND | 470.4 | 513.0 | 487.9 | 347.7 | | | 332.1 |
| PGM RECEIPTS | | | | | | 12.6 | |
| ** GENERAL FUND CHANGE VS. 80 AUTH | | | | | | | -4.4% |
| POSITIONS | | | | | | | |
| FULL-TIME | 5.0 | 5.0 | 5.0 | 5.0 | | | 5.0 |
| STAFF MONTHS | 60.0 | 60.0 | 60.0 | 60.0 | | | 60.0 |



RECORDS CERTIFICATION



I, the undersigned, an employee of the State of Alaska, do hereby certify that the microfilm images on this microform are accurate reproductions of the original records of the State of Alaska as accumulated during the regular course of business, and that it is the established policy and practice of this State to microfilm its records and to dispose of the original records after microfilm reproductions have been made.

James O Smith
Signature of Camera Operator

3/20/90
Date

(11)

COMMITTEE REPORT

HOUSE

3/7/80

FURTHER:

Date: 4-18-80

Mr. Speaker:

The Committee on FINANCE has had HB 648

"An Act relating to fire prevention."

under consideration and (a majority of the committee) (the committee) reports it back with the following recommendations:

- do pass do not pass
- do pass with attached amendments(s)
- replace with CS for HB 648 (Finance) same title
 new title
- and recommends it "do pass"
- AND attaches a "Letter of Intent" New Fiscal Note \oplus 2/5/80
- reports it back without recommendation
- referred to the _____ Committee

MEMBERS SIGNING
DO PASS

Freeman

McKinney

Smith

Montgomery

MEMBERS HAVING
OTHER RECOMMENDATIONS:

~~_____~~

Freeman
 Vice CHAIRMAN

Original sponsors: Malone and Duncan

1 IN THE HOUSE BY THE FINANCE COMMITTEE
2 CS FOR HOUSE BILL NO. 648 (Finance)
3 IN THE LEGISLATURE OF THE STATE OF ALASKA
4 ELEVENTH LEGISLATURE - SECOND SESSION
5 A BILL

6 For an Act entitled: "An Act relating to fire prevention."

7 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

8 * Section 1. AS 29.53.060(a) is amended to read:

9 (a) The assessor shall assess property at its full and true value
10 as of January 1 of the assessment year, except as provided in this
11 section and AS 29.53.030, 29.53.035, and 29.53.160. The full and true
12 value is the estimated price which the property would bring in an open
13 market and under the then prevailing market conditions in a sale between
14 a willing seller and a willing buyer both conversant with the property
15 and with prevailing general price levels. The assessor may not include
16 the value of a fire protection system in the assessment of the full and
17 true value of a building.

18 * Sec. 2. AS 29.53.060 is amended by adding a new subsection to read:

19 (d) In this section, "fire protection system" means a fire protec-
20 tion system as defined in the National Fire Codes published by the
21 National Fire Protection Association.

22 * Sec. 3. AS 42.05.381 is amended by adding a new subsection to read:

23 (d) A utility may not charge a fee or surcharge for standby water
24 for fire protection systems which use hydraulic sprinklers.

25 * Sec. 4. AS 42.05.701 is amended by adding a new paragraph to read:

26 (9) "fire protection systems" means fire protection systems
27 as defined in the National Fire Codes published by the National Fire
28 Protection Association.

29 * Sec. 5. AS 45.95.020(a) is amended to read:

1 (a) The commissioner shall, under regulations and policies adopted
2 by him, make small business loans to acquire, finance or refinance or
3 equip businesses, including farming equipment, fire protection equip-
4 ment, mining and fishing, not exceeding \$500,000. The loans shall be
5 secured by acceptable collateral and may not exceed 75 percent of the
6 appraised value of the collateral offered as security. The rate of
7 interest may not exceed nine and one-half percent a year on the unpaid
8 balance.

9 * Sec. 6. AS 45.95.020 is amended by adding a new subsection to read:

10 (e) The commissioner may not disqualify an applicant for, or
11 prejudice an applicant's privilege to receive, a loan to purchase and
12 install fire protection equipment because of a loan already made to the
13 applicant under this chapter.

14 * Sec. 7. AS 45.95.080 is amended by adding a new paragraph to read:

15 (2) "fire protection equipment" means fire protection or fire
16 alarm systems as defined in the National Fire Codes published by the
17 National Fire Protection Association.

18 * Sec. 8. AS 44.33.170 is amended by adding new subsections to read:

19 (b) Tourist attraction development matching money may also be
20 obtained for the purpose of purchasing and installing fire protection
21 equipment for a building used or to be used for the purposes described
22 in (a) of this section.

23 (c) In (b) of this section, "fire protection equipment" means fire
24 protection or fire alarm systems as defined in the National Fire Codes
25 published by the National Fire Protection Association.

THE LEGISLATURE OF THE STATE OF ALASKA
ELEVENTH LEGISLATURE

FISCAL NOTE

I. REQUEST
 Bill/Resolution No. S. B. 370 and H. B. 648
 Title An Act Relating to Fire Prevention
 Requested by Legislative Finance Date 2-6-80

II. FISCAL DETAIL
 Agency Affected Department of Community & Regional Affairs
 Program Category Affected Development
 Budget Request Unit(s) Affected Local Government Assistance

EXPENDITURES (Thousands of Dollars)

| | FY 79 | FY 80 | FY 81 | FY 82 | FY 83 | FY 84 |
|--------------------------|-------|-------|-------|-------|-------|-------|
| 100 PERSONAL SERVICES | | | | | | |
| 200 TRAVEL | | | | | | |
| 300 CONTRACTUAL | | | | | | |
| 400 COMMODITIES | | | | | | |
| 500 EQUIPMENT | | | | | | |
| 600 LAND & STRUCTURES | | | | | | |
| 700 GRANTS, CLAIMS, ETC. | | | | | | |
| TOTAL | 0 | 0 | 0 | 0 | 0 | 0 |

FUNDING (Thousands of Dollars)

| | FY 79 | FY 80 | FY 81 | FY 82 | FY 83 | FY 84 |
|-----------------|-------|-------|-------|-------|-------|-------|
| GENERAL FUND | | | | | | |
| FEDERAL FUNDS | | | | | | |
| OTHER (Specify) | | | | | | |
| | | | | | | |

POSITIONS

| | FY 79 | FY 80 | FY 81 | FY 82 | FY 83 | FY 84 |
|-----------|-------|-------|-------|-------|-------|-------|
| FULL TIME | | | | | | |
| PART TIME | | | | | | |
| TEMPORARY | | | | | | |

III. ANALYSIS (See Fiscal Note Preparation Instructions, Section III)

No fiscal impact to this agency. There may be fiscal impact to Department of Commerce and Economic Development.

IV. DATE 2/5/80 PREPARED BY LaDonna Brown
 AGENCY Local Government Assistance Division
 PHONE 465-4739
 Original: Legislative Finance
 cc: Budget and Management
 Prime Sponsor (First Legislator Named)

MEMORANDUM

State of Alaska

TO:

DEPT. _____

DIV. _____

SEC. _____

Legislative Affairs

DATE : April 15, 1980

FROM:

Wicki Wilson
 House Finance Committee
 Cap. Bldg. Room 519
 3795/3776

SUBJECT:

2 pages HB 648 (Finance)

Please prepare Finance Committee substitute for HB 648
 deleting the last sentence in Sec 5(2), p 2, lines 8, 9+10, page
 attached, and return to me asap. Thank you.

THE LEGISLATURE OF THE STATE OF ALASKA
ELEVENTH LEGISLATURE

FISCAL NOTE

I. REQUEST

Bill/Resolution No. S. B. 370 and H. B. 648
 Title An Act Relating to Fire Prevention
 Requested by Legislative Finance Date 2-6-80

II. FISCAL DETAIL

Agency Affected Department of Community & Regional Affairs
 Program Category Affected Development
 Budget Request Unit(s) Affected Local Government Assistance

EXPENDITURES (Thousands of Dollars)

| | FY 79 | FY 80 | FY 81 | FY 82 | FY 83 | FY 84 |
|--------------------------|-------|-------|-------|-------|-------|-------|
| 100 PERSONAL SERVICES | | | | | | |
| 200 TRAVEL | | | | | | |
| 300 CONTRACTUAL | | | | | | |
| 400 COMMODITIES | | | | | | |
| 500 EQUIPMENT | | | | | | |
| 600 LAND & STRUCTURES | | | | | | |
| 700 GRANTS, CLAIMS, ETC. | | | | | | |
| TOTAL | 0 | 0 | 0 | 0 | 0 | 0 |

FUNDING (Thousands of Dollars)

| | | | | | | |
|-----------------|--|--|--|--|--|--|
| GENERAL FUND | | | | | | |
| FEDERAL FUNDS | | | | | | |
| OTHER (Specify) | | | | | | |
| | | | | | | |

POSITIONS

| | | | | | | |
|-----------|--|--|--|--|--|--|
| FULL TIME | | | | | | |
| PART TIME | | | | | | |
| TEMPORARY | | | | | | |

III. ANALYSIS (See Fiscal Note Preparation Instructions, Section III)

No fiscal impact to this agency. There may be fiscal impact to Department of Commerce and Economic Development.

IV. DATE 2/5/80 PREPARED BY LaDonna Brown
 AGENCY Local Government Assistance Division
 PHONE 465-4739
 Original: Legislative Finance
 cc: Budget and Management
 Prime Sponsor (First Legislator Named)

CATEGORY: DEVELOPMENT
PROGRAM: COMMUNITY DEVELOPMENT

AGENCY: COMMUNITY AND REGIONAL AFFAIRS
BRU (S): LOCAL GOVERNMENT ASSISTANCE

The Local Government Assistance DRU assists communities in attaining or sustaining viable units of local government according to established criteria. Particular emphasis is given to communities having local governments that are organized under state law with population less than 2,000. Components include Training and Development, State Assessor, Local Boundary Commission (Administration), Revenue Sharing (Administration) and Coastal Energy Impact Program.

The Training and Development Component provides local government officials with an opportunity to learn or improve skills needed to administer local government. Offices in Juneau, Anchorage, Nome and Bethel provide individual technical assistance for specific needs. Included in this program is the administration of Rural Development Assistance grants which, in FY 80, was in the Community and Rural Development DRU.

The State Assessor assists local government with procedures for determining local property taxes based on full and true value. This component also administers property relief programs, and researches economic data relating to property tax assessments and municipal financing.

The Local Boundary Commission component reviews and makes recommendations on requests for changes to or establishment of municipal boundaries. The intent is to ensure that the proposed changes will facilitate improvements in municipal services. This program also administers a grant program which makes grants of up to \$25,000 for newly incorporated municipalities or those assuming special new powers such as police and fire protection.

The Community Legal Assistance Component provides grants to local governments for the purpose of bolstering their legal capabilities by enabling them to purchase appropriate resources to resolve legal issues. These grants may not exceed \$20,000.

The Revenue Sharing Administration Component provides the personnel and expertise required to determine eligibility of municipalities to receive revenue sharing grants; as well as determine their program allocation.

The Coastal Energy Impact Program is designed to assist those coastal communities, through federal grants from the U.S. Department of Commerce, who expect to be impacted by off-shore energy projects. Two positions will be federally funded in FY 81 to monitor existing grants and bond guarantees and to make future determinations on awarding bond guarantees from CEIP funds obligated to the Alaska Municipal Bond Bank.

| COMPONENT DESCRIPTION | 79 AUTH | 79 FINAL | 79 ACT | 80 AUTH | 80 SUPL | 80 RP | GOVERNOR |
|------------------------------------|---------|----------|--------|---------|---------|-------|----------|
| TRAINING, DEVELOP, & RDA | 473.4 | 515.3 | 471.6 | 488.9 | | | 740.9 |
| STATE ASSESSOR | 247.7 | 258.7 | 210.1 | 235.9 | | | 283.8 |
| LOCAL BOUND. COMM-ADMIN | 87.2 | 91.2 | 84.9 | 86.0 | | | 91.7 |
| REVENUE SHARING ADMINISTRATION | 85.4 | 89.9 | 77.8 | 72.5 | | | 73.7 |
| COAST ENERGY IMPACT PROGRAM | 364.7 | 886.4 | 585.2 | 376.9 | | | 585.2 |
| ADMINISTRATION | 592.9 | 625.2 | 578.5 | 598.5 | | | |
| XX TOTAL | 1851.3 | 2466.9 | 2008.1 | 1858.7 | | | 1775.3 |
| XX CHANGE VERSUS 80 AUTH | | | | | | | -4.4% |
| OBJECT DESCRIPTION | | | | | | | |
| PERS. SERV. | 1144.1 | 1184.9 | 1105.6 | 1179.8 | | | 952.9 |
| TRAVEL | 210.4 | 214.4 | 170.5 | 180.9 | | | 120.3 |
| CONTRACTUAL | 191.6 | 216.2 | 158.8 | 182.3 | | | 157.3 |
| COMMODITIES | 17.7 | 16.2 | 10.9 | 14.9 | | | 12.5 |
| EQUIPMENT | 6.5 | 8.5 | 8.4 | 2.1 | | | 29.1 |
| LANDS/BLDGS | 3.0 | 3.0 | 2.9 | 4.0 | | | 3.2 |
| GRANTS, CLHS | 278.0 | 823.7 | 521.0 | 294.7 | | | 500.0 |
| FUNDING SOURCE | | | | | | | |
| FED. RECEIPT | 648.7 | 1226.4 | 856.9 | 660.9 | | | 585.2 |
| G. F. MATCH | 71.0 | 77.3 | 67.9 | 71.0 | | | |
| GENERAL FUND | 1131.6 | 1163.2 | 1083.3 | 1126.8 | | | 1190.1 |
| XX GENERAL FUND CHANGE VS. 80 AUTH | | | | | | | -0.6% |
| POSITIONS | | | | | | | |
| FULL-TIME | 34.0 | 34.0 | 34.0 | 34.0 | | | 25.0 |
| PART-TIME | 7.0 | 7.0 | 7.0 | 7.0 | | | 9.6 |
| STAFF MONTHS | 450.0 | 450.0 | 450.0 | 450.0 | | | 357.6 |

MEMORANDUM

State of Alaska

DEPT. _____

DIV. _____

SEC. _____

TO: *Legislative Affairs*DATE : *April 15, 1980*

FROM:

*Wicki Nelson
House Finance Committee
Cap Bldg Room 519
3795/3796*

SUBJECT:

CS for HB 648 (Finance)

*Please prepare Finance Committee substitute for HB 648
deleting the last sentence in Sec 5(a), p 2, lines 8, 9+10, and
attached, and return to me asap. The Sec.*

Original sponsors: Malone and Duncan

Offered: 3/7/80
Referred: Finance

FINANCE COMMITTEE
~~BY THE COMMUNITY AND
REGIONAL AFFAIRS COMMITTEE~~

1 IN THE HOUSE

2 CS FOR HOUSE BILL NO. 648 (Finance)

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 ELEVENTH LEGISLATURE - SECOND SESSION

5 A BILL

6 For an Act entitled: "An Act relating to fire prevention."

7 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

8 * Section 1. AS 29.53.060(a) is amended to read:

9 (a) The assessor shall assess property at its full and true value
10 as of January 1 of the assessment year, except as provided in this
11 section and AS 29.53.030, 29.53.035, and 29.53.160. The full and true
12 value is the estimated price which the property would bring in an open
13 market and under the then prevailing market conditions in a sale between
14 a willing seller and a willing buyer both conversant with the property
15 and with prevailing general price levels. The assessor may not include
16 the value of a fire protection system in the assessment of the full and
17 true value of a building.

