

MINUTES OF THE HOUSE COMMITTEE ON FEDERAL & STATE AFFAIRS

The meeting was called to order by Representative Robert H. Miller at _____
Chairperson

1:30 a.m./p.m. on _____ February 20, 1984 in room 526S of the Capitol.

All members were present except:

Representatives Peterson, Goosen & ~~Hensley~~

Committee staff present:

Russ Mills, Research Department
Mary Torrence, Revisor's Office

Conferees appearing before the committee:

Gary L. Nichols, Fire Chief, Sedgwick County Fire Dept.
Edward C. Redmon, State Fire Marshal
Bill Mitchell, Tobacco Institute
John Rupp, Tobacco Institute
Rep. Arthur Douville
Edward R. DeSoignie, Dept. of Transportation
Sgt. William Jacobs, Kansas Highway Patrol
Bob Storey, Electrolert, Inc.

The meeting was called to order by Chairman Miller.

Representative Roe made a motion, seconded by Representative Sughrue, to approve the minutes of the February 16 meeting. The motion carried.

HB 2993 - Fire Safety standards for cigarettes

Gary Nichols, Sedgwick County Fire Chief, gave testimony in favor of the bill. See attachment #1.

A video tape was presented.

Edward C. Redmon, State Fire Marshal testified in favor of the bill. See Attachment #2.

Bill Mitchell, Tobacco Institute, testified in opposition to the bill, stating that the use of heavier tobacco and finer paper decreases the flamability of cigarettes but increases tar and nicotine.

John Rupp, Tobacco Institute, Washington, D.C., appeared in opposition to the bill, stating a committee formed at the federal level to study the options would be the preferred manner in which to handle this.

Hearings were concluded on HB 2993.

HB 2923 - Radar detection or interference devices unlawful

Representative Arthur Douville explained the bill.

Edward DeSiognie, Department of Transportation, appeared in favor of the bill. See attachment #3.

Sgt. William Jacobs, Kansas Highway Patrol, gave testimony in favor of the bill. See attachment #4.

Bob Storey, Electrolert Inc., testified in opposition to the bill, stating certain provisions of the bill violate constitutional rights of citizens of Kansas. See attachment #5.

Hearings were concluded on HB 2923.

The meeting was adjourned.

KANSAS STATE ASSOCIATION OF FIRE CHIEFS

Attachment #1



FEBRUARY 19, 1984

EXECUTIVE BOARD

PRESIDENT

Chief Warren L. Hanks
Bonner Springs Fire Department
P.O. Box 38
Bonner Springs, Kansas 66012

FIRST VICE PRESIDENT

Chief Gary Nichols
Sedgwick County Fire Dept.
4343 North Woodlawn
Wichita, Kansas 67220

SECOND VICE PRESIDENT

Chief Fred W. Schafer
Soldier Township Fire Dept.
600 N.W. 46th
Topeka, Kansas 66617

TRUSTEES

Chief Harold Corless
Greensburg Fire Department
216 West Grant
Greensburg, Kansas 67054

Chief Carl Friedrich
Green Rural Fire Dept.
Box 151
Green, Kansas 67447

Chief Milton L. Rice
Liberal Fire Dept.
P.O. Box 330
Liberal, Kansas 67901

IMMEDIATE PAST PRESIDENT

Chief Dave Robertson
Salina Fire Department
222 West Elm Street
Salina, Kansas 67401

TO: THE HONORABLE MEMBERSHIP OF THE HOUSE
COMMITTEE ON FEDERAL & STATE AFFAIRS

FROM: THE KANSAS STATE ASSOCIATION OF FIRE CHIEFS

RE: HOUSE BILL NO. 2993

SECRETARY-TREASURER
Chief Harry L. Price
(316) 722-6099
Sedgwick County Fire Dept
4343 North Woodlawn
Wichita, Kansas 67220

Al

HOW BAD IS THE CIGARETTE FIRE PROBLEM: ACCORDING TO THE U.S. FIRE ADMINISTRATION, CIGARETTES CAUSED 2100 RESIDENTIAL FIRE DEATHS IN THE U.S. IN 1981. THAT IS 35% OF ALL RESIDENTIAL FIRE DEATHS FOR THE YEAR, FAR MORE THAN ANY OTHER SINGLE CAUSE. CIGARETTE FIRES ALSO CAUSED 3,800 REPORTABLE INJURIES AND OVER \$300 MILLION IN PROPERTY LOSS. THE VAST MAJORITY OF THESE CIGARETTE FIRES BEGIN WITH IGNITION OF UPHOLSTERED FURNITURE, MATTRESSES OR BEDDING.

WHAT IS A FIRE-SAFE CIGARETTE? ONE THAT WILL NOT IGNITE MOST COMMON UPHOLSTERY, MATTRESSES OR BEDDING MATERIALS. THERE ARE TWO POSSIBLE WAYS TO ACCOMPLISH THIS:

- A. CIGARETTES MAY BE MADE TO SELF-EXTINGUISH -- i.e., TO GO OUT IF NOT PUFFED ON FOR A FEW MINUTES.
- B. CIGARETTES MAY BE MADE THAT WILL BURN THEIR ENTIRE LENGTH BUT EITHER DO NOT GENERATE ENOUGH HEAT TO IGNITE UPHOLSTERY OR DO NOT TRANSFER HEAT TO UPHOLSTERY VERY EFFICIENTLY.

THE BILL YOU ARE CONSIDERING TODAY, IS SIMILAR IN NATURE TO CALIFORNIA SENATE BILL #197 WHICH WAS INTRODUCED BY SENATE MAJORITY LEADER JOHN GARAMENDI ON JANUARY 25, 1983. IN ADDITION TO CALIFORNIA, THE STATES OF MARYLAND, VIRGINIA, CONNECTICUT, NEW YORK, INDIANA AND MASSACHUSETTS HAVE SIMILAR BILLS NOW IN COMMITTEE.

YOU SAY, WHY DOESN'T THE CONSUMER PRODUCT SAFETY COMMISSION REQUIRE THAT CAGARETTES BE FIRE-SAFE? THE ANSWER IS THEY CAN'T? IN THE MID 1970'S, WHEN THE COMMISSION BEGAN TO CONSIDER SUCH ACTION, THE TOBACCO INDUSTRY WENT TO CONGRESS AND GOT AN AMENDMENT TO THE CONSUMER PRODUCT SAFETY ACT, REMOVING CIGARETTES FROM THE COMMISSION'S JURISDICTION.

BOTH THE U.S. HOUSE AND SENATE HAVE INTRODUCED BILLS, H.R. 1880 & SENATE 51, ENTITLED THE CIGARETTE SAFETY ACT. KANSAS COULD AND SHOULD BE THE LEADER IN RECOGNIZING THE FIRE SAFE CIGARETTE AS AN IMPORTANT AND LONG OVERDUE MEASURE IN THE BATTLE AGAINST FIRE.