18 * Sec. 2. AS 29.53.060 is amended by adding a new subsection to read:

19 (d) In this section, "fire protection system" means a fire protec-
20 tion system as defined in the National Fire Codes published by the
21 National Fire Protection Association.

22 * Sec. 3. AS 42.05.381 is amended by adding a new subsection to read:

23 (d) A utility may not charge a fee or surcharge for standby water
24 for fire protection systems which use hydraulic sprinklers.

25 * Sec. 4. AS 42.05.701 is amended by adding a new paragraph to read:

26 (9) "fire protection systems" means fire protection systems
27 as defined in the National Fire Codes published by the National Fire
28 Protection Association.

29 * Sec. 5. AS 45.95.020(a) is amended to read:

1 (a) The commissioner shall, under regulations and policies adopted
2 by him, make small business loans to acquire, finance or refinance or
3 equip businesses, including farming equipment, fire protection equip-
4 ment, mining and fishing, not exceeding \$500,000. The loans shall be
5 secured by acceptable collateral and may not exceed 75 percent of the
6 appraised value of the collateral offered as security. The rate of
7 interest may not exceed nine and one-half percent a year on the unpaid
8 balance. ~~The commissioner shall give preference in the granting of~~
9 ~~loans under this section to applications for loans the purpose of which~~
10 ~~is to purchase and install fire protection equipment.~~]

DELETE

11 * Sec. 6. AS 45.95.020 is amended by adding a new subsection to read:

12 (e) The commissioner may not disqualify an applicant for, or
13 prejudice an applicant's privilege to receive, a loan to purchase and
14 install fire protection equipment because of a loan already made to the
15 applicant under this chapter.

16 * Sec. 7. AS 45.95.080 is amended by adding a new paragraph to read:

17 (2) "fire protection equipment" means fire protection or fire
18 alarm systems as defined in the National Fire Codes published by the
19 National Fire Protection Association.

20 * Sec. 8. AS 44.33.170 is amended by adding new subsections to read:

21 (b) Tourist attraction development matching money may also be
22 obtained for the purpose of purchasing and installing fire protection
23 equipment for a building used or to be used for the purposes described
24 in (a) of this section.

25 (c) In (b) of this section, "fire protection equipment" means fire
26 protection or fire alarm systems as defined in the National Fire Codes
27 published by the National Fire Protection Association.

Original sponsors: Malone and Duncan

Offered: 3/7/80
Referred: Finance

1 IN THE HOUSE

BY THE COMMUNITY AND
REGIONAL AFFAIRS COMMITTEE

2

CS FOR HOUSE BILL NO. 648

3

IN THE LEGISLATURE OF THE STATE OF ALASKA

4

ELEVENTH LEGISLATURE - SECOND SESSION

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21 (b) Tourist attraction development matching money may also be
22 obtained for the purpose of purchasing and installing fire protection
23 equipment for a building used or to be used for the purposes described
24 in (a) of this section.

25 (c) In (b) of this section, "fire protection equipment" means fire
26 protection or fire alarm systems as defined in the National Fire Codes
27 published by the National Fire Protection Association.

Introduced: 1/31/80
Referred: Community & Regional
Affairs and Finance

1 IN THE HOUSE

BY MALONE AND DUNCAN

2 HOUSE BILL NO. 648

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 ELEVENTH LEGISLATURE - SECOND SESSION

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10 obtained for the purpose of purchasing and installing fire protection
11 equipment for a building used or to be used for the purposes described
12 in (a) of this section.

BILL ANALYSIS

ASSIGNMENT DATE 2-1-80

UNASSIGNED _____

| | | |
|---|---|--|
| DEPARTMENT Public Safety | SPONSOR (PRINCIPAL) Malone and Duncan | BILL NO. HB 648 |
| DEPARTMENT POSITION Support | | |
| DIVISION DIRECTOR <i>Ronald A. Hendrie</i> Ronald A. Hendrie | DATE 2-13-80 | COMMISSIONER <i>William R. Nix</i> William R. Nix |
| | | DATE 2/14/80 |
| GOVERNOR'S OFFICE USE | | |
| <input type="checkbox"/> POSITION NOTED <input type="checkbox"/> POSITION APPROVED <input type="checkbox"/> POSITION DISAPPROVED | | |
| BY: | | DATE: |
| SUMMARY | | |
| (1) RELATED BILLS (SIMILAR OR CONFLICTING) | | (1) Identical to SB 370 introduced 1/31/80 |
| (2) OTHER AGENCIES AFFECTED BY BILL | | (2) Department of Commerce & Economic Development |
| (2) a. ORGANIZATIONAL SUPPORT FOR BILL | | (2) b. ORGANIZATIONAL OPPOSITION TO BILL |
| Alaska Fire Chiefs Association Alaska State Firefighters Association | | Unknown |
| (3) PROGRAM EFFECTS OF BILL | | |
| <p>The incentive aspects of the bill (voluntary or regulated installation of private fire protection systems) will favorably affect fire prevention and protection programs and efforts at the <u>state and local levels.</u></p> | | |
| (4) FISCAL IMPACT: <input type="checkbox"/> NONE <input type="checkbox"/> FISCAL ANALYSIS ATTACHED | | |
| (5) AMENDMENTS PROPOSED: | | |
| None | | |

(6) COMMENTS:

The provisions in this bill provide the incentive and means and methods for the installation of private fire protection systems in private property which will in turn enhance and support the public fire protection systems and capabilities of communities throughout Alaska. Many communities are being faced with providing additional fire protection services and with the costs associated with providing those services. A community fire protection incentive program can provide an alternative to the increasing costs of fire protection. A long term affect of such a program would be in the area of security of a communities assets, e.g. private fire protection systems protect the economics of the community by providing security for the businesses that provide the tax base and employment of those within the community. Both the direct and indirect socioeconomic impacts, from fire, would be reduced.

REDUCE ESCALATING INFLATION OF LOCAL GOVERNMENT COSTS

SAVE LIVES AND PROPERTY

ENCOURAGE SUSTAINED RESPONSIBLE BUSINESS
AND ECONOMIC ACTIVITY IN ALASKAN COMMUNITIES

SUPPORT COMMUNITY FIRE PROTECTION
INCENTIVE PROGRAM

A Legislative Incentive Program
Which Will Save Your Taxes,
Provide Low Interest
Capitalization Loans and
Reduce Fire Department and
Your Water Utility Costs
and, at the same time,
Increase Fire Safety

Prepared For
Alaska Fire Chiefs Association
and
Alaska State Firefighters' Association
by
Brian R. Shute
Attorney At Law

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I. THE PROBLEM: ALASKA'S EXPANDING AND DEVELOPING COMMUNITIES WITH UNDERDEVELOPED PUBLIC SERVICES ARE PARTICULARLY VULNERABLE TO CATASTROPHIC FIRE LOSSES.

A high fire death rate is peculiarly an American problem. No other industrialized nation comes close to the American fire death rate. Fire deaths and injuries per million population in the United States are nearly three times that of Sweden which has the next highest death and injury rate by fire.

In 1974 nearly 3 million fires caused nearly \$4 billion worth of fire losses. The dollar value of the damage and destruction by fire does not even begin to approximate the actual losses because serious fires create indirect business and community losses such as:

- (a) Loss of customers
- (b) Loss of profits
- (c) Cost of retaining key personnel during shutdown
- (d) Loss of taxes on destroyed property.

Finally, there are indirect losses of a personal nature. These may be even more difficult to estimate, yet their importance should not be neglected. In addition to financial losses incurred through temporary unemployment and expenses incurred in finding and moving to new housing, there is the destruction of irreplaceable personal belongings. With its vast expanses and small communities with

underdeveloped public services, Alaska has a particularly dismal experience with fire losses. Tragic reminders of this are the New England Fish Company and Alaska Steamship dock fire in Cordova, the fires in Sitka which destroyed the priceless Russian cathedral, and the Sitka Cold Storage Company and dock facility. Perhaps most tragic are the cannery fires in small communities (most recently in Craig, Alaska, in 1980). Most often the canneries have not been rebuilt, and in some cases, the communities, which relied on the canneries as their sole means of economic support have ceased to exist. Canneries have plenty of water by virtue of the business they are in, and private fire protection would have eliminated the monetary losses, and in some cases, assured the continued existence of the community itself.

Water is an indispensable commodity when it comes to fighting fire. Fires cause billions of gallons of water to be consumed putting them out. Providing adequate water supplies constitutes a major community expense. Residents of the Anchorage and Matanuska-Susitna boroughs are certainly aware of the Susitna hydroelectric project, as part of the ongoing efforts to assure that area with adequate and safe water supplies. The residents of Juneau learned of the exigencies of having adequate water supplies in January of 1980, when climatic conditions temporarily depleted their water supply.

The State of Alaska will undergo rapid growth in population as development of its resources progresses. The oil industry is expanding, other industrial plants associated with the oil industry are planned and coming on line. The fishing industry is expanding into new products and plants. This is bringing increasing population and business to many of our communities. The growth is impacting the fire protection and water supplies of these growing areas. Communities are being faced with providing additional fire protection services, and with the costs of providing these services. See, Shirnberg, Robert R., Community Fire Protection Incentive Program, October 20, 1979.

Consequently, given the compelling social goal of avoiding catastrophic fire losses, together with the absolute necessity to provide water for basic human existence, a community must develop policies which maximize its ability to provide both fire protection and adequate water supplies.

II. THE SOLUTION: MAXIMUM UTILIZATION OF PRIVATE FIRE PROTECTION SYSTEMS MINIMIZES FIRE LOSSES AND MINIMIZES COSTS OF OPERATING FIRE DEPARTMENTS AND WATER UTILITIES.

Private fire protection systems (the backbone of which are automatic sprinkler systems) are the most effective means of controlling fires in buildings. Not only do private fire protection systems put out fires, they do not require nearly as much water to extinguish fires as would be required for the Fire Department to put out the same fire. Nor do sprinkler systems require as much or as expensive equipment to fight a given fire as a Fire Department. Where private fire protection systems are deployed the expense and cost of the Fire Department are much less, and the chance for injury to firemen as a result of fire is almost negligible in sprinklered buildings. Sprinkler systems are the most technologically advanced fire fighting weapon, and their use should be maximized to reduce and hold down costs of the Fire Department.

We must accept the fact that public fire departments can control a fire only in its early development stages. For the most part, fire departments can only combat fire by directly overwhelming it with massive amounts of expensive equipment, manpower and water. When the fire is small, the fire department is still on the way. Even with the best response time, it is fact that many small fires are out of control by the time the fire departments arrive.

By contrast, the private fire protection system has no response time. It is on scene before the fire starts, and usually has put out the fire before the fire department even arrives.

III. LEGISLATION CREATING INCENTIVES FOR THE INSTALLATION OF PRIVATE FIRE PROTECTION SYSTEMS WILL ENCOURAGE A STATEWIDE SHIFT TOWARD MAXIMIZING UTILIZATION OF MORE EFFICIENT, LESS COSTLY FIREFIGHTING TECHNOLOGY, THEREBY HOLDING DOWN OR REDUCING COSTS OF WATER UTILITIES AND FIRE DEPARTMENTS.

Private fire protection is an alternative. Its technology is ready to be implemented, and, through legislative incentive, it will reduce the increasing burden of fire protection costs. Within a few short years of implementing legislative incentives, private fire protection systems will become increasingly prevalent in communities statewide. As Alaskan communities expand and grow, the legislative incentives will alleviate the necessity to expand the manpower, equipment, and water supplies for the fire department as in the past. Fire departments won't need to open as many new stations, buy as much firefighting equipment, or hire as many firefighters to meet the fire protection needs of the state's expanding communities. Costs of water supplies will be reduced as existing supplies go farther as a result of the water conservative propensities of private fire protection systems are realized. By moving now to take advantage of proven fire protection technology huge savings in property loss, jobs, insurance costs, building costs, life, and indeed even entire communities (in cases of unprotected cannery fires) will result and those savings will continue to accrue and continue to accelerate as the incentives prompt more and more property

to be protected. (For a hypothetical case study of savings a community can realize as a result of widespread sprinkler installation see, Hackey, Associate Professor, Univ. Maryland, Built In Fire Protection and Fire Department Manning (Appendix A).

IV THE SAVINGS IN LIFE, PROPERTY, CONSERVATION OF WATER, AND REDUCED COST OF LOCAL GOVERNMENT SERVICES FROM WIDESPREAD INSTALLATION OF PRIVATE FIRE PROTECTION SYSTEMS.

Statistics showing the effectiveness of automatic sprinkler systems are phenomenal. Only in rare instances do automatic sprinkler systems fail to control fires in sprinklered buildings. The failures are seldom due to the sprinklers, but rather, the lack of water, often because the system has been turned off, either unintentionally, intentionally, or by vandals. A complete record of fires in sprinklered buildings would show that their efficiency probably approaches 100%. National Fire Protection Association, Fire Protection Handbook, pp. 14-1 through 14-48, 14th edition, 1976. Given the billions of dollars in fire losses, the potential for savings resulting from widespread installation of sprinklers cannot be ignored. Of all the fires controlled by sprinklers, more than 90% of them are controlled by three or less sprinkler heads. Fire Protection Handbook, supra.

The effectiveness of automatic sprinklers stems from their presence at the scene of a potential fire before it starts. They can apply water immediately where it is needed because there are not problems of access to the seat of the fire, or interference with visibility for fire fighting due to smoke. Fire Protection Handbook, supra. Sprinklers extinguish fires much earlier than a fire department could

ever respond to an alarm. Automatic sprinklers are particularly effective for life safety because they give warning of the existence of fire, and at the same time apply water to the burning area.

The only fatalities in fully sprinklered properties reported to the National Fire Protection Association were caused by explosions or flash fires; by ignition of the bedding or clothing of a person who was too young, too old, too intoxicated, or too handicapped in some other way to protect himself properly. . . .

In those isolated instances of fatalities to sleeping, handicapped, or intoxicated persons, ignition of clothing or bedding caused fatal burns or asphyxiation either because the small fire did not generate sufficient heat to fuse the sprinkler, or because the victim had suffered fatal injuries before the sprinkler operated. In these later instances, however, the sprinklers protected the lives of persons in adjoining areas. Fire Protection Handbook, supra.

See, also, Horne, B.G., Fire Chief, Controlling the Cost of Fire Protection in the City of San Buenaventura.

Water necessary to put out a fire in its beginning stages is nowhere near the water required for the fire department to put it out after it once gets blazing. Performance characteristics of sprinklers indicate that standard automatic sprinklers discharge anywhere from 18 to 58 gallons of water per minute, depending on the pressure at

the sprinkler head. Fire Protection Handbook, supra, at pp. 14-42 through 14-48. By comparison, a heavy-attack two and one-half inch mobile fire department hose line in operation can consume as much as 250 gallons of water per minute. If the fire is not put out in its infant stages (as occurs over 90% of the time when automatic sprinklers are deployed), it may take a number of heavy-attack lines hours to control the fire - if the water supply holds out that long.

Sprinklers do not cause excessive water damage. Damage by sprinklers is negligible compared to that caused by fighting the same fire with a hose stream. Most fires are controlled by a small number of sprinklers, while many hose streams are required to combat a fire which is out of control. Sprinklers, in most cases, control the fire immediately. The water damage which does occur is negligible compared to the damage which would have resulted if the building should have been completely or substantially consumed by a fire fought by conventional means. See, Horne, B. G., Fire Chief, Controlling the Cost of Fire Protection in the City of San Buenaventura.

V. THE SIZE OF A COMMUNITY'S WATER SYSTEM CAN BE REDUCED BY WIDESPREAD INSTALLATION OF PRIVATE FIRE PROTECTION SYSTEMS IN THE COMMUNITY.

A major part of the cost of the developing community's water supply is the additional reservoir of water which must be on hand for major fires, and the high pressure distribution lines from the reservoir to assure the fire department will have enough water pressure to project many hose streams onto a raging major fire. Nowhere near the same quantity of water or water pressure would be required for automatic sprinklers to do the same job.

The traditional method for estimating the water supply required to serve a community's fire protection needs is by computing fire flow requirements. The criteria to estimate fire flow requirements are found in the Guide for Determination of Required Fire Flow, Insurance Service Organization, 1972. The fire flow formula reflects significant water conservation propensities of private fire protection. Depending on the flammability of a given building, the fire flow required is reduced by 25% to 75% when a sprinkler system is present in a building. Fire Protection Handbook, supra, at pp. 11-2 through 11-6.

The fire flow formula developed by ISO can be utilized to determine the community-wide fire flow requirements. This procedure is more fully described in ISO's Municipal Grading Schedule, copies of which are available in many

community Fire Department and Fire Department Protection offices.

Although the methodology in the Municipal Grading Schedule does not enable a precise computation of the reduction in community fire flow requirements caused by widespread sprinkler installation, it is significant. Anchorage, Alaska, is a specific case in point, where ISO engineers indicate installation of sprinklers in the Central Business District, alone, made Anchorage a more fireworthy community, and caused a reduction in fire flow requirements.

VI. PRIVATE FIRE PROTECTION REDUCES THE COST OF OTHER PUBLIC SERVICES.

In addition to the water conserving properties of automatic sprinkler systems, and the significant savings in life and property, there are other public benefits from widespread installation of private fire protection systems.

Among these are:

1. Both the economic and physical burden of the Fire Department are decreased since private fire protection generally puts out the fire before the fire department even arrives. This also decreases the hazards of fighting fire.
2. The cost of manpower and time fighting the fire is reduced and therefore the money necessary to operate the Fire Department can be reduced, stabilized, and diverted to other essential Fire Department or community expenditures.
3. Private fire protection decreases fire insurance costs not only for the person installing it, but also for an entire community where the installations are widespread. Many rural communities have little or no fire protection. These communities may not be able to afford the expensive fire-fighting equipment more urbanized communities have. Commercial construction moneys are also difficult to obtain because insurance rates are too high. By installing private fire protection, great reductions in insurance premiums can be achieved, which will enable property owners to get reasonable insurance premiums needed to obtain financing for construction.

4. Construction without sprinklers imposes higher insurance costs and imposes on the architect more stringent rules governing compartmentalization, fire proofing, exit distance spacing, travel distance, and exterior design requirements. It costs more to construct without sprinklers. 242 News Bulletin, Automatic Sprinkler Fire Control Association, Inc., pp. 1316 (1973). Providing incentives to construct with sprinklers will lower construction costs and then insurance costs, enabling construction to go forward that otherwise would have been too costly. The resulting stabilization and expansion of a community's economic base, not to mention expanded tax base, is obvious.
5. Private fire protection increases municipal tax revenues by encouraging property development.
6. Private fire protection increases a community's total fire protection security, preventing conflagrations and exposure fires.
7. Private fire protection results in lessening the cost of capital improvements to the community's water supply since widespread installation of private fire protection decreases the required fire flow necessary for adequate municipal fire protection.
8. Private fire protection saves billions of gallons of water, which is in chronic short supply in many communities.
9. Encouragement of private fire protection is consistent with the State policy of encouraging installation of fire protection devices (smoke alarms).
10. Since private fire protection can reduce the cost of the Fire Department and the water utility, Municipal tax

dollars and State revenue sharing
monies can be expended for other
essential services, making more efficient
use of government dollars.

These benefits are substantial and should be encouraged
by the incentive legislative programs hereinafter described.

VII. TAX CREDITS, LOW INTEREST LOANS FOR PRIVATE FIRE PROTECTION, INSTALLATION, AND ELIMINATION OF WATER STANDBY CHARGES WILL PROVIDE THE LEGISLATIVE INCENTIVE TO MOVE TOWARD UTILIZATION OF THE BEST AND MOST ECONOMICAL FIRE SAFETY TECHNOLOGY - PRIVATE FIRE PROTECTION.

A. Why Legislative Incentives?

The decision to install or not to install private fire protection hinges on two variables. First, the Uniform Building Code requires building materials with a higher fire rating for higher fire rating for higher risk occupancies. If construction is without sprinkler systems the construction costs may be too high, and the increased cost could prevent the decision to construct from even being made. Second, the reduction in insurance rates for buildings with sprinklers will be greater for some kinds of buildings than for others. The size of the reduction is largely determinative of how long it will take the property owner to amortize the cost of the sprinkler system. If the insurance reduction is too small, it will take too long to amortize the cost of installing the system, and the decision to install it may not be made, with the resultant loss in fire safety. Legislative incentives in the form of low interest loans which can be obtained to finance sprinkler installation, additional tax credits to buildings that have sprinklers, and legislative elimination of water standby charges will make the decision to install private protection economical and, thus, voluntary. A significant trend would develop

wherein water guzzling fire companies would be replaced by water efficient sprinkler systems, reducing both losses caused by fire and costs to local government.

B. Low Interest Loans Will Cause Financing to be Available so that Sprinklers can be Installed in Both New and Pre-existing Construction.

Funds for low interest loans to finance installation of private fire protection systems should be available in amounts that will allow for a rapid implementation and installation of private fire protection systems by those who qualify for the loans. Many small businesses in our state do not have access to financing at reasonable rates. The current level of interest rates simply does not make it economical for the property owner to consider the installation of private fire protection. Loan qualifications should be established on the basis of need similar to that required for small business loans. But, in addition, loans should also be made available to property owners who are required to install private fire protection by the community building codes, with some consideration given to those property owners desiring to install a system in a pre-existing structure. Making funds available to owners of pre-existing structures will accelerate the move towards utilizing private fire protection technology instead of the more costly and riskier Fire Department.

C. Tax Credits for Installation of Private Fire Protection Will Encourage, not Penalize the Owner who Adopts Better Fire Safety Technology, and Will Not Cause Cities to Lose Tax Revenue.

Installation of private fire protection systems causes property valuations to increase. Up to now the increase has been included in the property's assessed and the community's mill rate has been applied accordingly, thus raising the owner owner's taxes. This penalizes the property owner for installing fire protection systems. A property owner who does not install such a system is the one to penalize, because he increases the potential for disastrous fires in the community, and causes escalating costs for the Fire Department and Water System. Enacting State legislation will remove from tax rolls the penalizing assessment against private fire protection systems. This approach does away with counterproductive taxing practices, and maximizes the cost savings of better fire safety technology.

Local governments will not lose tax revenue as a result of the tax credit for fire protection systems. First, as the incentives induce increasing numbers of fire protection systems to be installed, fire departments will save literally millions of dollars because their requirements for manpower, equipment, and additional fire stations will be drastically reduced, to maintain a given level of fire safety. Attached as Appendix II is an actual case study of great savings which resulted in fire department costs in

the City of Fresno, California. By inducing widespread installation on of private fire protection systems, the City of Fresno's fire department saved literally millions of dollars, according to the study. Reilly and Viniello, Sprinklers Cut Fresno's Fire Losses and Budget, Fire Journal, November 1979 (See Appendix II). Appendix I empirically documents the huge savings which will result to the Fire Department from a program of this sort.

Second, the assessed value of a sprinkler system, when compared to the value of the rest of a building, is minimal. Without the sprinkler system a fire will destroy the building, and the corresponding loss from municipal tax rolls of the entire valuation of the building will be many-fold greater than the minimum value of the sprinkler system. The City's tax base will grow more rapidly if it is not being consumed by destructive fires, which will not occur when a City's property tax base is protected by sprinklers. It is a certainty that the loss of tax-assessable property will be many times greater in a community that does not have widespread sprinkler installation.

Third, the major component of a City's water supply cost is the necessity to have water available to combat fire. Widespread installation of private fire protection systems will drastically reduce the fire flow demand, with a correspondent cost reduction to the water

utility. In sum, then, the savings to the fire department and the water utility, together with the increased tax base that will result from the increased fire safety, induced by exemption of fire protection systems from the tax base, all culminate to provide increased, rather than decreased, revenue to municipalities. The tax credit incentive in Senate Bill 370 and House Bill 648 will insure this result.

D. Elimination Of Water Standby Charges

One of the most invidious disincentives to the installation of private fire protection systems has been the water standby charge levied by water utilities. The charge is levied when a private fire protection system is connected to the water system, regardless of whether it consumes water or not. The theory of the charge is that the connection of the system creates demand that the Utility must meet. Nothing can be further from the truth, however. By connection to the water supplies, the required fire flow, and, therefore, demand, is reduced. Sprinklers simply do not demand anywhere near as much water to fight fires as do Fire Departments. See, p. 6, supra; see, also, Fire Protection Handbook, supra, at 14-42 through 14-48. The cumulative effect of widespread sprinkler installation is reservoir requirements which are stabilized or reduced when compared to the requirements without the sprinklers.

Water demand charges eat up or completely eliminate any

insurance savings to the property owner which would otherwise go towards amortizing the cost of installing the system. The demand charge makes it uneconomical to install the sprinklers. The water demand charge eliminates the only source of cost saving to be realized by installation of the sprinkler system. The demand charge should be exposed for what it is--a disincentive to installation of private fire protection that is counter productive to the goal of having adequate water supplies, and to the goal of making our communities safe from destructive fires. In the interests of conserving scarce water resources and maximizing the public fire protection dollar, then, legislation banning imposition of water demand charges on private fire protection systems should be enacted.

VIII. CONCLUSION

For the foregoing reasons support of this legislative program is urgently solicited. Senators, Representatives, local governments, and the public are urged to support these legislative incentives. The Alaska State Firefighter's Association and the Alaska State Fire Chiefs Association believe it's time to stop utilizing expensive, dangerous, and outmoded fire safety technology to protect our communities. These legislative incentives promote utilization of the best firefighting technology, while at the same time saving money. It will save the public and local government

Reducing Manning Costs For Fire Suppression

"Manning policy for fire suppression personnel is a very controversial issue. At a time when taxpayers are demanding budget stringency, fire department manning practices require further examination and evaluation. To date, no significant research has been done on the fundamental question of how many fire fighters are optimally required for fire suppression duty. As a priority issue, the U.S. Fire Administration is planning to initiate a manning study this year. In this issue of Fire Management Review, Dr. Harry Hickey makes some important observations on how built-in fire protection can affect ISO water flow requirements and therefore, fire suppression manning levels."

Gordon Vickery, Administrator, U.S. Fire Administration.

Built-In Fire Protection And Fire Department Manning

by
Harry E. Hickey
Associate Professor
University of Maryland



The number of companies required and the manning levels for each company are directly related to the number of hazards in a community. Any community has a range of hazards. Therefore, the geographical location and the nature of these hazards are prime factors in determining the location of engine and ladder companies.

Property Hazard Level Reduction

Generally, property hazard levels should be used to determine the number and type of fire companies required and the manning levels for each.

One method of measuring property hazard levels is to determine the amount of water required to control and extinguish a fire in a building or group of buildings. Required fire flow will vary according to a building's ground floor area,

height, construction, occupancy, internal fire protection and alarm systems (automatic sprinklers and alarm transmission to an emergency response service), and exposure conditions.

The Guide for the Determination of Required Fire Flow, which is published by the Insurance Services Office (ISO), can help to determine fire flow requirements for specific hazards (there is some question on the validity of the final computations). It is also helpful in assessing fire flow requirements according to a community's hazard variables. The guide states that by using these computations, fire flow requirements "may be reduced by up to 50 percent for complete

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automatic sprinkler protection. Where buildings are either fire resistant or noncombustible construction, the reduction may be up to 75 percent. Thus, established fire flow values can be cut drastically by requiring the installation of automatic sprinkler protection.

Regardless of the method used to compute required fire flow, there is general agreement that the public protection equipment requirement increases with the fire flow requirement. Conversely, as the property hazard is reduced, so is the required fire flow and thus, the level of fire department response.

A community policy to control and reduce property hazard levels by requiring automatic sprinklers can have a significant impact on holding the line with fire department manning requirements. In addition to improved life safety and property protection, automatic sprinklers may reduce property insurance premiums and the demand on the community's fire suppression delivery system. This may open new service delivery options, such as improvement of emergency medical services with existing personnel.

Hypothetical Case Study

The community of Newtown, which covers approximately 12.75 square miles, has 5 primary hazards characterized by: ordinary construction; four stories; ground floor areas from 43,000 to 50,000 sq. ft.; occupancies of the moderate hazard level, and normal exposure conditions. It is assumed that these buildings are the worst fire hazards in the community, and that the level of fire protection required for them will be equal or better for the rest of the community.

FIRE MANAGEMENT REVIEW VOLUME ONE, NUMBER THREE

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Project Manager and Editor: Leo Staveron
 Administration Assistant: Susan Brown
 Project Secretary: Nancy Brown

Without automatic sprinkler protection the ISO guide sets a required fire flow of 8,000 gallons per minute for each fire. However, using the water supply section of the ISO Grading Schedule, the basic fire flow for Newtown is 7,500 gallons per minute. The guide makes a clear distinction between required fire flow and basic fire flow.

If each of the primary hazards were retrofitted with a hydraulic automatic sprinkler system, the peak required fire flow for each fire demand zone would be reduced from 8,000 gallons per minute to 4,000 gallons per minute. This would reduce the basic fire flow for Newtown to 3,500 gallons per minute.

The reduction in fire flow requirements has a dramatic effect on manning levels. Fire suppression manning requirements were calculated on the following assumptions:

- a 48 hour work week;
- average vacation and sick leave of 4 hours per week for each individual;
- 3.8 persons are required to staff a suppression position 24 hours a day, and
- engine and ladder companies each require one officer on duty at all times.

The ISO Grading Schedule was used to determine the number of engine and ladder companies required, based upon the response distance and the established required fire flows, and the manning requirements for each company.

Company and manning requirements were calculated with and without automatic sprinklers.

| | Without Automatic Sprinklers | With Automatic Sprinklers |
|---------------|------------------------------|---------------------------|
| Stations | 5 | 3 |
| Engines | 7 | 4 |
| Ladders | 3 | 1 |
| Officers | 42 | 15 |
| Fire fighters | 209 | 76 |

Annual personnel costs (including fringe benefits) were estimated on the basis of \$24,000 for each officer and \$18,000 for each fire fighter.

| | Without Automatic Sprinklers | With Automatic Sprinklers |
|---------------|------------------------------|---------------------------|
| Officers | \$1,008,000 | \$ 360,000 |
| Fire fighters | 3,762,000 | 1,368,000 |
| TOTAL | 4,770,000 | 1,728,000 |

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deficiency point rating had been implemented as a solution to the fire defense strategy.