Atch. 1

Fire-Safe Cigarettes
Background and Information

I. BACKGROUND:

Unattended burning cigarettes are the number one preventable cause of fatal home fires in California. In 1981, 76 people were killed, 218 people were injured and over 25 million dollars in property was lost in fires caused by cigarettes.

Although the industry does not reveal the compounds used in making cigarettes, there is evidence that manufacturers add phosphate, citrate compounds, and other chemicals to the paper or the tobacco in order to promote a long burn. Porous paper is often used to allow more oxygen into the cigarette to ensure a steady burn to the end.

The technology exists now to end the senseless deaths of countless, often innocent, citizens. One way to produce a fire-safe cigarette is to remove the burn promoting chemicals that many manufacturers add to their cigarettes. (World-wide, there are over 95 patents for fire-safe cigarettes.)

There are brands of cigarettes now sold in California which are already self-extinguishing -- Mores and Shermans are among those considered to be safe.

II. LEGISLATION

The Garamendi bill is an attempt to help solve this serious fire problem that exists in California. It is not an attempt in any way to prohibit smoking or tax tobacco products.

This legislation attempts to substantially reduce the number of injuries, deaths, and destruction of property caused by cigarette fires by establishing cigarette performance standards.

The bill would require:

- The State Fire Marshal, by June 1985, to set a performance standard for cigarettes and little cigars so that they will not ignite home furnishings if left unattended.
- These standards would be developed with the aid of the Bureau of Home Furnishings of the Department of Consumer Affairs.
- Any person who sells or distributes non-"fire-safe" cigarettes 18 months after standards have been set will be fined \$1,000 per day for each day of violation.

III. COMMONLY ASKED QUESTIONS:

Toxicity

Question: Is it true toxic chemicals might be added to slow the burning of cigarettes?

Answer: Cigarette companies do not need to add chemicals to retard burning. Non-toxic methods of producing self-extinguishing cigarettes are available, such as leaving chemicals like citrate and phosphate out of cigarettes.

Consumer Acceptance

Question: Will the taste of cigarettes be altered by additives making them fire-safe?

Answer: The bill does not require the addition of any additives to make cigarettes fire safe. If cigarette companies choose to use additives, then there could be a change in taste. Product taste is already altered by blending, preservatives, expanders, and moisteners. The fire-safe brands, More and some Shermans, have little or no additives and do self-extinguish.

Economic Impact

Question: Won't requiring a fire-safe cigarette place an undue economic burden on cigarette companies in the form of increased manufacturing costs?

Answer: Sales are good for the tobacco industry. A recent Federal Trade Commission report said Americans bought a record number of cigarettes in 1980, but Californians still lost 25 million dollars in damages due to fires caused by cigarettes. Just as the cigarette companies have researched ways to lower tar and nicotine, they should pursue avenues to develop a fire-safe cigarette in order to help save 2,000 lives nationally a year.

Furniture Alternative

Question: Wouldn't it be better to develop improved ignition resistant fabrics and furniture construction methods than to require fire-safe cigarettes?

Answer: Under current California state law, furniture is required to be fire retardant. To increase the level of fire resistance would be prohibitively expensive. Furthermore, there would be a lag time of 20-30 years before new furniture would replace older, less fire resistant furnishings. Also, many highly ignition-resistant fabrics, once finally aflame, produce highly toxic fumes and gases.

Over-Regulation

Question: Isn't there already too much hasty government regulation of private industry?

Answer: The problems of cigarette-caused fires, deaths, and injuries must be responsibly addressed. This legislation gives a reasonable time table in which to develop such technologies.

Health Hazard

Question: Don't most fire-safe cigarettes burn inefficiently and therefore increase tar and nicotine levels to smokers?

Answer: The development of a cigarette with fewer health hazards should continue, but this bill is not an anti-smoking bill and does not seek to address the health concern of smoking cigarettes. This bill is intended to stop the deaths, injuries, and property loss due to fires caused by cigarettes. Both paths must be pursued.

Implementation

Question: How long will the cigarette industry have to develop and produce fire-safe cigarettes?

Answer: The Garamendi bill states that the State Fire Marshal shall, by June 1, 1985, set fire safety performance standards for cigarettes.

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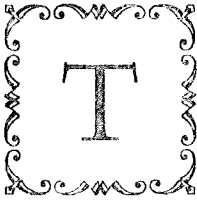
The Cigarette Safety Act
by Elizabeth McLoughlin

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The Cigarette Safety Act

ELIZABETH McLOUGHLIN

COMMUNICATION

HE U.S. Fire Administration has determined that, in 1979, fires initiated by smoking materials killed approximately 2,300 people, injured approximately 5,800 others, and resulted in property damage amounting to approximately \$210,000,000 (1). A study of 463 fire fatalities in Maryland during 1972-77 found that 44% of the fires were ignited by cigarettes (2).

There are two common sequences associated with such fires. A cigarette is dropped or falls into upholstered furniture; it smolders and starts a fire several hours later, usually after people have retired for the night. Or, a smoker falls asleep in bed, often after consuming alcohol; the cigarette falls on the bedding, smolders, and ignites the mattress.

There are at least three types of approaches to prevent such fires: change the smoker, the "fuel," or the ignition source. Education of smokers in the proper use and disposal of cigarettes has long been recommended. Since it is estimated that 99.99% of the 616 million cigarettes smoked each year are safely disposed of (3), it is unlikely that this percentage can be improved substantially by education. Moreover, there is a correlation between smoking and alcohol. Of the adult fire victims in the Maryland study 50% showed a blood alcohol concentration of above 0.10%.

The U.S. Consumer Product Safety Commission (CPSC) attempts to change the "fuel" by regulating the flammability of carpets (4) and mattresses (5), and is currently monitoring the effectiveness of an industry-wide voluntary flammability standard for upholstered furniture. This regulatory action to protect home furnishings from cigarette-ignited fires is the only means presently available to CPSC because the Commission's enabling legislation specifically excludes tobacco and tobacco products from its definition of a consumer product.

Is it possible to manufacture a fire-safe cigarette? Two important characteristics that determine a cigarette's likelihood of initiating fires are the tem-

perature at which it burns and the length of time it continues to burn. Both vary greatly with the brand of cigarette. There are at least nineteen registered patents for self-extinguishing cigarettes. However, American manufacturers apparently believe that the public wants a cigarette that continues to burn until it is completely consumed (i.e., for approximately twenty to forty-five minutes) without being smoked or touched. How manufacturers accomplish this continuous burn is considered proprietary information, and thus the additives and processes used are not required to be disclosed.