Real losses (measured in replacement cost of buildings destroyed) were reduced by 22 percent. While most cities in the United States are operating with fewer fire stations, fewer pumpers and ladders, fewer fire fighters, and less equipment than they had 20 years ago (and many are protecting more land area), Fresno chose to do

so out of an intelligent master concept. Its results: a more efficient municipal government, more fire protection for its citizens at less cost, lower insurance rates, and a smaller, more efficient, higher paid, and well-trained fire department, plus a planning and inspection department with the proven capability to develop and execute a "cost-effective" master plan for municipal fire defense. △

Light-Wall and Special Light-Weight Pipe in Automatic Sprinkler Systems (continued from page 61)

Table 1.

| Pipe Trade Size | Internal Diameter (Inches) | | % of Reduction in Friction Loss |
|--------------------|----------------------------|--------------------------|------------------------------------|
| | Schedule 40 | Schedule 10 ^a | |
| 1" | 1.049 | 1.097 | 20% |
| 1½" | 1.380 | 1.442 | 19% |
| 1½" | 1.610 | 1.682 | 19% |
| 2" | 2.068 | 2.157 | 19% |
| 2½" | 2.469 | 2.635 | 27% |
| 3" | 3.064 | 3.260 | 26% |
| 4" | 4.026 | 4.260 | 24% |
| 5" | 5.047 | 5.295 | 21% |
| 6" | 6.065 | 6.357 ^b | 20% |
| 8" | 8.071 ^c | 8.249 ^d | 10% |

¹ Schedule 30.

² 0.134" wall thickness — light-wall pipe.

³ 0.168" wall thickness — light-wall pipe.

⁴ ASTM A-135 light-wall steel pipe.

An illustration of the effect of specifying light-wall pipe as a substitute for standard-weight pipe in an automatic sprinkler system follows. A warehouse with high-piled storage of a type requiring 0.38 gpm per square foot over 2,000 square feet of floor area uses 17/32-inch orifice automatic sprinklers. The pressures required for this automatic sprinkler system are illustrated in Table 2 for both standard-weight and light-wall pipe.

Fire pump power demand in this example can be reduced by as much as 13 percent, depending on pump efficiency. Table 2 illustrates that this water supply will be required to deliver 16.7 psi less pressure at 760 gpm.

Smooth Interior Pipe Walls

Friction loss is a function of interior wall roughness. Light-wall pipe, manufactured in accordance with ASTM A-135 specifications, is made by the electric-

resistance weld process. The steel used to form this pipe is rolled, either cold or hot, and has a smooth surface. The pipe is generally formed cold, and thus has little opportunity for scale formation and roughening of the surfaces. Standard-weight pipe is often formed hot, and may include scale and other imperfections on its surfaces. Ten percent improvement in surface finish can result in a 16 percent reduction in friction loss.

Table 2

| Pressure Required | Standard- Weight | Light-Weight at 20' |
|----------------------------------|---------------------|------------------------|
| To obtain sprinkler discharge | 22.6 | 22.6 |
| Friction Loss | | |
| Branch Line | 32.0 | 26.1 |
| Mains | 45.0 | 34.2 |
| Underground | 15.0 | 15.0 |
| Elevation | 10.5 | 10.5 |
| TOTAL | 125.1 | 108.7 |

SUMMARY

1. Sprinkler system designers have an added option of using Schedule 10 light-wall pipe.
2. Substitution of Schedule 10 light-wall pipe for Schedule 40 pipe will significantly reduce the total pressure and power demand on the water supply.
3. Reduction in pressure requirements can save installed and operating costs as follows:
 - Less horsepower required to deliver water;
 - Smaller pumps or the ability to supply sprinkler systems from existing water supplies;
 - Smaller pipe sizes — lower pipe cost — less weight — less labor and freight costs. △



Sprinklers Cut Fresno's Fire Losses and Budget

EDWARD J. REILLY and JOHN A. VINIELLO

IN THE 1960s, the city of Fresno, California began the process of basing its municipal firesafety program on the installation of automatic sprinklers. As a result, the city decreased its fire losses, decreased the percentage of the municipal budget allocated to its fire department, and improved its insurance rating.

Many of the details of the Fresno program were explained in a March 1975 *FIRE JOURNAL* article entitled "How the City of Fresno Achieved Better Fire Protection." A major element of the program was the enactment by the Fresno City Council in 1961 of the Dangerous Building Ordinance, which focused on the central business district and gave city officials the power to remedy the hazards resulting from unsafe buildings or structures. City officials were empowered to condemn those buildings or order their repair, renovation, or restoration so that they would meet the requirements of the *Fresno Building Code*.

Under the provisions of the Dangerous Building Ordinance, buildings owners could choose among several alternatives to bring their buildings up to the requirements of the *Building Code*. Most owners found that the most economical way to comply with the *Code* was to install automatic sprinklers.

The city coupled the Dangerous Building Ordinance with a funding plan that city officials arranged with the local agency that administered the federal urban renewal program in Fresno. Federal funds were provided to the

city by the US Department of Housing and Urban Development for the acquisition of property and the demolition of buildings not worth saving. The city's agreement with the urban renewal agency specified that any new construction in the city's urban renewal area would be sprinklered in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*. Finally, the urban renewal agency agreed to help interested owners find loans for building renovation. The agency did not, however, provide funds to owners or guarantee the loans made to owners.

As a result of these two actions by the city -- enactment of the Dangerous Building Ordinance and the agreement with the federal urban renewal agency -- sprinkler protection became almost universal in the 18-block central business district and a separate 22-block area once considered a slum. More than 95 percent of all the buildings in both areas ultimately were protected by automatic sprinklers.

Representatives of the National Automatic Sprinkler and Fire Control Association (NAS), which was involved in the initial discussions that resulted in the Fresno program, revisited the city in 1977 to study the results produced by the program. What follows is a recounting of the effects that the organization found the program had made on the fire department and fire losses.

Fire Department Results

In 1955, Fresno's population stood at 115,000. By 1977, 69,500 people had been added to its population, a

Mr. Reilly is President of the National Automatic Sprinkler and Fire Control Association, Inc. Mr. Vinello is that organization's Vice-President of Field Operations.

65 percent increase. In 1955, Fresno covered only 21 square miles. By 1977, through a process of annexation, its area had jumped to 58 square miles. During the same period, the number of Fresno's engine companies increased from 9 to 11, a 22 percent increase. Total paid fire-fighting personnel increased from 218 men in 1955 to 276 men in 1977, a 26 percent increase. The number of fire fighters on duty around the clock remained unchanged: 68 men on duty during any 24-hour period in 1955, and 68 men on duty around the clock in 1977.

The burden per fire fighter had increased enormously between 1955 and 1977. In 1955, there were 3.2 fire fighters per square mile of area to protect. By 1977, the number of fire fighters per square mile was reduced to 1.2 men per square mile. Therefore, each fire fighter was required to protect more than 2½ times the number of square miles of area in 1977 than he was required to protect in 1955.

The number of fire fighters on duty during any 24-hour period decreased from 6.04 men per 10,000 in 1955 to 3.64 men per 10,000 in 1977. So the fire department was protecting almost twice as many people and property in 1977 as it had predicted in 1955, and had to cover over 2½ times the geographical area with only 20 percent more equipment, and virtually no increase in manpower.

In 1955, Fresno's fire department received so few deficiency points that it was rated as a Class 1 department. If the fire department were to maintain its Class 1 rating, 14 new fire stations would have to have been added between 1955 and 1976. Assuming a cost of \$1 million per station, including land and construction costs, this \$14 million acquisition would have cost the taxpayers about \$2.2 million per year, assuming a 6 percent municipal bond issue floated over a 20-year period.

Fourteen pumpers would have to have been added to maintain a zero deficiency point rating. At \$65,000 per truck, this additional cost would add about \$145,600 per year to the fire department budget with the same 6 percent municipal bond float for the same 20-year period.

It is difficult to calculate with precision the impact of additional manpower required to maintain a zero increment in deficiency points resulting from a manpower shortfall. However, in 1955, the Fresno Fire Department was up to full complement: six men per company, on duty 24 hours a day. By 1976, only four men could roll on a call during any hour of the day or night.

If the three-platoon system (three men working 56-hour shifts around the clock) had been in existence in 1955, 84 new fire fighters would have been required to meet full manpower needs of the department. To say it another way, Fresno's 1977 department of 276 men would have to have been increased to 360 men if the department were to maintain its Class 1 rating. This would have added about \$1.26 million per year to Fresno's fire department budget. This would have increased the 1977 fire department budget from about \$9 million

per year to about \$12.6 million. About a 40 percent increase. If the fire department budget came to 13 percent of the total in 1975, it would have come to about 11 percent in 1977 if manpower, fire stations, and equipment were to be maintained at zero deficiency point levels.

Fire Losses

Between 1956 and 1966, per capita fire losses averaged \$4.71. In the decade immediately following, per capita fire losses averaged \$8.11. However, construction cost more than doubles every decade. NAS wanted to measure the cost of replacing buildings destroyed by fire, so it adjusted per capita fire losses to the Building Construction figures published by *Engineering News-Record*. Adjusting per capita fire losses to the Building Code Index, "real losses" dropped 22.4 percent in that decade.

Of even greater significance is the fact that nonresidential losses averaged 62.1 percent at the beginning of the 20-year period. By 1976, nonresidential losses had plunged to 33.5 percent of the total, and it was these buildings that became the object of the intensive automatic sprinkler master plan.

Conclusions

The Fresno program is a comprehensive fire defense master plan.

In the decade that followed its implementation, the city's fire losses (adjusted for inflation) were cut by 22 percent.

The fact that 95 percent of two urban renewal areas covering 40 square blocks were protected throughout by automatic sprinklers under a combination of ordinances made it possible for the fire department to take full advantage of the 50 percent reductions permitted under the "fire flow" standards of the Insurance Service Office (ISO) grading schedule and the additional 25 percent credit given by ISO for superior construction. This resulted in the imposition of almost zero deficiency points against the water department.

Intelligent planning based upon a thorough understanding of the ISO grading schedule enabled the building and fire departments to take the steps needed to upgrade the city from an ISO Class 3 to Class 2 city.

The implementation of the plan resulted in economies in fire department operations of up to 40 percent of the total operating budget for that department. The 1977 fire department budget of \$9 million would probably range up to about \$12.6 million if the \$4 added fire fighters, 14 pumpers, and 14 fire stations required to maintain a zero

(Continued on page 91)

F A C T D I G E S T

HOW PRIVATE FIRE PROTECTION CONSERVES PUBLIC RESOURCES
BY REDUCING WATER NECESSARY FOR FIGHTING FIRES, BY REDUCING THE LOSS
OF LIFE AND PROPERTY FROM FIRE, AND BY REDUCING COST OF FIGHTING FIRES

Compiled by Brian R. Shute, Attorney
For the Water Conservation Association

Anchorage, Alaska

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PART I

S T A T I S T I C S

LOSS OF LIFE AND DAMAGE TO PROPERTY FROM FIRE

FIRE CASUALTIES

Throughout the world fire takes a heavy toll of human life. The progress that has been made in controlling this tragic waste has been due primarily to the intelligent application of the principles of fire prevention and protection discussed in other sections of this HANDBOOK.

In this chapter, the present and past record of destruction of life by fires and explosions in the United States is reported, and the factors affecting life safety from fire are discussed. In the other chapters of this Section, property damage is similarly treated, fire investigating and reporting are discussed, and large loss fires and conflagrations are analyzed.

A. Deaths and Injuries by Fire

According to estimates by the NFPA Fire Analysis Department, the annual fire death toll in the United States has averaged about 12,000 per year over the last 20 years. The number increased in absolute terms until 1970. Since then, it has shown a slight decline. (In 1974 the estimate was 11,600, a decline of 100 from the previous year.) In general, the risk of death from fire to a given individual has been declining fairly steadily, as can be seen from the death rate per million population (see Fig. 1-2A).

A high fire death rate seems to be peculiarly an American problem. No other industrialized nation comes close to the American fire death rate (see Fig. 1-2B).

Fire Injuries

Personal injury by fire, always painful and often disfiguring, involves about ten times the number of deaths in the United States. According to estimates by the NFPA at least 123,000 fire-related injuries occurred in the United States in 1974. Every fire injury is a potential fatality,

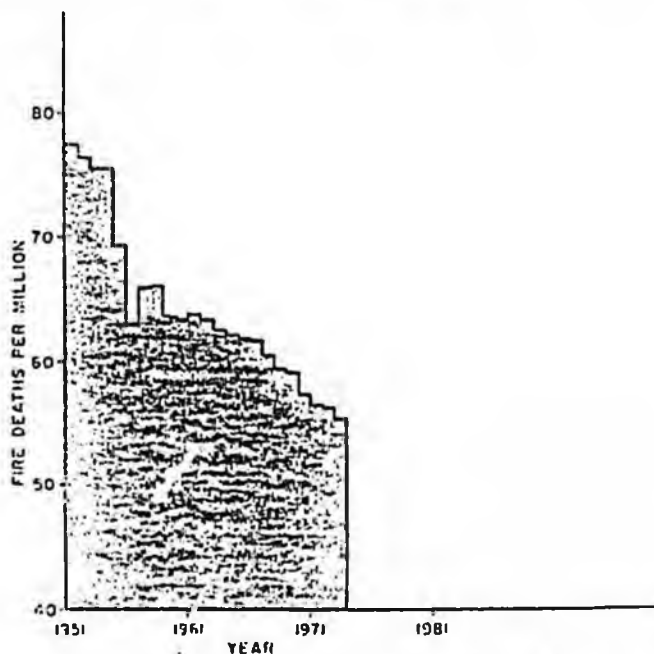


Fig. 1-2A. Trends in fire deaths in the United States.

although improvement in medical techniques has substantially improved the chances of recovery from serious fire injuries.

Nonfatal fire casualties are principally due to burns and to the inhalation of carbon monoxide and other gaseous products of combustion, though many casualties involve various other types of injury.

Trend of Fire Casualties

The principal reason that gradual improvements in life safety have not resulted in a more significant downward trend in the actual number of fire casualties in the rapid growth of population in recent years. From 1964 to 1974 the number of people in the United States increased about 10 percent. During the same period, the annual death rate from fire decreased 2½ percent.

The annual total of fire deaths is continuing, however, at a high level in spite of improvements in building construction, more widespread installation of automatic protection, more effective fire prevention campaigns, and more efficient fire department operation. While these factors have all had their effect in improving life safety from fire, there have been other offsetting factors, particularly the progressive increase in the smoking habit and the general increase in the use of flammable liquids.