In 1978, recognizing that the time had come to change the ignition source, Andrew McGuire of the Northern California Burn Council and members of the Oakland, California, fire fighters' union funded the Center for Investigative Reporting to study attempts to modify and/or regulate the ignition characteristics of the cigarette. Publication of their findings (6) spurred Congressman Joseph Moakley (D,MA) to introduce a bill into the U.S. Congress in October 1979 entitled "The Cigarette Safety Act." It requires that "cigarettes and little cigars manufactured for sale . . . be processed to ensure that such cigarettes . . . A) if ignited, will stop burning within a time period designated by the Commission (CPSC) if such cigarettes . . . are not smoked during such period, or B) meet some other performance standard . . . to ensure that such cigarettes . . . do not ignite smoldering upholstered furniture and mattress fires, and that such proceeding be accomplished without the addition of any toxic elements" (7). The bill was reintroduced in 1981 with twenty-two co-sponsors as HR1854, and an identical bill was introduced in the Senate (S51) by Senator Alan Cranston (D,CA). Similar bills have been introduced in the state legislatures of Oregon, New York, and Massachusetts.

Organizations supporting the action for a fire-safe cigarette include the American Public Health Association, the American Medical Association, the International Association of Fire Chiefs, the International Association of Fire Fighters (AFL-CIO), the U.S. Consumer Product Safety Commission, the U.S. Fire Administration, the American Burn Association, the American Trauma Society, and the Emergency Department Nurses' Association.

In addition to legislative activities, successful product liability lawsuits have the potential for influencing product design and manufacture (8). Five personal injury lawsuits involving victims of cigarette-ignited fires have been filed since October 1979. The most recent case in California involves a non-smoker who sustained second- and third-degree burns over 40% of his body.

At a time of intense antiregulatory sentiment in Washington and powerful tobacco interests fighting any governmental control, the Cigarette Safety Act will become law only if significant public awareness and support can be generated. Interested public health professionals can help by sending copies of all local newspaper coverage of cigarette-related fire injuries and deaths to their elected officials in Washington, accompanied by a request to co-sponsor HR1854 or S51, with copies to the Northern California Burn Council, San Francisco General Hospital, San Francisco, California 94110.

REFERENCES

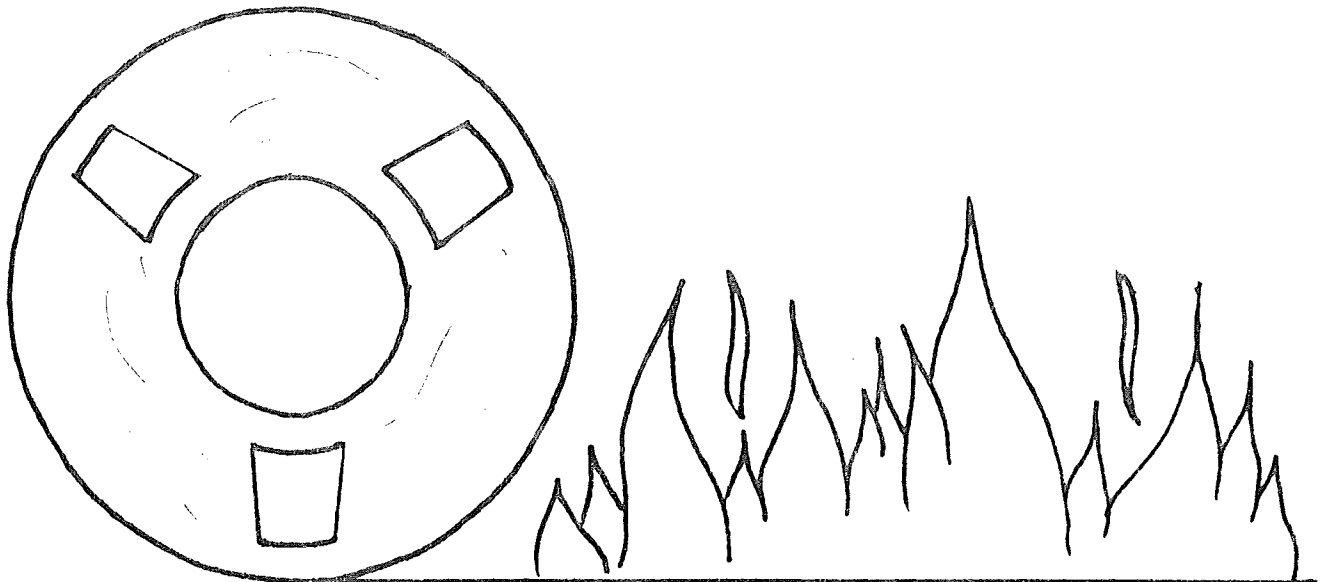
1. Cigarette Safety Act, Sec. 3a, 2A, B, C.
2. Berl, W. G., and B. M. Halpin. "Human Fatalities from Unwanted Fires," *The Johns Hopkins University - Applied Physics Laboratory* (December 1978), p. 8.
3. Cranston, A. *Congressional Record*, January 6, 1981.
4. Carpet standards: Large carpets/rugs (24 sq. ft.): DOC-FE-1-70 (effective Apr. 1971); Small carpets/rugs: DOC-FE-2-70 (effective Dec. 1971).
5. Mattress standard: FE-4-72 (effective June 1973).
6. O'Malley, B. "Cigarettes and Sofas: How the Tobacco Lobby Keeps the Home Fires Burning," *Mother Jones* (July 1979): 56-63.
7. Cigarette Safety Act, Sec. 3b, 1A, B, 2.
8. Teret, S. "Injury Control and Product Liability," *Journal of Public Health Policy* 2 (1981): 49-57.

SPECIAL KANSAS
FIRE LOSS
SUMMARY

TITLE: Analysis of Fires Related to Smoking
(January 1, 1980 through December 31, 1983)

DATE: February 6, 1984

REPORT NUMBER: 84-0001



Kansas Fire Information System

- KANSAS UNIFORM FIRE INCIDENT REPORTING SYSTEM {K-FIRS}
- KANSAS INSURANCE LOSS REPORTING SYSTEM {KILRS}
- KANSAS ARSON DATA SYSTEM {KADS}



KANSAS STATE FIRE MARSHAL DEPARTMENT
109 W 9TH; SUITE 203
TOPEKA, KANSAS 66612

EDWARD C REDMON, STATE FIRE MARSHAL
ROSS K BOELLING, SYSTEM MANAGER

KANSAS FIRE INFORMATION SYSTEM
KANSAS STATE FIRE MARSHAL DEPARTMENT
503 KANSAS AVENUE, SUITE 303
TOPEKA, KANSAS 66603

TITLE: Analysis of Fires Related to Smoking-(Smoking Related)

Type of Fire	Number of Fires	Number of Civilian Injuries	Number of Civilian Deaths
STRUCTURE FIRES	1403	130	38
VEHICLE FIRES	371	4	2
TREE/GRASS FIRES	2088	1	0
OTHER FIRES*	1186	1	0
Totals	5448	136	40

Estimated dollar loss based on 1980-1983 K-FIRS Data for Smoking Related Fires is \$7,599,500.