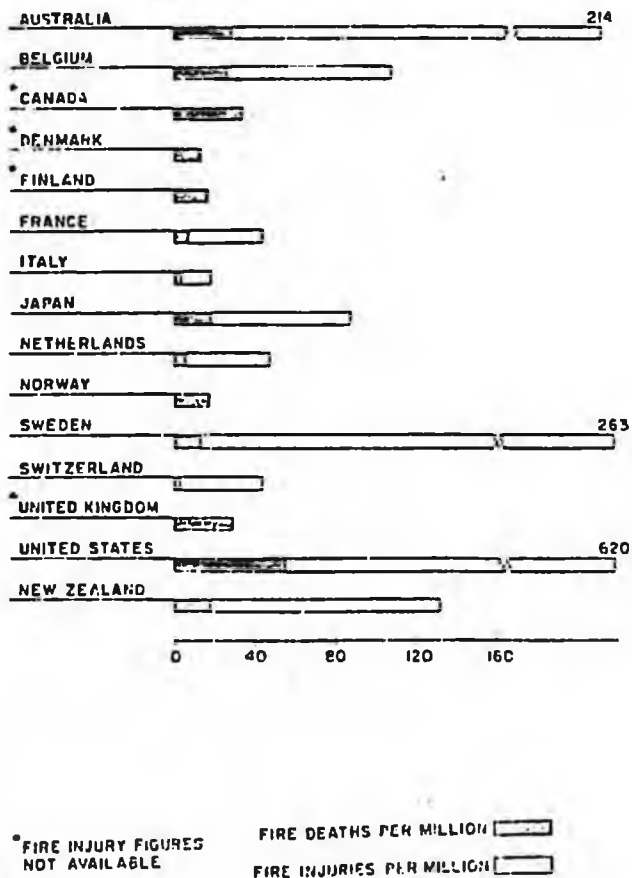


Fig. 1-2B. International fire deaths and injuries per million of population.

Source: National Fire Protection Association; Fire Protection Handbook, p. 1-5 14th edition 1976

When a going industry is struck by fire, and key processes or equipment sustain damage, serious business interruption can occur. Such business interruption can have one or more of the following effects:

1. Losses to the Fire-damaged Business

- (a) Loss of customers
- (b) Loss of return on capital investment
- (c) Loss of profits on finished goods
- (d) Loss of confidence of stockholders
- (e) Loss of credit standing
- (f) Loss of good will of customers, employees, and the community
- (g) Loss of trained personnel who transfer to other jobs
- (h) Cost of retaining key personnel during shutdown
- (i) Loss of productive services of key personnel retained during enforced shutdown
- (j) Seizure of fire insurance payments by uneasy creditors
- (k) Excessive replacement costs due to overtime, inability to buy at time most advantageous to buyer, etc.
- (l) Cost of demolition
- (m) Cost of replacing depreciated buildings and equipment with new facilities
- (n) Continuance of fixed charges during shutdown.
- (o) Cost of hiring temporary quarters
- (p) Loss of patterns, valuable records, and other items that cannot be replaced or can be replaced only at great cost
- (q) Loss of earning power of patents, trade marks, etc.
- (r) Loss of value of past advertising
- (s) Inability to defend against unjust claims due to loss of records
- (t) Loss of rent from tenants

2. Losses to the Community

- (a) Loss of circulation of employee payroll
- (b) Increased burden on welfare funds
- (c) Loss of business by suppliers of raw materials and services to fire-damaged plant
- (d) Loss of a labor market
- (e) Loss of taxes on destroyed property

In some special cases, a single fire can seriously hamper production in an entire industry. The 1954 fire in an automatic transmission plant, in Livonia, Mich., halted production for several months. Its transmissions were used in six makes of automobile. Their unavailability led to sharply depressed sales for five major U.S. automobile makers. Indirect losses were never accurately estimated.

Another example is a fire in a telephone exchange in downtown New York City in 1975 that disrupted service to 170,000 phones. The impact of such an outage on a major commercial center, such as the Wall Street financial district, is hard to assess, but it must have been substantial.

These two cases indicate the magnitude that indirect losses can assume.

Finally, there are indirect losses of a personal nature. These may be even more difficult to estimate, yet their importance should not be neglected. In addition to financial losses incurred through temporary unemployment and expenses incurred in finding and moving to new housing, there is the destruction of irreplaceable personal belongings.

Source: National Fire Protection Association; Fire Protection Handbook, p. 1-5 14th edition 1976

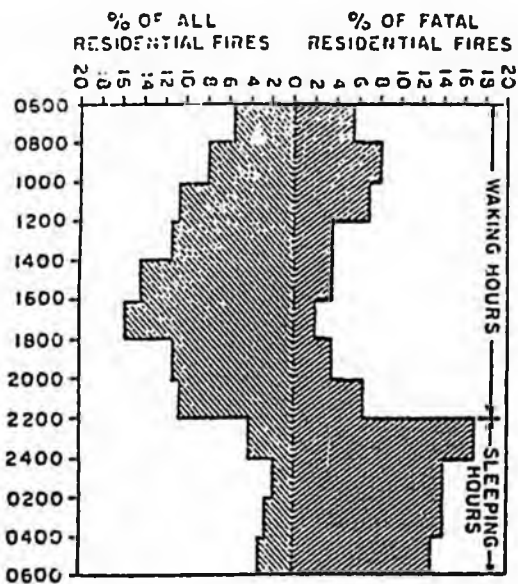


Fig. 1-2E. Time distribution of fatal residential fires.

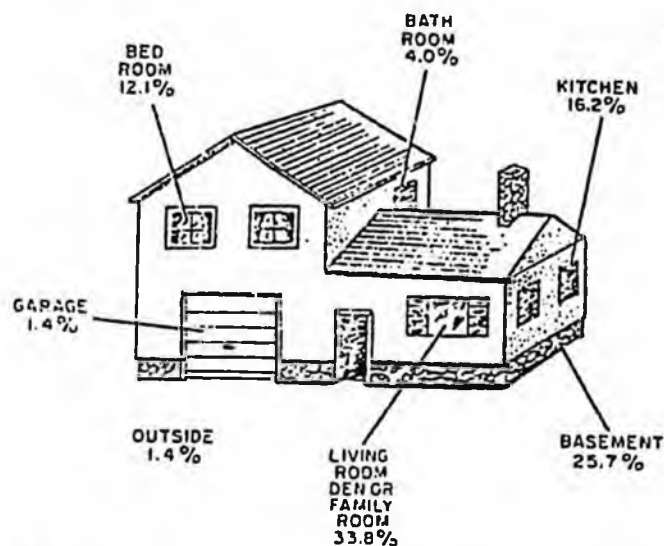


Fig. 1-2F. Locations where fatal fires start in one- and two-family dwellings (5.4 percent of the locations where fatal residential fires started were unknown.)

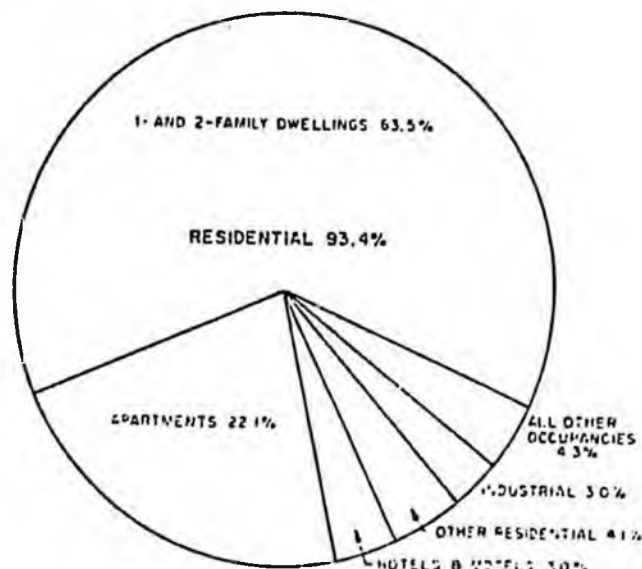


Fig. 1-2D. Occupancies where fire deaths in buildings occur.

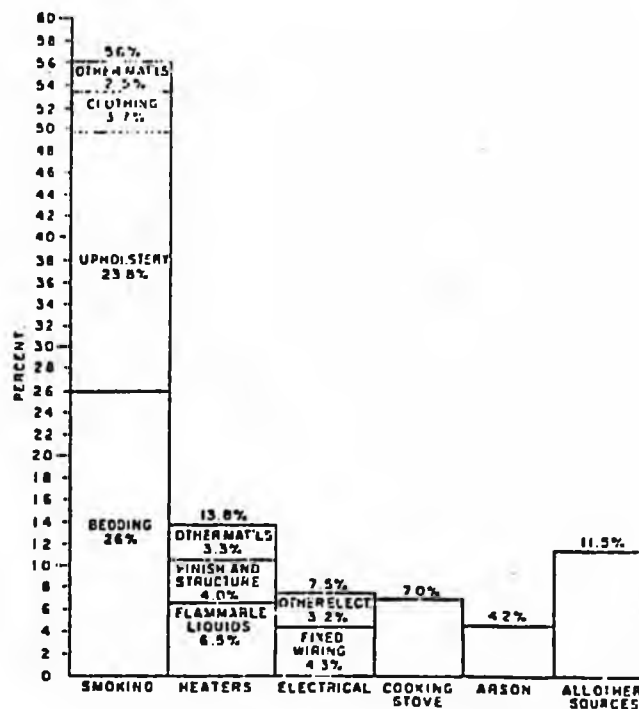


Fig. 1-2G. Causes of fatal residential fires.

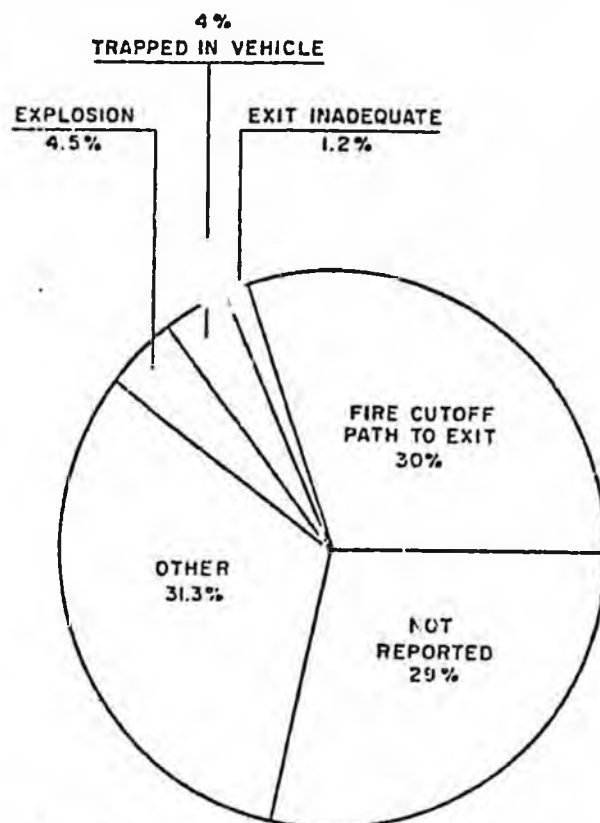


Fig. 1-2H. The reasons why fire victims do not escape.

Source: National Fire Protection Association; Fire Protection Handbook, p. 1-5 14th edition 1976

PROPERTY LOSS BY FIRE

Table 1-3A. Number of Fires by Occupancy 1970-1974

| | 1970 | 1971 | 1972 | 1973 | 1974 |
|--|------------------|------------------|------------------|------------------|------------------|
| Public Assembly Occupancies | | | | | |
| Amusement Centers, Ballrooms | 2,300 | 2,400 | 2,400 | 2,300 | 3,100 |
| Auditoriums, Exhibition Halls | 700 | 700 | 700 | 600 | 600 |
| Convention Establishments | 800 | 800 | 900 | 800 | 1,100 |
| Churches | 3,300 | 3,400 | 4,300 | 3,300 | 5,400 |
| Clubs, Private | 2,900 | 3,000 | 3,400 | 3,000 | 4,100 |
| Restaurants, Taverns | 17,800 | 18,200 | 21,700 | 19,500 | 26,800 |
| Theaters, Studios | 1,000 | 1,000 | 1,200 | 1,100 | 1,500 |
| Transportation Terminals | 600 | 600 | 600 | 500 | 600 |
| Other Public Assembly Occupancies | 1,600 | 1,600 | 2,600 | 2,400 | 3,600 |
| Total: | 31,000 | 31,700 | 37,900 | 34,100 | 47,000 |
| Educational Occupancies | | | | | |
| Schools, thru 12th grade | 13,000 | 15,700 | 17,200 | 18,300 | 27,800 |
| Other Schools | 4,000 | 4,800 | 5,200 | 5,200 | 7,700 |
| Total: | 17,000 | 20,500 | 22,400 | 24,100 | 35,500 |
| Institutional Occupancies | | | | | |
| Rest & Nursing Homes | 3,700 | 4,800 | 6,100 | 6,400 | 9,300 |
| Hospitals | 7,800 | 10,100 | 10,500 | 10,700 | 15,600 |
| Mental Institutions | 500 | 700 | 800 | 800 | 1,200 |
| Other Institutions | 2,000 | 2,600 | 3,800 | 3,700 | 5,400 |
| Total: | 14,000 | 18,200 | 21,200 | 21,600 | 31,500 |
| Residential Occupancies | | | | | |
| Dwellings, 1-2 Family | 547,000 | 536,000 | 562,500 | 587,200 | 661,400 |
| Apartments | 87,700 | 103,000 | 109,000 | 138,000 | 151,500 |
| Hotels, Motels | 13,400 | 15,200 | 16,400 | 21,700 | 30,200 |
| Mobile Homes | 22,600 | 25,000 | 27,400 | 25,100 | 29,700 |
| Other Residential Occupancies | 19,400 | 19,800 | 20,300 | 23,800 | 28,200 |
| Mercantile & Office Occupancies | 74,500 | 71,000 | 76,900 | 76,100 | 86,800 |
| Appliance, Furniture Stores | 4,000 | 3,800 | 4,100 | 4,100 | 4,700 |
| Clothing Stores | 4,400 | 4,200 | 4,500 | 4,500 | 5,100 |
| Department, Variety Stores | 5,200 | 5,000 | 4,600 | 4,500 | 5,700 |
| Drugstores | 3,000 | 2,900 | 2,900 | 2,900 | 3,300 |
| Grocery Stores, Supermarkets | 6,500 | 6,200 | 6,900 | 6,900 | 7,800 |
| Motor Vehicle Sales, Repair | 9,700 | 9,200 | 9,700 | 9,600 | 11,900 |
| Offices, Banks | 14,200 | 13,500 | 16,100 | 15,900 | 6,100 |
| Service Stations | 5,500 | 5,200 | 5,400 | 5,300 | 6,000 |
| Other Mercantile Occupancies | 22,000 | 21,000 | 22,700 | 22,400 | 24,200 |
| Total: | 690,100 | 699,000 | 735,600 | 795,800 | 901,000 |
| Basic Industry, Defense Occupancies | | | | | |
| Electric Power Plants | 3,900 | 2,900 | 3,100 | 3,000 | 3,100 |
| Laboratories, Data Processing Ctrs. | 900 | 600 | 800 | 800 | 800 |
| Mines, Mineral Products Plants | 2,000 | 1,500 | 1,600 | 1,600 | 1,700 |
| Other Basic Industry Occupancies | 1,800 | 1,300 | 1,500 | 1,500 | 1,600 |
| Total: | 8,600 | 6,300 | 7,000 | 6,900 | 7,200 |
| Manufacturing Occupancies | | | | | |
| Beverage, Tobacco, Essential Oils | 1,200 | 900 | 900 | 900 | 1,300 |
| Drug, Chemical, Paint, Petroleum PL | 4,200 | 3,100 | 3,800 | 3,600 | 4,900 |
| Food Product Plants | 5,100 | 3,700 | 3,700 | 3,600 | 5,700 |
| Laundry, Dry Cleaning Plants | 4,400 | 3,200 | 3,400 | 3,300 | 3,100 |
| Metal, Metal Product Plants | 4,700 | 3,500 | 4,100 | 4,000 | 5,700 |
| Paper, Paper Product Plants | 2,400 | 1,800 | 3,000 | 3,100 | 4,800 |
| Plastic, Plastic Product Plants | 1,300 | 1,000 | 1,900 | 1,900 | 3,700 |
| Printing Plants | 1,900 | 1,400 | 1,600 | 1,600 | 1,400 |
| Textile, Textile Product Plants | 3,800 | 2,800 | 3,500 | 3,500 | 3,900 |
| Wood, Wood Product Plants | 3,700 | 2,700 | 3,100 | 3,100 | 3,700 |
| Other Manufacturing Occupancies | 14,900 | 10,900 | 12,000 | 11,800 | 14,800 |
| Total: | 47,600 | 35,000 | 41,000 | 40,400 | 53,000 |
| Storage Occupancies | | | | | |
| Barns, Stables | 19,800 | 20,600 | 19,300 | 14,800 | 17,900 |
| Bulk Plants, Tank Farms | 1,400 | 1,500 | 1,500 | 1,100 | 1,400 |
| Garages, Residential Parking | 26,900 | 28,000 | 26,000 | 20,000 | 24,800 |
| Grain Elevators | 3,000 | 3,100 | 2,400 | 1,800 | 2,200 |
| Lumber, Building Materials Storage | 1,400 | 1,500 | 1,300 | 1,000 | 1,400 |
| Sheds, Farm Outbuildings | 15,000 | 15,600 | 14,000 | 10,800 | 12,700 |
| Other Storage Buildings | 10,600 | 11,000 | 10,400 | 7,800 | 8,100 |
| Total: | 78,100 | 81,400 | 74,900 | 51,300 | 68,500 |
| Other Buildings | 31,100 | 33,800 | 33,000 | 30,200 | 39,500 |
| Total Building Fires: | 992,000 | 996,600 | 1,050,200 | 1,025,900 | 1,270,000 |
| Nonbuilding Occupancies | | | | | |
| Standing Crops | 27,000 | 22,000 | 22,000 | 21,000 | 22,000 |
| Forests | 121,700 | 111,500 | 125,000 | 119,000 | 127,000 |
| Grass, Brush, Rubbish | 908,000 | 1,076,300 | 989,900 | 891,200 | 920,000 |
| Motor Vehicles | 479,700 | 501,600 | 550,300 | 574,000 | 640,000 |
| Ships, Boats, RR | 21,000 | 20,000 | 20,000 | 2,700 | 2,700 |
| Aircraft, Aerospace Vehicles | 150 | 200 | 200 | 200 | 300 |
| Total Fires: | 2,549,550 | 2,728,200 | 2,757,500 | 2,695,100 | 2,932,000 |

Source: National Fire Protection Association; Fire Protection Handbook, p. 1-5 14th edition 1976

Table 1-3B. Estimated Fire Losses by Occupancy

| | 1970 | 1971 | 1972 | 1973 | 1974 |
|--|------------------------|------------------------|------------------------|------------------------|------------------------|
| Public Assembly Occupancies | | | | | |
| Amusement Centers, Ballrooms | 9,500,000 | 10,100,000 | 10,600,000 | 10,700,000 | 12,300,000 |
| Auditorium, Exhibition Halls | 5,500,000 | 5,500,000 | 5,600,000 | 5,600,000 | 7,500,000 |
| Bowling Establishments | 7,400,000 | 8,100,000 | 9,300,000 | 9,500,000 | 10,400,000 |
| Churches | 18,500,000 | 23,300,000 | 28,100,000 | 28,400,000 | 34,200,000 |
| Clubs, Private | 13,500,000 | 12,800,000 | 14,200,000 | 14,500,000 | 19,400,000 |
| Restaurants, Taverns | 46,000,000 | 50,900,000 | 54,300,000 | 54,900,000 | 65,300,000 |
| Theaters, Studios | 7,600,000 | 11,700,000 | 13,400,000 | 13,500,000 | 13,400,000 |
| Transportation Terminals | 2,500,000 | 2,800,000 | 2,600,000 | 2,600,000 | 3,500,000 |
| Other Public Assembly Occupancies | 8,900,000 | 13,700,000 | 15,100,000 | 15,300,000 | 15,400,000 |
| Total: | \$119,400,000 | \$138,900,000 | \$153,200,000 | \$155,000,000 | \$181,400,000 |
| Educational Occupancies | | | | | |
| Schools, thru 12th grade | 64,800,000 | 72,500,000 | 76,100,000 | 81,900,000 | 106,200,000 |
| Other Schools | 13,000,000 | 14,500,000 | 14,800,000 | 17,100,000 | 18,600,000 |
| Total: | 77,800,000 | 87,000,000 | 90,900,000 | 99,000,000 | 124,800,000 |
| Institutional Occupancies | | | | | |
| Rest & Nursing Homes | 2,700,000 | 3,500,000 | 3,900,000 | 3,600,000 | 5,900,000 |
| Hospitals | 8,500,000 | 11,100,000 | 12,200,000 | 12,400,000 | 20,400,000 |
| Mental Institutions | 1,000,000 | 1,300,000 | 1,500,000 | 1,500,000 | 2,500,000 |
| Other Institutions | 5,000,000 | 6,500,000 | 7,200,000 | 6,400,000 | 10,600,000 |
| Total: | 17,200,000 | 22,400,000 | 24,800,000 | 23,900,000 | 39,400,000 |
| Residential Occupancies | | | | | |
| Dwellings, 1-2 Family | 603,500,000 | 608,600,000 | 638,500,000 | 700,700,000 | 808,100,000 |
| Apartments | 132,800,000 | 151,400,000 | 151,600,000 | 265,300,000 | 299,100,000 |
| Hotels, Motels | 33,800,000 | 37,800,000 | 43,600,000 | 42,200,000 | 68,300,000 |
| Mobile Homes | 33,000,000 | 36,500,000 | 42,000,000 | 57,800,000 | 77,200,000 |
| Other Residential Occupancies | 38,600,000 | 39,700,000 | 42,700,000 | 37,400,000 | 50,100,000 |
| Total: | 841,700,000 | 874,100,000 | 918,400,000 | 1,163,400,000 | 1,302,800,000 |
| Mercantile and Office Occupancies | | | | | |
| Appliance, Furniture Stores | 26,000,000 | 24,800,000 | 28,100,000 | 27,500,000 | 32,600,000 |
| Clothing Stores | 20,400,000 | 19,400,000 | 21,800,000 | 20,900,000 | 24,900,000 |
| Department, Variety Stores | 37,400,000 | 35,600,000 | 41,900,000 | 40,700,000 | 53,300,000 |
| Drugstores | 11,800,000 | 11,200,000 | 11,800,000 | 11,800,000 | 12,900,000 |
| Grocery Stores, Supermarkets | 33,200,000 | 31,600,000 | 36,900,000 | 35,900,000 | 40,900,000 |
| Motor Vehicle Sales, Repair | 33,300,000 | 31,700,000 | 35,100,000 | 34,100,000 | 43,800,000 |
| Offices, Banks | 43,000,000 | 41,200,000 | 48,700,000 | 47,300,000 | 55,800,000 |
| Service Stations | 11,500,000 | 10,900,000 | 11,600,000 | 11,100,000 | 14,200,000 |
| Other Mercantile Occupancies | 132,000,000 | 125,800,000 | 141,800,000 | 137,800,000 | 154,200,000 |
| Total: | 348,600,000 | 332,200,000 | 377,700,000 | 356,700,000 | 432,600,000 |
| Basic Industry, Defense Occupancies | | | | | |
| Electric Power Plants | 5,500,000 | 8,600,000 | 24,700,000 | 22,900,000 | 26,900,000 |
| Laboratories, Data Processing Ctrs. | 2,500,000 | 2,000,000 | 2,800,000 | 2,600,000 | 12,900,000 |
| Mines, Mineral Products Plants | 44,100,000 | 39,700,000 | 44,500,000 | 41,000,000 | 40,400,000 |
| Other Basic Industry Occupancies | 8,700,000 | 7,900,000 | 9,600,000 | 9,400,000 | 8,200,000 |
| Total: | 64,800,000 | 58,200,000 | 81,600,000 | 76,300,000 | 88,400,000 |
| Manufacturing Occupancies | | | | | |
| Beverage, Tobacco, Essential Oils | 6,600,000 | 6,400,000 | 6,700,000 | 5,100,000 | 6,800,000 |
| Drug, Chemical, Paint, Petroleum PL | 76,000,000 | 73,700,000 | 94,900,000 | 89,000,000 | 172,000,000 |
| Food Product Plants | 41,400,000 | 40,200,000 | 42,200,000 | 39,600,000 | 58,600,000 |
| Laundry, Dry Cleaning Plants | 9,200,000 | 8,900,000 | 9,900,000 | 9,200,000 | 7,100,000 |
| Metal, Metal Product Plants | 46,500,000 | 45,100,000 | 54,400,000 | 51,700,000 | 82,700,000 |
| Paper, Paper Product Plants | 8,400,000 | 8,100,000 | 7,800,000 | 11,800,000 | 17,000,000 |
| Plastic, Plastic Product Plants | 11,500,000 | 11,200,000 | 16,500,000 | 16,700,000 | 27,600,000 |
| Printing Plants | 5,400,000 | 5,300,000 | 6,400,000 | 6,100,000 | 14,100,000 |
| Textile, Textile Product Plants | 16,500,000 | 16,100,000 | 18,100,000 | 15,700,000 | 32,200,000 |
| Wood, Wood Product Plants | 39,800,000 | 39,600,000 | 46,500,000 | 43,600,000 | 48,600,000 |
| Other Manufacturing Occupancies | 81,400,000 | 93,900,000 | 82,000,000 | 76,700,000 | 118,200,000 |
| Total: | 342,700,000 | 332,500,000 | 389,000,000 | 364,400,000 | 584,900,000 |
| Storage Occupancies | | | | | |
| Barns, Stables | 61,600,000 | 85,000,000 | 81,000,000 | 74,400,000 | 96,600,000 |
| Bulk Plants, Tank Farms | 7,900,000 | 8,300,000 | 10,300,000 | 9,300,000 | 58,700,000 |
| Garages, Residential Parking | 29,800,000 | 31,000,000 | 30,500,000 | 27,900,000 | 36,100,000 |
| Grain Elevators | 47,800,000 | 49,800,000 | 42,800,000 | 39,300,000 | 51,300,000 |
| Lumber, Building Materials Storage | 20,400,000 | 21,300,000 | 20,700,000 | 18,900,000 | 29,900,000 |
| Sheds, Farm Outbuildings | 30,200,000 | 31,500,000 | 30,100,000 | 27,600,000 | 36,600,000 |
| Other Storage Buildings | 126,400,000 | 131,800,000 | 111,800,000 | 102,600,000 | 125,100,000 |
| Total: | 344,100,000 | 358,700,000 | 327,200,000 | 300,000,000 | 434,300,000 |
| Other Buildings | 52,900,000 | 62,200,000 | 53,500,000 | 48,500,000 | 71,400,000 |
| Total Building Fires: | 2,209,200,000 | 2,266,000,000 | 2,416,300,000 | 2,537,200,000 | 3,260,000,000 |
| Nonbuilding Occupancies | | | | | |
| Standing Crops | 27,200,000 | 26,000,000 | 29,000,000 | 32,000,000 | 36,200,000 |
| Forests | 131,100,000 | 119,000,000 | 128,000,000 | 126,000,000 | 169,700,000 |
| Grass, Brush, Rubbish | | | | | |
| Motor Vehicles | 88,900,000 | 112,660,000 | 177,300,000 | 135,300,000 | 135,000,000 |
| Ships, Boats, RR | 29,000,000 | 27,600,000 | 29,200,000 | 30,300,000 | 37,900,000 |
| Railroad Rollingstock | | | | | |
| Aircraft, Aerospace Vehicles | 145,000,000 | 192,000,000 | 199,000,000 | 150,000,000 | 181,000,000 |
| Total Fire Losses: | \$2,630,400,000 | \$2,743,260,000 | \$2,927,800,000 | \$3,020,800,000 | \$3,819,100,000 |

Source: National Fire Protection Association; Fire Protection Handbook, p. 1-5 14th edition 1976

PROPERTY LOSS BY FIRE

Table 1-3C. Occupancies Where Large-loss Fires Occurred, 1974

| Occupancy | No. Large-loss Fires | Loss | No. Large-loss Fires | Loss |
|--|----------------------|-------------|----------------------|----------------------|
| Public Assembly | | | 73 | \$41,649,577 |
| Bowling Establishments | 8 | \$4,345,000 | | |
| Churches | 15 | 6,014,875 | | |
| Clubs | 7 | 2,460,000 | | |
| Restaurants, Night Clubs and Taverns | 31 | 16,656,786 | | |
| Other Public Assembly Places | 12 | 12,172,916 | | |
| Educational | | | 42 | 29,831,212 |
| Nonresidential Schools | 40 | 28,571,212 | | |
| Other Educational | 2 | 1,260,000 | | |
| Institutional | | | 2 | 1,350,000 |
| Residential | | | 43 | 19,242,599 |
| Apartments | 16 | 9,483,607 | | |
| Hotels and Motels | 13 | 5,423,325 | | |
| Other Residential | 14 | 4,335,667 | | |
| Mercantile | | | 118 | 85,830,629 |
| Food Sales | 15 | 8,731,378 | | |
| Textile Product Sales | 6 | 2,837,000 | | |
| Household Goods Sales | 17 | 8,808,000 | | |
| General Item Sales | 20 | 14,123,750 | | |
| Offices | 18 | 17,704,727 | | |
| Other Commercial | 42 | 33,625,774 | | |
| Basic Industry | | | 24 | 31,244,500 |
| Utilities | 10 | 6,375,000 | | |
| Other Basic Industry | 14 | 24,869,500 | | |
| Manufacturing | | | 119 | 132,668,862 |
| Food Processing | 15 | 17,915,470 | | |
| Wood and Wood Paper Products | 24 | 35,320,001 | | |
| Chemical, Plastic and Petroleum Products | 15 | 33,754,000 | | |
| Metal and Metal Products | 29 | 18,986,457 | | |
| Other Industrial and Manufacturing | 36 | 26,692,934 | | |
| Storage | | | 138 | 139,909,279 |
| Agricultural Products | 15 | 19,201,860 | | |
| Textile Products | 11 | 18,377,617 | | |
| Wood and Wood Paper Products | 29 | 13,239,691 | | |
| Chemical, Plastic and Petroleum Products | 20 | 13,992,000 | | |
| Metal and Metal Products | 16 | 10,350,500 | | |
| General Items | 21 | 24,846,480 | | |
| Other Storage | 26 | 39,901,331 | | |
| Other Occupancies | | | 35 | 74,207,057 |
| Special Structures | 1 | \$7,500,000 | | |
| Unoccupied Properties* | 20 | 9,003,417 | | |
| Ships and Other Water Vessels | 2 | 2,180,000 | | |
| Rail Vehicles | 3 | 31,250,000 | | |
| Road Vehicles | 4 | 6,203,640 | | |
| Aircraft | 5 | 24,820,000 | | |
| Unclassified Property | 21 | 9,975,696 | 21 | 9,975,696 |
| Total | | | 615 | \$565,909,411 |

* Includes buildings under construction, renovation and demolition.