* OTHER FIRES include: Outside of Structure Fires, Refuse Fires, Explosion, or Spills With Fire.

Source: K-FIRS

KANSAS FIRE INFORMATION SYSTEM
KANSAS STATE FIRE MARSHAL DEPARTMENT
503 KANSAS AVENUE, SUITE 303
TOPEKA, KANSAS 66603

TITLE: Analysis of Fires Related to Smoking-(Other Causes)

Type of Fire	Number of Fires	Number of Civilian Injuries	Number of Civilian Deaths
STRUCTURE FIRES	14860	649	75
VEHICLE FIRES	11591	119	26
TREE/GRASS FIRES	12540	13	2
OTHER FIRES*	8606	58	9
Totals	47597	839	112

Estimated dollar loss based on 1980-1983 K-FIRS Data for Other Causes of Fires is \$126,240,000.

*OTHER FIRES include: Outside of Structure Fires, Refuse Fires, Explosion, or Spills With Fire.

Source: K-FIRS

KANSAS FIRE INFORMATION SYSTEM
KANSAS STATE FIRE MARSHAL DEPARTMENT
503 KANSAS AVENUE, SUITE 303
TOPEKA, KANSAS 66603

TITLE: Analysis of Fires Related to Smoking
Residential/Institutional Structure Fires Only-Smoking Related

Type of Structure	Number of Fires	Number of Civilian Injuries	Number of Civilian Deaths
Institutions	64	7	1
1-2 Family Dwellings	764	75	27
Apartments	258	32	10
Hotels/Motels	29	8	0
Other Residential	30	3	0
Totals	1145	125	38

Estimated dollar loss (for Smoking Related Fires) in Residential/
Institutional Structure for 1980-1983 K-FIRS Data is \$4,778,613.

Source: K-FIRS

KANSAS FIRE INFORMATION SYSTEM
KANSAS STATE FIRE MARSHAL DEPARTMENT
503 KANSAS AVENUE, SUITE 303
TOPEKA, KANSAS 66603

TITLE: Analysis of Fires Related to Smoking
Residential/Institutional Structure Fires Only-Other Causes

Type of Structure	Number of Fires	Number of Civilian Injuries	Number of Civilian Deaths
Institutions	160	13	0
1-2 Family Dwellings	9246	420	64
Apartments	1177	103	5
Hotels/Motels	111	5	0
Other Residential	144	7	0
Totals	10838	548	69

Estimated dollar loss for Other Causes of Fires in Residential/
Institutional Structures for 1980-1983 K-FIRS Data is \$53,442,973.

Source: K-FIRS

KANSAS FIRE INFORMATION SYSTEM
KANSAS STATE FIRE MARSHAL DEPARTMENT
503 KANSAS AVENUE, SUITE 303
TOPEKA, KANSAS 66603

TITLE: Analysis of Fires Related to Smoking

DATA IDENTIFICATION-K-FIRS

- A. Source of Data: 1980-1983 Kansas Uniform Fire Incident Reporting System Reports.
- B. Data Time Frame: January 1, 1980 through December 31, 1983
- C. Data Area: 77% of Kansas population
- D. Reporting Departments: 229
- E. Total Number of Kansas Fire Departments: 800
- F. Percentage of Total Fire Departments: 29.0
- G. Data Selection Criteria:
 - 1. Summary
 - a) Type of Situation Found = 10-19
 - b) Mutual Aid Given = Less than 2
 - 2. Detail
 - a) Type of Situation Found = 11
 - b) Fixed Property Use = 300-499

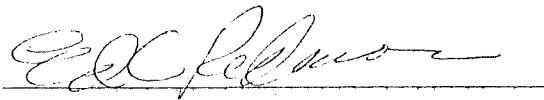
KANSAS FIRE INFORMATION SYSTEM
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TITLE: Analysis of Fires Related to Smoking

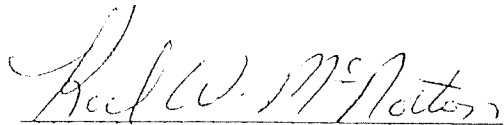
STATEMENT OF VALIDITY

The information contained in this report, "Analysis of Fires Related to Smoking", is the most accurate information available to the Kansas State Fire Marshal's Office. The report reflects only actual information received. No attempt was made to mislead or distort the reported information.

To the best of my knowledge and belief, this report is an accurate and true reflection of the information that was collected and analyzed.

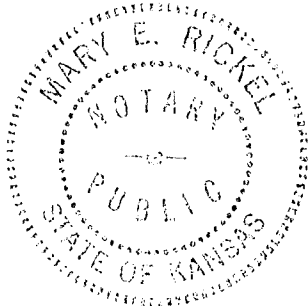


EDWARD C. REDMON
STATE FIRE MARSHAL



KARL W. McNORTON
FIRE INFORMATION SYSTEM MANAGER

Subscribed and sworn to before me this 6th day of February, 1984.

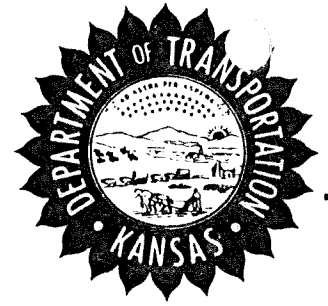


Mary E. Rickel
NOTARY PUBLIC

My Commission Expires: September 9, 1984.

KANSAS DEPARTMENT OF TRANSPORTATION

STATE OFFICE BUILDING—TOPEKA, KANSAS 66612



JOHN B. KEMP, Secretary of Transportation

JOHN CARLIN, Governor

MEMORANDUM TO: House Federal and State Officers Committee
 FROM: Kansas Department of Transportation
 REGARDING: House Bill 2923
 DATE: Febraury 20, 1984

I. Summary

House Bill 2923 prohibits the sale and use of radar detection devices in Kansas and provides for the seizure of such devices by law enforcement personnel when found in a motor vehicle.

II. Comments

Under the provisions of Public Law 97-35 of the United States Congress, states are required to monitor and report to the Secretary of Transportation (U.S. D.O.T.) on their enforcement of the 55 MPH speed limit. Should the data submitted by a state indicate that the percentage of vehicles exceeding 55 MPH is greater than 50 percent the Secretary of the DOT is to reduce the state's apportionment of Federal-aid highway funds up to 10 percent in a fiscal year.

The Fiscal Year 1984 amount of such funds was:

\$29,977,783	- Primary
13,000,959	- Secondary
<u>6,599,525</u>	- Urban
\$49,578,267	- Total

MEMO TO: House Federal and State Officers Committee

Page 2

February 20, 1984

Attached is speed measurement information submitted by the Kansas Department of Transportation for the Federal Fiscal Year ending September 30, 1983, indicating an adjusted percentage of 45.8.

Prohibiting the use of radar detection devices could decrease the percentage of vehicles exceeding the 55 MPH speed limit and ensure that Federal aid construction funds are not jeopardized.

KANSAS
SPEED MEASUREMENT INFORMATION
for the Year Ending
September 30, 1983

Calculation of the percentage of total vehicles exceeding 55 MPH taking into account the variability of speedometer readings:

Let A = Statewide percent exceeding 55 MPH for 1983

B = Statewide percent exceeding 60 MPH for 1983

C = A - B statewide percent traveling 56-60 MPH for 1983, inclusive

Adjusted statewide percent exceeding 55 MPH for 1983 = $0.7 C + B$

$$A = 56.1\%$$

$$B = 21.7\%$$

$$C = 56.1 - 21.7 = 34.4$$

Adjusted statewide percent exceeding 55 MPH for
1983 = $0.7 (34.4) + 21.7 = 45.8$

SUMMARY OF TESTIMONY
BEFORE THE HOUSE COMMITTEE ON FEDERAL AND STATE AFFAIRS

HOUSE BILL 2923

PRESENTED BY THE KANSAS HIGHWAY PATROL
(Sergeant William A. Jacobos)

February 20, 1984

APPEARED IN SUPPORT

The Patrol strongly supports House Bill 2923 concerning radar detection devices, the seizure and disposition thereof, and providing penalties for unlawful use.

Since the enactment of the 55 miles per hour national maximum speed limit, (NMSL), use of radar speed measuring equipment by law enforcement agencies has increased nationwide.

In Kansas, traffic deaths have decreased significantly since the enactment of the NMSL in 1974. We realize that many factors have played a role in this decrease, but we also feel that the reduced speed has been one of the major factors. The following chart illustrates the number of fatalities for 10 years prior, (6,780) versus 10 years after, (5,335) enactment of the law which represents a decrease of 1,445 or 21.3%.

TRAFFIC FATALITIES IN KANSAS

<u>Prior to NMSL</u>	<u>After NMSL</u>
1973 - 620	1983 - 411
1972 - 665	1982 - 498
1971 - 678	1981 - 578
1970 - 657	1980 - 595
1969 - 780	1979 - 520
1968 - 649	1978 - 572
1967 - 664	1977 - 562
1966 - 733	1976 - 563
1965 - 665	1975 - 517
1964 - <u>669</u>	*1974 - <u>519</u>
 Total 6,780	 Total 5,335
	Decrease 21.3%

*After NMSL

Other important effects of the NMSL is a reduction in the severity of injuries resulting from accidents and a reduction in fuel consumption.

The Surface Transportation Act of 1978, requires a high level of compliance of the NMSL by motorists or we face the loss of federal funds. The loss to the State could be in the millions of dollars.

While the Kansas Highway Patrol attempts to enforce compliance for the aforementioned reasons, the motoring public attempts to avoid speed enforcement arrests. One popular avoidance method is the use of radar detectors. A radar detector is a radio receiver tuned to receive and warn the driver of a signal generated by a radar speed measuring device. Radar speed measuring devices are assigned two (2) frequencies by the Federal Communications Commission (FCC), 10.525 gigahertz (X-Band) and 24.150 gigahertz (K-Band).

The magnitude of the use of radar detectors is not known but is without a doubt increasing. At present, there are numerous radar detectors on the market which range in price from approximately \$40.00 to over \$250.00. Some models are capable of reception at distances in excess of two miles.

A recent innovation to interfere with radar speed measuring devices is electronics counter-measure (ECM) or "radar jammers". These devices transmit a signal on the X-Band or K-Band frequency which injects a false reading into the radar unit. The presence of these devices is small, but they are gaining in popularity and will undoubtedly increase in numbers.

The only argument we have heard concerning possession of radar detection devices is that "it makes the user aware of their speed." We submit that the sole purpose for possession is to circumvent the speed laws. Vehicles have for many years been equipped with speedometers to suffice this need and in more recent years with cruise controls which further assures compliance if used properly.

Another serious consideration in this regard is the concept that burglars and other felons are using radar detection instruments to establish the proximity of police units in relation to the location of their intended illegal activities.

Once again, let me reiterate that we strongly support this bill; not only would it be one of the greatest boosts for the morale of the state's law enforcement officers, but it would also be one more step toward speed limit compliance.

TESTIMONY REGARDING HOUSE BILL 2923
BEFORE HOUSE FEDERAL AND STATE AFFAIRS COMMITTEE
BY BOB W. STORFY
REPRESENTING ELECTROLERT, INC.

DEAR COMMITTEE MEMBER:

For your information, Electrolert, Inc. is the manufacturer of Fuzzbuster, which I am sure you are aware is one of the most popular radar detector devices sold in the United States. I am speaking on behalf of my client today in opposition to House Bill 2923 which outlaws the use, and even the possession of a radar detector within the state of Kansas.

I would like to point out here that I do not oppose, and am not speaking against, the outlawing of any device which jams law enforcement radars in the state of Kansas, but only in opposition to those laws which outlaw radar detectors. The Federal Communications Commission has ruled, and various court actions have ruled, that the jamming of radar devices is illegal and should not be condoned. However, the Federal Communications Commission also has determined in various communications, one of which is contained in the booklet which I have presented to the committee on behalf of Electrolert, Inc., that the use of radar detectors is perfectly legal within the purviews of federal law. Congress has never attempted to enact any legislation banning radar detectors, since radar detectors are radio receivers that are capable of receiving the same signals transmitted by radars. They basically function the same way as do the more common AM or

FM receivers, television receivers, and receivers used in communication systems such as police radio systems, or the various scanner type receivers which are readily available and are extensively used by the public. The only difference is that radar detectors are tuned to one or two of the radar frequencies and simply indicate the existence of the signal. The Federal Communications Commission stated in a letter to the Deputy City Clerk of Glendale, Wisconsin, that it believes legislation confined to radar detectors, even if desirable, would be impractical in that it would be difficult to draft, and even more difficult to enforce. A copy of that letter is attached to this testimony as Exhibit "A." You will note the letter is dated February 6, 1979; however, the Federal Communications Commission has not changed its opinion since that date, and Congress has not attempted to enact any legislation prohibiting the use of radar detectors.

I cannot attempt in the short time which is afforded to me to speak in opposition to the legislation, to bring out all of the deficiencies of legislative bills which prohibit the use of radar detectors, and specifically of House Bill 2923 which is before you today. I do wish to direct your attention to the blue booklet which has been supplied to each member of the Committee and which contains in numerous articles, decisions, and regulations, information which I believe will be useful to you in your determination as to whether or not House Bill 2923 should be reported favorably or unfavorably.