Table 1-3D. Large-loss Fires by Size of Loss

| Year | No. Fires \$250,000 and Over | No. Fires \$750,000 and Over | No. Fires \$3,000,000 and Over | No. Fires \$10,000,000 and Over |
|------|---------------------------------|---------------------------------|-----------------------------------|------------------------------------|
| 1974 | 615 | 177 | 31 | 8 |
| 1973 | 501 | 157 | 22 | 4 |
| 1972 | 574 | 158 | 12 | 0 |
| 1971 | 499 | 132 | 10 | 1 |
| 1970 | 504 | 149 | 21 | 4 |

NOTE: See 1974 Large-loss Fires in the United States, *Fire Journal*, pp 13-18, Sep. 1975.
Source: National Fire Protection Association; Fire Protection Handbook,
p. 1-5 14th edition 1976

PART II

S T A T I S T I C S

HOW SPRINKLERS OPERATE AND THEIR
EFFECTIVENESS AT REDUCING LOSSES CAUSED BY FIRE

FUNDAMENTALS OF SPRINKLER PROTECTION

Automatic fixed extinguishing systems are the most effective means of controlling fires in buildings. In order to understand the capabilities of these systems, a thorough understanding of their use is essential. This Section deals with one such extinguishing system; sprinklers.

A. Development of Sprinkler Protection

The rapid growth of business and industry and the resultant increase in fire hazards and property values brought about the need for more adequate protection against fire. The difficulty of reaching a fire with hose streams has often been demonstrated, and such simple fire protection as water pails, standpipes, and hose equipment has proved inadequate unless the fire was discovered in its early stages. Although

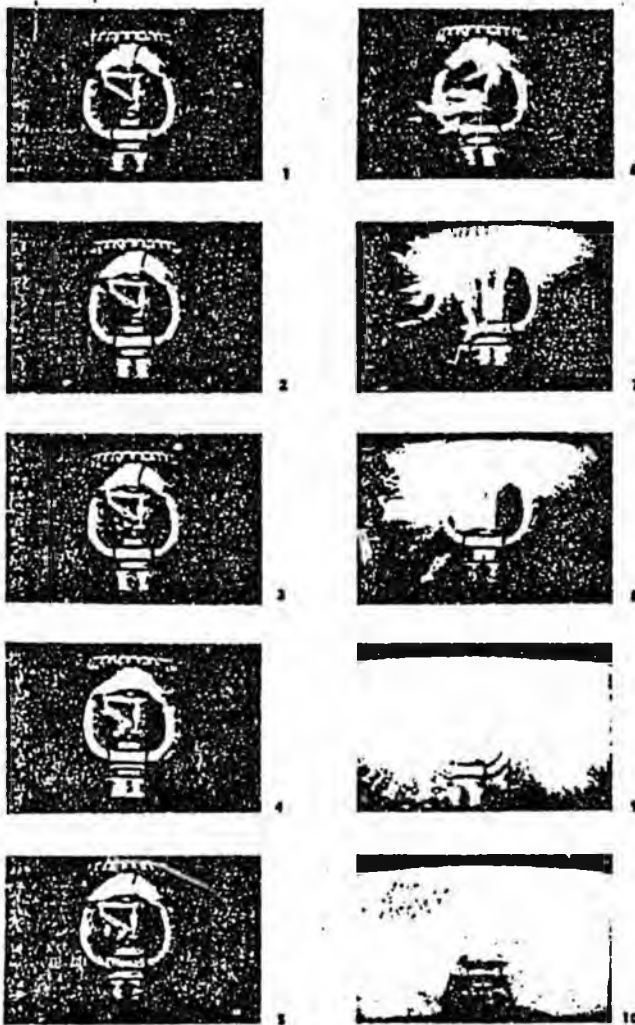


Fig. 14-1A. Operation of a typical fusible link automatic sprinkler is shown in this sequence of photos. As heat melts the solder, separation of members of the soldered link (the sloping side of the triangle in photos 1 to 5) is followed by complete separation of the link and lever arrangement (photo 6) which releases the cap over the sprinkler orifice allowing water to escape and strike the deflector (photos 7 to 10).

fire control has been made easier by improved building construction, comparatively little headway was made in reducing fire loss involving delayed detection until the advent of the automatic sprinkler.

The Automatic Sprinkler

Automatic sprinklers are devices for automatically distributing water upon a fire in sufficient quantity either to extinguish it entirely or to prevent its spread in the event that the initial fire is out of range of, or is of a type that cannot be extinguished by, water discharged from sprinklers. The water is fed to the sprinklers through a system of piping, ordinarily suspended from the ceiling, with the sprinklers placed at intervals along the pipes. The orifice of the fusible link automatic sprinkler is normally closed by a disk or cap held in place by a temperature-sensitive releasing element. Figure 14-1A shows in stop-action photo sequence the operation of a typical fusible link, upright automatic sprinkler.

Perforated Pipe and Open Sprinkler Systems

The forerunners of the automatic sprinkler were the perforated pipe and the open sprinkler. These were installed in a number of mill properties from 1850 to 1880 (see Fig. 14-1B). The systems were not automatic, the discharge openings in the pipes often clogged with rust and foreign materials, and water distribution was poor.

Open sprinklers, an improvement over perforated pipes, consisted of metal bulbs with numerous perforations attached to piping and intended to give improved water distribution. This system was only slightly better than the perforated pipe.

Early Automatic Sprinklers

The idea of automatic sprinkler protection, whereby heat from a fire opens one or more sprinklers and allows the

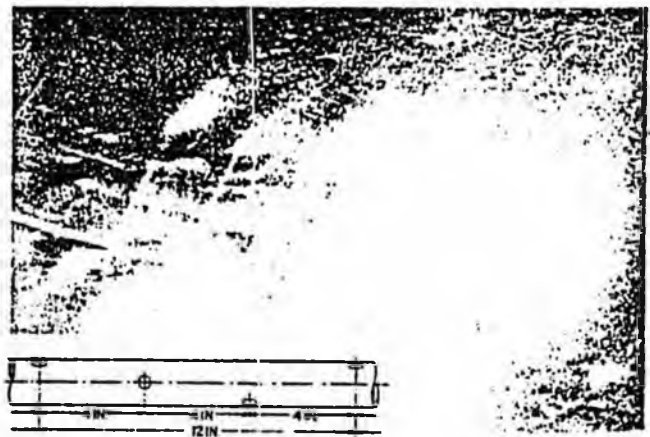


Fig. 14-1B. Early Perforated Pipe Sprinkler System: Water is shown discharging from a length of pipe representing what was the type of sprinkler protection in use from 1850 to about 1880. The inset shows the locations of perforations and the distances between them on a typical length of perforated pipe as was installed by the Providence Steam and Gas Pipe Co. (Grinnell Corp.)

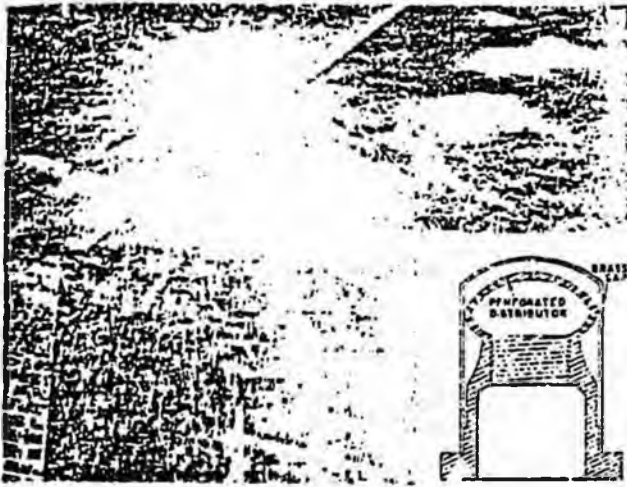


Fig. 14-1C. An Early Automatic Sprinkler: Water is shown discharging from a Parmelee No. 3 upright sprinkler which was first used in 1875. It consisted of a brass cap soldered over a perforated distributor and was designed to screw onto a nipple. The inset shows a cross-sectional view of the sprinkler.

water to flow, dates back to about 1860. Its practical application in the United States, however, began about 1878 when the Parmelee sprinkler was first installed. This sprinkler, while very crude when compared with modern devices, gave generally good results and proved conclusively that automatic sprinkler protection was both practical and valuable. (See Fig. 14-1C.)

B. Value of Automatic Sprinkler Protection

Automatic sprinkler protection helped develop modern industrial, commercial, and mercantile practices. Large areas, high buildings, hazardous occupancies, large values, or many people in one fire area, all tend to develop conditions which cannot be tolerated without automatic fixed fire protection. Part C of this chapter contains material on the performance of automatic sprinkler systems.

Safety to Life

Automatic sprinklers, properly installed and maintained, provide effective safeguards against loss of life by fire. Their value is psychological as well as physical: they give a sense of security to the occupants of buildings, and minimize the possibility of panic.

NFPA records of loss of life by fire show that in completely sprinklered buildings fire fatalities have been minimal.* They are limited to situations where sprinklers cannot

* The only fatalities in fully sprinklered properties reported to the NFPA were caused by explosions or flash fires; by ignition of the bedding or clothing of a person who was too young, too old, too intoxicated, or too handicapped in some other way to protect himself properly; by closure of water supply valves to the sprinkler system; or by hazards too severe for effective sprinkler performance in the protected property. Explosions in sprinklered properties have caused fatal injuries to occupants or have so damaged sprinkler piping as to render the systems virtually useless, with resultant loss of life. Severe flash fires have under unusual conditions traveled in advance of sprinkler operation, trapping victims before they had time to reach safety.

In those isolated instances of fatalities to sleeping, handicapped, or intoxicated persons, ignition of clothing or bedding caused fatal burns or asphyxiation either because the small fire did not generate sufficient heat to fuse a sprinkler, or because the victim had suffered fatal injuries before the sprinkler operated. In these latter instances, however, the sprinklers protected the lives of persons in adjoining areas.

be expected to be effective, such as in cases where the water is shut off, or where suffocation occurs before a fire is large enough to cause sprinklers to operate. Loss of life can also be caused by explosions where sprinklers have no opportunity to be effective.

Automatic sprinklers are particularly effective for life safety because they give warning of the existence of fire, and at the same time apply water to the burning area. With sprinklers there are seldom problems of access to the seat of the fire, or of interference with visibility for fire fighting due to smoke. While the downward force of the water discharged from sprinklers may lower the smoke level in a room where a fire is burning, the sprinklers also serve to cool the smoke and make it possible for persons to remain in the area much longer than they would if the room were without sprinklers.

Objections sometimes advanced against automatic sprinkler installation in the interest of life safety are generally based on misconceptions of the basic characteristics of sprinkler protection. The opinion is sometimes expressed that sprinkler discharge might drench people and cause panic or illness. This objection ignores the fact that without sprinklers the same people in the fire area would perhaps be burned to death. There is no case in the NFPA records of over 100,000 fires in sprinklered buildings where water from automatic sprinklers has in any way contributed to panic or caused any other hazard to occupants.

Another common misconception is that all sprinklers discharge water at the time of fire. This is not the case, as most fires are controlled by only a few sprinklers in the immediate vicinity of the fire.

Other objections to automatic sprinkler protection are based upon cost, and occasionally upon appearance. These objections are unsound where conditions are such that sprinklers are needed for life safety. Sprinklers are generally no more expensive than some decorative floor coverings, and aesthetic designs are available in sprinklers.

Contrary to popular opinion, automatic sprinklers are practicable for dwellings and other small properties. In country areas where water supplies are limited, a pressure tank can be provided with sufficient capacity to control the fire during evacuation.

NFPA 101, Life Safety Code, recognizes sprinklers in numerous ways, particularly to offset deficiencies in existing buildings. For example, longer travel distances to exits and interior finish of a higher combustibility are permitted with sprinklers.

Recent developments in the sprinkler industry have resulted in systems and discharge devices that will cycle on and off. When a fire occurs, this system reacts to the increase in temperature and discharges water. When the temperature decreases to a predetermined level because the fire has been controlled or extinguished, the system automatically stops the flow of water. Should the fire flare up again, the system will repeat this cycle. This cycling continues until the fire is either out or the system is shut off.

Protection of Property

Figures available on the fire loss in manufacturing and mercantile properties where sprinklers are installed show a much better loss/value ratio than those properties not so equipped. Insurance may largely compensate for property loss, but a severe fire loss goes much further.

Prevention of Business Interruption

In addition to the saving in direct fire losses due to sprinkler protection, there is a saving represented by the

freedom from business interruption. There also is an undetermined but possibly even greater reduction in conflagration and exposure losses, which reasonably may be attributed to automatic sprinkler protection. The destruction of property and its adverse association and sometimes permanent effect upon business may be, and often is, a great hardship, not only to the owner, tenants, and employees, but also to the community as a whole. Safeguarding a business from serious interruption by fire is often a determining factor in a decision to install sprinkler protection.

In many situations, sprinkler protection is required by law for specific parts of the building only. Where partial systems are required, complete systems should be installed. Partial systems are not cost effective. Should the fire start remote to the system, it will have no effect on the growing fire. Should the fire burn into the protected area, it will generally have developed sufficient intensity to overpower the sprinklers, thereby wasting water needed by the fire service to fight the fire.

Minimizing of Water Damage

Standard sprinkler systems have devices which automatically give an alarm in case of sprinkler operation; thus, they not only apply water at the point most needed, but also give an audible signal. This permits immediate check of fire conditions and minimizes water damage.

A properly installed sprinkler system will generate less water damage than the application of hose streams by the fire service. Sprinklers are not hampered in their operation by smoke or heat as is the fire service. Sprinklers can apply water efficiently and promptly to the seat of the fire. For this reason, they are one of the greatest life-saving tools of the fire service.

Fear of water damage is sometimes offered as an objection to the installation of automatic sprinkler protection. This comes in part from the thoughtless emphasis placed upon water damage in news reports of fires. Statements that a fire was of insignificant size, but that water damage was severe have been frequent. The probability of very severe destruction by fire in the absence of automatic sprinkler protection is seldom mentioned in these news accounts.

Accidental discharge of water from an automatic sprinkler system or other parts of a fire service water system due to defects in sprinklers, water control devices, piping, or associated equipment, is very rare. Precautions to prevent unnecessary discharge of water as a result of mechanical injury, freezing or overheating, or corrosion are covered in Chapter 6 of this Section.

Economics of Sprinkler Protection

In addition to the protection against destruction of property values and interruption to business, the saving in insurance costs often makes the expenditure for automatic sprinkler protection a sound business investment.

Many buildings do not have automatic sprinkler protection because the per dollar cost of the protection has appeared unjustifiably high to the building owners in relation to the value of the building.

Savings in insurance premiums alone could in numerous cases be adequate to finance, over a few years time, the installation of automatic sprinkler protection. Of equal importance are the many building code "trade-offs" that are allowed when sprinklers are installed. These "trade-offs" permit an increase in undivided area and often less fire resistance for the building construction, and therefore less erection cost. No value can be placed on the life safety aspects of total sprinkler protection or the security occupants feel when such systems are installed.