The legal arguments in opposition to the passage of House Bill 2923 are that the provisions of the bill violate the constitutional rights of the citizens of Kansas, and that the language therein violates the provisions of the First, Fourth, Fifth, Ninth, and Tenth Amendments to the United States Constitution. The constitutional rights that are being violated are as follows:

1. The taking of a person's property without compensation.
2. The presumption that the mere presence of a device constitutes prima facie evidence of a violation of the law.
3. The illegal search and seizure of the device without due cause.
4. The invasion of a citizen's privacy and the enactment in excess of the powers delegated to the United States by the Constitution of a right which resides with the Congress of the United States.

As stated above, all of the information contained in the blue book before you defines more in detail how all of these constitutional rights would be invaded by the passage of this particular piece of legislation. However, I do want to point out the case entitled the District of Columbia vs. Marion J. McGhee in the Superior Court of the District of Columbia, Criminal Division, No. D 1506-79 (a copy of which is attached as Exhibit "B"). This case was brought against the defendant for the

possession of a device to detect radar. I am not going to read all the provisions of the decision, since it is available for your purview. However, I do wish to point out in the last paragraph what the Superior Court of the District of Columbia the court found, and I quote:

For the foregoing reasons and because it is the feeling of this Court that the subject police regulation infringes a citizen's Constitutional rights under the First Amendment, the Fourth Amendment, the Fifth Amendment, and Ninth Amendment and the Tenth Amendment to the United States Constitution in that it constitutes an invasion of a citizen's privacy, a denial of the citizen's right to know what officials of the government are doing, an illegal search and seizure of the citizen's property in an electronic sense, a violation of the citizen's rights as retained by the people, and an enactment in excess of the powers delegated to the United States by the Constitution and therefore to the District of Columbia Government which prosecutes as a delegate in accordance with the Constitution.

This case is in direct point to the House Bill which is presently before you, since it does provide that the use and possession both are illegal, and following the provisions of the case just cited the act itself would be unconstitutional.

It is interesting to note that no antiradar detector law has ever withstood serious judicial scrutiny, and only one antiradar detector law has been passed since 1962. That was in the District of Columbia and it is now in the Court of Appeals of the District of Columbia. As yet there has been no ruling as to its constitutionality.

Other states such as New Hampshire have passed laws making such devices legal on the highways within those particular states. As an example, on September 28, 1982, the Michigan

Supreme Court upheld the legality of radar detectors. The ruling by the state's highest court overturned a previous appellate decision which held that radar detectors could be banned under a 1929 police radio law enacted long before the advent of police radio and radar detectors. In overturning the prohibitions upheld by the lower court, the Michigan Supreme Court questioned the propriety of police radar use by calling radar "electronic surveillance by the police, which is a serious business and an intrusion of the privacy of anyone to whom it is subjected." Of even greater impact, however, was the Michigan Supreme Court's declaration that the police derived their authority from the legislature, not the Constitution. The legislature alone can empower the police to engage in electronic surveillance. To date no such legislative authority has been granted to the police in Michigan. In 1982 New York state in the Green County Court of New York declared unconstitutional the arrests of motorists who were possessed of fuzzbusters under a state law which outlawed the obstruction to the driver's view. Cases contesting the constitutionality of the possession and use of radar detectors go on and on, and it would be infringing upon the Committee's time to set out all of these court decisions to you. However, I am possessed of a large number of decisions stating in essence that the use of radar detectors (not jammers) are perfectly legal, and the airwaves are controlled by the Federal Communications Commission. There is no federal law against the same, and further, as I stated earlier, it is unconstitutional to try to

impose some of the provisions of House Bill 2923 on the citizens of the United States.

I mentioned earlier that the state of Michigan's antiradar detection legislation has been ruled unconstitutional. Only one state today, other than Michigan, has an antiradar detector law, and that is the state of Virginia, which was passed in 1962. However, in the case of Commonwealth vs. Crenshaw, 1978, parts of the law were found to be unconstitutional and the enforcement aspects were removed to the extent that mere possession cannot be enforced and if a detector is found in an automobile it has to be proved that it was in use before the law can be enforced.

One of the first and most serious issues facing this legislature is the bill's preemption of the United States Constitution. As passive devices which in no way interfere with radar's operation, radar detectors are essentially radio receivers. As such, regulation over radar detectors falls to the Federal Communications Commission by congressional mandate.

The FCC has, in fact, addressed the topic of radar detectors on three different occasions. The FCC Chief Engineer advised a Wisconsin community that a sought after ban on radar detectors would be neither desirable nor enforceable. The second occasion arose when the state of Washington erected dummy radar units which emitted a continuous beam intended to fool radar detectors. The FCC called the devices improper and ordered their removal. The third occasion came when the FCC banned the use of radar jammers--devices capable of causing malfunction to police

radar. In their prohibition the FCC drew a clear distinction between jammers and radar detector devices.

In addition, an existing regulation in the District of Columbia and a law in the state of Virginia both have experienced court tests, resulting in the former being struck down in 1979, and the latter having its enforcement provision stricken as a violation of due process of the law. The Virginia law has a federal suit currently pending against it which is expected to remove the remainder now nominally on the books.

There are other issues besides the legal ones which we would like the Committee to be cognizant of in its determination of whether to report House Bill 2923 favorably or unfavorably, and they are as follows:

The typical radar detector owner is a well-educated, older individual holding a sales, professional, or managerial position, who must drive 15,000 miles per year. This marketing analysis profile is hardly the lawless individual some would have us portray. Detector owners, as a matter of fact, have a significantly lower accident rate than average drivers.

The prohibition of radar receivers will not result in slower driving speeds. Driving speeds are determined by law enforcement visibility, individual driving habits, and traffic flow. The radar receiver extends police visibility and driver awareness of speed, slowing speed averages. Drivers purchase radar receivers to protect themselves from speeding tickets, not to drive faster.

In 1982 a five-year study was completed by the National Bureau of Standards (NBS), which was commissioned by the National Highway Traffic Safety Administration (NHTSA). This studied all the relevant facts concerning radar and the use thereof. Delving into all existing types of radar, whether they were X or K band, whether they were moving or stationary, the NBS found numerous technological problems which caused radar's malfunction. These problems resulted in erroneous speed readings caused by temperature, humidity, the unit's power supply source, the power surge phenomenon and/or vibration to the unit. Interference sources from within the patrol vehicle or from another vehicle in close proximity were cited as the vehicle's ignition, air conditioner, heater motor, windshield wiper motor, the police FM transceiver, a CB radio and/or an AM transceiver. The study pointed out that each of these technological errors found within all existing types of radar were discovered under normal operation rather than under extraordinary conditions.

One of the most common, and indeed one of the most sobering findings by NBS, was the correct identification of a target vehicle. Radar units, bar none, cannot assign a speed reading to a particular vehicle. NBS points out that this is one of the most frequent instances of unwarranted ticketing, in part due to the radar unit and in part due to operator error.

Another problem which we have, of course, in the use of radar is the operator error which intensifies the problem of radar on today's highways. Innumerable law enforcement agencies fail to adequately train their officers. Often the training they

do receive is handled by the manufacturer's representative, who is understandably reluctant to point out a unit's deficiencies--particularly when a sale of multiple units hangs in the balance.

An individual's livelihood, not to mention insurance rates, can hardly be left to the risk of an undeserved speeding ticket, although according to the aforementioned study this is not in the least improbable. The gravity of the situation certainly suggests a need for legislation--but not in the area of radar detectors.

The Committee is well aware that the radar detectors are no longer strictly dashboard mounted devices, but are mounted out of sight under the hoods of the automobiles, and the enforcement of the proposed ban is impractical at best. Any method of enforcement is likely to produce unequal treatment under the law, unreasonable search and seizure, or--if a vehicle-by-vehicle check was to be adopted to preclude these problems--enforcement may be grounds for suits claiming interference with interstate commerce.

In addition to these enforcement problems are the ones arising from the initial drafting of such a law. As has been pointed out, over two dozen users are allocated the same frequencies as police radar. Therefore, the proposed legislation would have the unintentional effect of outlawing devices not originally meant to be outlawed. Once again, fundamental constitutional rights of freedom of speech must also be considered. Whether one is advised of radar's use ahead by a

friendly warning over a CB radio or by a radar detector is immaterial. Prohibition of either activity is a circumvention of freedom of speech.

In the final analysis, the degree of the problem is highly suspect. If radar detectors are indeed neutralizing the efficiency of police such that agencies are continuously seeking funds for new equipment touted to be "fuzzbuster-proof," then why is such a ban necessary? Morally speaking, in view of the many errors manifested by radar, it seems that the purchase of a radar detector is the only way a motorist can at least attempt to secure justice for all.

Regardless of the school of thought to which one subscribes, the fact remains that pending House Bill 2923 presents several constitutional conflicts ranging from preemption to forfeiture of freedom of speech. Interference with interstate commerce may be its net result as well. Enforcement disparities are many even if the drafting of the bill could be accomplished without unintended results. Whatever the motivation for defeating this bill, it is a certainty that the state of Kansas will avoid prolonged litigation and expensive civil proceedings by so doing.

Respectfully submitted,

BOB W. STOREY

SUPERIOR COURT OF THE DISTRICT OF COLUMBIA

CRIMINAL DIVISION

DISTRICT OF COLUMBIA

v.

Criminal No. D 1506-79

MARION J. MCGHEE,
Defendant

O R D E R

Defendant appeared for arraignment charged with possession of a device to detect radar. After counsel was appointed by the Court for the defendant he moved to dismiss. The District of Columbia Government, represented by an Assistant Corporation Counsel, objected to the oral Motion to Dismiss and also informed the Court that another judge of the Court had many such similar cases consolidated because a study was being made of the complex constitutional problems. The words and spirit of the Bill of Rights are clear.

During this Court's service in arraignment for the last several weeks there have been a substantial number of cases involving radar detectors, many of which at arraignment resulted in either guilty pleas by the defendant or forfeiture of posted collateral. Since it is the view of this Court that the legislation under which these penalties are imposed is unconstitutional and, since everyday that a ruling is delayed citizens are being subjected to an unfair and unwarranted charge, this Court has welcomed the dismissal Motion and rules on it accordingly.

The only basis for any legislation of the character relied upon by the government is police power. Police power, in this city, the seat of the federal government, is to be measured in accordance with the due process standards of the Fifth Amendment and citizens in this district are possessed and cloaked with the protection of the entire Bill of Rights.

Practically speaking, we are dealing with whether a citizen may possess in his vehicle an electronic device which in no way affirmatively intrudes upon the property or person of any other citizen. In essence, the device is one which under proper conditions may give a signal to its possessor that an electronic beam is being projected in the area where the citizen and his vehicle is presently situated and moving. It is totally passive in nature and affects no other thing or person. Any intrusion, therefore, emanates from the radar source which is admittedly under the control of the government. Such an intrusion by the government may easily be considered an unwarranted search of an individual's vehicle by the government since there is no consent to such a search. Or, in a technical sense, it actually constitutes a seizure because a response to the searching beam is manifested on a radar screen in the possession of the government and, of course, this is without a warrant "issued on probable cause particularly describing the place to be searched and the persons or things to be seized".

In most automobiles today there are radios which receive signals on AM and FM bands from commercial stations. They may even include reception of transmissions on a police band. We are not concerned here with the citizen as an operator projecting any sort of beam or projecting any sort of electronic signal which would interfere with or in any way vitiate the electronic beam projected by the government, assuming that the government was legally entitled to project such beam.

Therefore, no more than the normal radio receiver does the radar detection device interfere with or intrude upon the province of any other agency, be it government or citizen. The press in this country has long espoused the philosophy that the individual citizen in accordance with the First Amendment to the Constitution has a right to know. A citizen using the highways in a vehicle has a

right to know whether or not the government is monitoring his actions.

Drawing a parallel to the instant situation, suppose a citizen kept a pair of binoculars along side his seat and would observe through the binoculars far ahead the existence of a police speedtrap. Would our constitutional law sustain an interpretation that the citizen could be prohibited from carrying binoculars in the car?

Again, the basis for the government's legislation is the police power interest of preventing speeding. In this case there is no evidence that the defendant was speeding or even had any intentions of speeding. In fact, it could be surmised that the possession of a radar detection device would discourage a citizen from exceeding the speed limit and therefore render the citizen more likely to be law abiding than not. No factual legislative finding was ever made to support a contrary presumption.

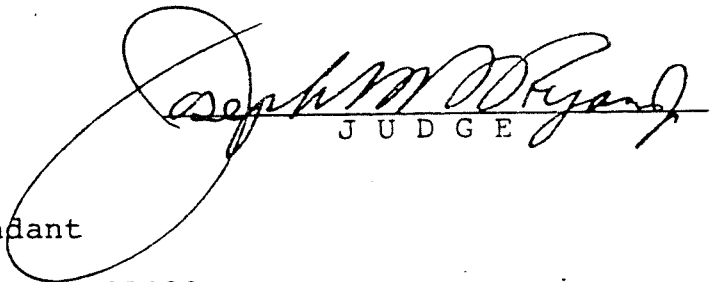
Our jurisprudence has from the beginning of the republic abhorred the idea of prior restraint on the commission of any sort of offense, This purported legislation goes far beyond even prior restraint in its anticipation of wrong-doing. There is no reasonable relationship between the police power objective and the end sought by the legislation. Even if there were such a valid relationship, the chilling effect on personal rights and liberties guaranteed by the Bill of Rights far outweighs any such legislative purpose.