C. Record of Automatic Sprinkler Performance

Periodically the NFPA prepares summaries of sprinkler performance from the fire data reported to its Fire Analysis Department. The information is published in the NFPA *Fire Journal* as the Automatic Sprinkler Performance Tables, and is also available in pamphlet form.¹

Effectiveness of Automatic Sprinklers

Only in rare instances do automatic sprinkler systems fail to control fires. The failures are very seldom due to the sprinklers themselves, but rather to the lack of water. Even with older types of sprinklers which are no longer approved, the failure of the sprinkler itself has been very infrequent. Failure of the modern types under normal conditions is practically unknown. Some 117,770 fires in sprinklered buildings have been reported to the NFPA since 1897. Of these, 95 percent of the sprinklers showed satisfactory performance.

Because numerous fires extinguished by one or two sprinklers (with only a slight loss) are not reported to NFPA, the NFPA records do not represent the total number of fires in sprinklered properties. If it were possible to include a complete record, the efficiency of sprinkler performance would probably approach 100 percent.

It should be noted that recorded data reflect only the efficiency of operation, and are but indirectly related to the amount of fire losses. For example, where sprinklers do not operate because the water is shut off, unsatisfactory performance is recorded even though the fire may have been promptly discovered and extinguished by other means. Figure 14-1D shows graphically cumulative data from 1970 to 1974 on the number of sprinklers operating.

In recent years, the apparent percentage of satisfactory sprinkler operations has declined. From 1970 to 1974 it was 81 percent. This may be the result of the NFPA's "tagging" system which concentrates on those fires causing larger losses. Other studies (N.Y. Board of Fire Underwriters, Factory Mutual, etc.) that are based on approximately 100 percent reporting show considerably higher rates. The same is true of Australian records where all sprinkler actuations are reported.

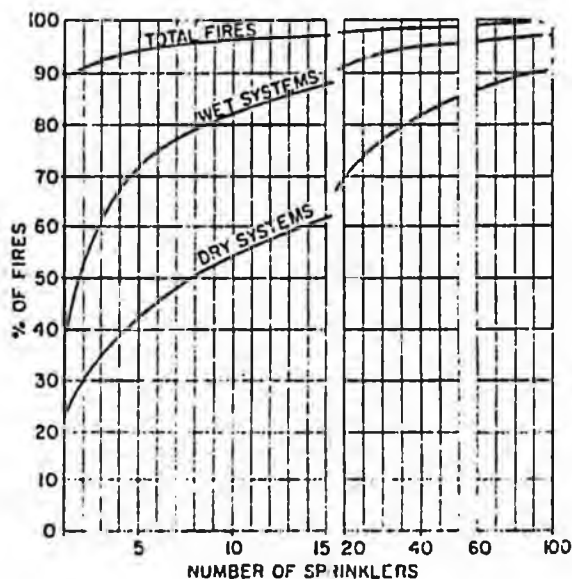


Fig. 14-1D. Number of sprinklers operating, cumulative data, 1970-74.

Effectiveness of Sprinklers by Occupancy Groups

Table 14-1A shows characteristic differences in sprinkler effectiveness for 22 major occupancy groups. As would be expected, some situations present a more difficult extinguishing problem than do others. This record of effectiveness is useful in evaluating the need for specially designed systems or auxiliary fire fighting facilities.

Unsatisfactory Sprinkler Performance by Occupancy Groups

Table 14-1A also lists by occupancy the reasons for unsatisfactory sprinkler performance for the same 22 occupancy groups. Closed sprinkler control valves are the most frequent cause, being responsible for 36 percent of the unsatisfactory performance reported. A study of the fires not controlled by sprinklers is of great importance, as it shows how to guard against such occurrences. It will be noted from Table 14-1A and from Figure 14-1E that in most cases there is a definite explanation for unsatisfactory performance. A more detailed analysis of unsatisfactory sprinkler performance will be found in the 1970 edition of the NFPA Automatic Sprinkler Performance Tables.¹

D. Standard Sprinkler Installations

The terms "sprinkler protection," "sprinkler installations," and "sprinkler systems" usually signify a combination of water discharge devices (sprinklers); one or more sources of water under pressure; water-flow controlling devices (valves); distribution piping to supply the water to the discharge devices; and auxiliary equipment, such as alarms and supervisory devices. Outdoor hydrants, indoor hose standpipes, and hand hose connections are also frequently a part of the system that provides protection. Figure 14-1F is an illustration of a typical sprinkler installation with all common water supplies, outdoor hydrants, and underground piping.

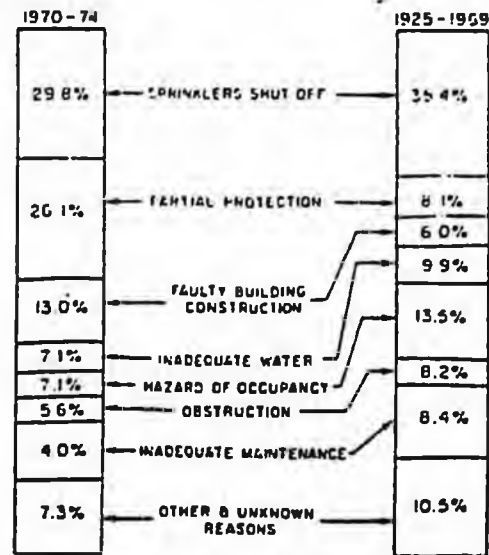


Fig. 14-1E. Reasons for unsatisfactory sprinkler performance.

When considering water supply problems, the performance of sprinklers, dry-pipe or wet systems, or special arrangements of sprinkler protection, the designation "sprinkler system" applies to the sprinklers controlled by a single water supply valve. Under this definition large buildings require several sprinkler systems, and a single water system may supply a number of sprinkler systems.

The fundamentals of sprinkler protection evolve around the principle of the automatic discharge of water, in sufficient density, to control or extinguish a fire in its incipiency. In planning for a system that fulfills this objective, many factors must be considered. They can, however, be broadly grouped into four categories: the sprinkler system itself, features of building construction, hazards of occupancy, and water supplies.

Table 14-1A. Sprinkler Performance Summary and Classification of Unsatisfactory Performance*

| Occupancies | Performance Summary | | | | Classification of Unsatisfactory Performance | | | | | | | | | | | | |
|---------------------------|---------------------|----------------------|--------------------|-----------------------------|--|--------------------|---------------------------|---------------|----------------|--------------------------|------------------------------|-----------------------------|---------------------|---------------|------------------------|--------------------|---------------------------|
| | Total No. of Fires | Total Unsatisfactory | Total Satisfactory | Total Satisfactory Per Cent | Water Shut Off | Partial Protection | Inadequate Water Supplies | System Frozen | Slow Operation | Defective Dry-Pipe Valve | Faulty Building Construction | Obstruction to Distribution | Hazard of Occupancy | Exposure Fire | Inadequate Maintenance | Articulated System | Miscellaneous and Unknown |
| Residential | 1,073 | 48 | 1,025 | 95.5 | 13 | 9 | 5 | 1 | — | — | 11 | 3 | 1 | — | 2 | 2 | 1 |
| Assembly | 1,551 | 52 | 1,499 | 96.6 | 23 | 10 | 3 | — | 1 | — | 9 | 1 | — | 1 | 4 | — | — |
| Educational | 241 | 20 | 221 | 91.7 | 4 | 8 | 1 | — | — | — | 5 | — | — | — | 1 | 1 | — |
| Institutional | 305 | 12 | 293 | 96.1 | 3 | 3 | 2 | — | — | — | 1 | — | 1 | — | — | — | 2 |
| Office | 494 | 13 | 481 | 97.4 | 4 | 2 | 1 | — | — | 2 | — | — | 1 | — | 1 | 1 | — |
| Mercantile | 6,237 | 176 | 6,061 | 97.2 | 63 | 11 | 4 | 4 | 4 | 5 | 35 | 11 | 12 | 1 | 4 | 1 | 1 |
| Industrial | | | | | | | | | | | | | | | | | |
| Beverages, essential oils | 543 | 64 | 479 | 88.2 | 17 | 4 | 9 | — | — | 1 | 2 | 1 | 18 | 3 | 3 | 5 | 1 |
| Chemicals | 4,147 | 198 | 3,949 | 95.2 | 33 | 11 | 19 | — | 3 | 3 | 1 | 13 | 95 | 2 | 12 | 1 | 6 |
| Fiber products | 539 | 25 | 514 | 95.3 | 6 | — | 4 | 1 | — | 2 | — | 5 | 4 | — | 2 | 1 | — |
| Food products | 2,484 | 133 | 2,351 | 94.6 | 43 | 11 | 8 | 1 | 2 | 1 | 7 | 9 | 29 | 4 | 12 | 1 | 5 |
| Glass products | 519 | 23 | 496 | 95.6 | 8 | — | 3 | 1 | — | — | 2 | 1 | 5 | — | 3 | — | — |
| Leather, leather products | 2,804 | 114 | 2,750 | 88.0 | 43 | 8 | 7 | 3 | 2 | 4 | 9 | 7 | 9 | 4 | 5 | 6 | 3 |
| Metal, metal products | 9,807 | 305 | 9,502 | 96.9 | 91 | 36 | 22 | 3 | 6 | 0 | 15 | 35 | 43 | 6 | 29 | 7 | 6 |
| Mineral products | 394 | 19 | 375 | 95.2 | 10 | 4 | 2 | — | — | — | 1 | — | — | — | 1 | — | — |
| Paper, paper products | 7,147 | 234 | 6,913 | 96.7 | 75 | 16 | 34 | 3 | 2 | 2 | 16 | 32 | 21 | 2 | 23 | 4 | 4 |
| Rubber, rubber products | 1,489 | 61 | 1,428 | 95.9 | 21 | 4 | 3 | — | 1 | 1 | 1 | 10 | 14 | 1 | 5 | — | — |
| Textiles—Manufacturing | 16,119 | 291 | 15,878 | 98.2 | 109 | 15 | 32 | 3 | 5 | 3 | 11 | 27 | 18 | 1 | 50 | 9 | 8 |
| Textiles—processing | 6,577 | 127 | 6,400 | 98.1 | 57 | 6 | 11 | — | 5 | 1 | 8 | 13 | 15 | 2 | 7 | 1 | 6 |
| Wood products | 5,353 | 492 | 4,861 | 90.6 | 137 | 57 | 64 | 9 | 16 | 14 | 27 | 19 | 77 | 8 | 24 | 12 | 8 |
| Miscellaneous industries | 9,013 | 265 | 8,748 | 97.1 | 146 | 15 | 14 | 8 | 3 | — | 12 | 11 | 18 | 3 | 27 | 8 | — |
| Total (Industrial) | 66,945 | 2,351 | 64,594 | 96.5 | 791 | 187 | 252 | 37 | 45 | 39 | 112 | 163 | 266 | 36 | 207 | 56 | 46 |
| Storage Occupancies | 4,160 | 375 | 3,785 | 91.0 | 172 | 24 | 43 | 5 | 6 | 9 | 10 | 57 | 28 | 11 | 40 | 3 | 7 |
| Other Occupancies | 419 | 87 | 332 | 79.2 | 67 | — | — | 2 | — | — | 2 | 1 | 5 | 3 | 3 | 1 | 3 |
| Total (All Occupancies) | 81,425 | 3,134 | 78,291 | 96.2 | 1,110 | 254 | 311 | 44 | 56 | 53 | 167 | 256 | 424 | 52 | 262 | 65 | 60 |

* From the 1970 edition of the NFPA Automatic Sprinkler Performance Tables.

16

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AUTOMATIC SPRINKLER PERFORMANCE TABLES
NATIONAL AUTOMATIC SPRINKLER AND FIRE CONTROL ASSOCIATION, INC.

SUMMARY — LIFE SAFETY OCCUPANCIES

| Occupancy | No. of Fires | No. of Fires Extinguished | No. of Fires Held In Check | Satisfactory Systems Performance | FIRES CONTROLLED BY | | | Unsatisfactory Sprinkler Performance | |
|--|--------------|---------------------------|----------------------------|----------------------------------|---------------------|----------------------|----------------------|--------------------------------------|------------|
| | | | | | 1 Sprinkler | 2 or Less Sprinklers | 3 or Less Sprinklers | | |
| Mercantiles | 82 | 49 | 32 | 81 | 49 | 64 | 73 | 8 | 1 |
| Hotels, Motels Multiple Residences | 31 | 25 | 5 | 30 | 22 | 28 | 29 | 1 | 1 |
| Bowling Lanes | 24 | 22 | 2 | 24 | 21 | 22 | 23 | 1 | |
| Nursing Homes | 21 | 18 | 3 | 21 | 16 | 20 | 20 | 1 | |
| Hospitals | 17 | 13 | 4 | 17 | 11 | 15 | 15 | 2 | |
| Restaurants | 9 | 7 | 2 | 9 | 3 | 7 | 7 | 2 | |
| Assembly and Office Buildings | 6 | 3 | 3 | 6 | 4 | 4 | 5 | 1 | |
| Schools and Colleges | 35 | 29 | 5 | 34 | 24 | 31 | 32 | 3 | 1 |
| Cumulative Totals in Numbers | 225 | 166 | 56 | 222 | 150 | 191 | 204 | 19 | 3 |
| Cumulative Totals in Per Cent | | 74.1% | 25.0% | 99.1% | 66.5% | 85.4% | 90.6% | 8.6% | .9% |

1957-1957

An analysis of 225 fires in "completely" sprinklered "life safety" occupancies (light or ordinary hazard).

99.1% of these fires were extinguished or controlled by sprinklers.

The three instances of unsatisfactory performance resulted from "closed" valves.

Simple automatic valve supervision by central station, proprietary or remote station systems would send an automatic trouble signal alerting building employees and/or the fire department that water is "shut-off".

S-II

Source: 241 National Automatic Sprinkler and Fire Control Association, Inc.; News Bulletin, P. 18, May-August, 1971

AUTOMATIC SPRINKLER PERFORMANCE IN AUSTRALIA AND NEW ZEALAND

1886-1968

by

Harry W. Marryatt, Chairman, Australian Fire Protection Association

540 pages

Published by

AUSTRALIAN FIRE PROTECTION ASSOCIATION

51-53 William Street, Melbourne, Victoria Australia 3000

April, 1971

We don't very often publish book reviews. But this case is different. We would be remiss in our responsibilities to you — our readers — if we didn't tell you about Harry W. Marryatt's text, a comprehensive and scholarly study of automatic sprinkler performance in Australia and New Zealand, covering a period of 82 years.

Harry Marryatt is the founder of the Australian Fire Protection Association, has been its chairman since it was established in May, 1960. He is a graduate of the University of Melbourne, a charter member of the Society of Fire Protection Engineers (USA) and a Fellow of the Australian Institute of Management. He has been a professional fire protection engineer for more than forty years; has designed, manufactured, installed and serviced automatic sprinkler systems and virtually all fixed fire protection systems in Australia for more than four decades.

The book, inspired by Percy Bugbee, Chief Administrator of the National Fire Protection Association International (retired), is the most incisive, penetrating, detailed and comprehensive text published to date on the historic behavior of automatic sprinkler systems.

The book is more than a statistical analysis of sprinkler performance. It is a fire protection engineer's delight, examining the basic principles of loss control, delving into the basic physical laws governing the capabilities of water to absorb heat when droplets are broken up into a fine spray.

For those of you who relish the physics and chemistry of fire, its calculitic formulae, this book will keep you and your slide rule busy.

For those of you who want a reference text with well documented case histories of fires in virtually every conceivable