For the foregoing reasons and because it is the feeling of this Court that the subject police regulation infringes a citizen's Constitutional rights under the First Amendment, the Fourth Amendment, the Fifth Amendment, the Ninth Amendment and the Tenth Amendment to the United States Constitution in that it constitutes an invasion of a citizen's privacy, a denial of the citizen's right to know what officials of the government are doing, an illegal search and seizure of

the citizen's property in an electronic sense, a violation of the citizen's rights as retained by the people, and an enactment in excess of the powers delegated to the United States by the Constitution and therefore to the District of Columbia Government which prosecutes as a delegatee in accordance with the Constitution,^{1/}

It is therefore this 26th day of June, 1979:

O R D E R E D that the information herein be and hereby is dismissed.


J U D G E

cc: Jerry Dier, Esq.
Attorney for Defendant
11448 Kowley Road
Clarksville, Maryland 21029

S. Perry Jones, Esq.
Office of the Corporation Counsel

^{1/} In circumstances that are not dissimilar the federal government has been admonished against insensitive and unbecoming conduct toward the citizen. See Stockstrom v. Commissioner of Internal Revenue, 88 U.S. App. D.C. 286 (D.C. Cir. 1951) where the Court stated at page 292:

"It has been well said that the government should always be a gentleman. Taxpayers expect, and are entitled to receive, ordinary fair play from tax officials."

The government, acting under its police power should be no less sensitive than revenue officials in their dealings with citizens. If government seeks to use clandestine and furtive methods to monitor citizen actions it can ill afford to complain should the citizen insist on a method to effect his right to know he is under such surveillance.

FEDERAL COMMUNICATIONS COMMISSION

WASHINGTON, D.C. 20554

February 6, 1979

IN REPLY REFER TO:

6000

Ms. June B. Joswick
Deputy City Clerk
City of Glendale
5909 North Milwaukee River Parkway
Glendale, Wisconsin 53209

Dear Ms. Joswick:

The resolution of the Common Council of the City of Glendale asking for Federal action to ban "radar detectors" has been referred to us by the White House.

Please advise the Council that we in the Federal government share its concern about excessive speed on highways and we, too, are aware that radar detectors are used to avoid detection by police radars. However, there is no Federal statutory authority to prohibit these detectors, and we believe that enactment of such legislation by the Congress would not be desirable.

Radar detectors are radio receivers which are capable of receiving the radio signals transmitted by radars. They function basically the same way as do the more common AM or FM radio receivers, television receivers, receivers used in communication systems such as police radio systems, or the various "scanner"-type receivers which are readily available and are extensively used by the public. The only difference is that radar detectors are tuned to one or two of the radar frequencies and simply indicate the existence of a signal.

Unlike other countries, the United States does not regulate the manufacture, sale, or use of all radio receivers. We believe that adoption of Federal legislation to cover all receivers would be undesirable. There are hundreds of millions of receivers in use and millions more are sold every year. The need to regulate the use of receivers has to be very great to justify imposition of Federal regulation on this industry. We do not see that need.

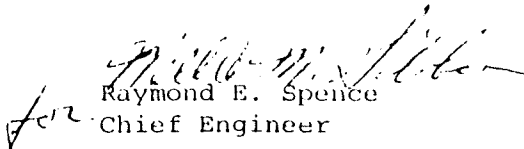
Ms. June B. Joswick

Also, we think that legislation confined to radar detectors, even if desirable, would be impractical in that it would be difficult to draft and even more difficult to enforce. This is because there are many otherwise legitimate receivers that are capable of receiving the same radar signals. Examples are broad-band scanners which are capable of tuning to a wide-range of frequencies and communication receivers which are authorized to use the same frequencies as others, including so-called "radiolocation" systems which are employed in many legitimate purposes. Moreover, radars may and do operate in different bands in the radio spectrum, such as the 2400, 10,500, and 23,000 MHz bands, which are also used by other radiolocation systems. Therefore, it would be difficult, if not entirely impossible to differentiate the legitimate from illegitimate receivers which are or may be tuned to the same frequencies.

Finally, enforcement of the legislation, even if confined to radar detectors, would require additional policing resources. The Commission's enforcement facilities are very limited and are hardly enough to enforce the present laws and regulations. We assume the same may be true of other Federal law enforcement agencies and, therefore, a very significant issue which Congress would have to consider in passing the legislation you suggest is whether its cost would be justified.

We hope this information is helpful to the Council.

Sincerely,


Raymond E. Spence
for Chief Engineer

cc: Safety and Special Radio
Services Bureau

Report of the
International Association
of Fire Chiefs

Ad Hoc Committee on
Fire-Safe Cigarettes

REPORT OF THE INTERNATIONAL ASSOCIATION OF FIRE CHIEFS

AD HOC COMMITTEE ON

FIRE-SAFE CIGARETTES

WILLIAM STAMM, Chairman
Chief, Milwaukee Fire Department

JOHN J. HART, Chief
New York Fire Department

DR. DIETRICH HOFFMAN, Associate Director,
Naylor Dana Institute for Disease Prevention,
American Health Foundation

DR. RICHARD D. STEWART, Corporate Medical
Director, S.C. Johnson & Son, Inc.

PROFESSOR RICHARD L. P. CUSTÈR, Associate
Director, Center for Fire Safety Studies,
Worcester Polytechnic Institute

REPORT OF THE INTERNATIONAL ASSOCIATION OF FIRE CHIEFS
AD HOC COMMITTEE ON FIRE-SAFE CIGARETTES

Background

At the International Association of Fire Chief's annual meeting in Atlanta on August 28-31, 1983, the chiefs decided that they needed better technical information to make an informed decision on whether to support resolutions regarding fire-safe cigarettes. And if there are to be resolutions, what they should be. There had been many opinions expressed in the past, but few documented facts had been made available to the chiefs either from proponents of self-extinguishing cigarettes or those who thought they were not such a good idea.

Chief William Stamm of Milwaukee was asked to select and chair an Ad Hoc Committee to find out what was really known and what was not. The Committee was to review documented research, expert testimony, the ideas and data from various chiefs, and the positions of the various sides to the discussion. The Committee was then to recommend a course of action for the IAFC.

Ad Hoc Committee

The Committee selected, after many suggested names were researched and considered to assure that no one had a special interest and would be 100% impartial, consisted of two IAFC Metropolitan Fire Chiefs, one a smoker and the other not; two medical scientists with background relevant to the toxicology of smoke; and two scientists with fire-related backgrounds. The following individuals were selected; all agreed to serve totally at their own expense:

Chairman - William Stamm, Chief, Milwaukee Fire Department

John J. Hart, Chief, New York City Fire Department

Dr. Dietrich Hoffmann, Associate Director, Naylor Dana
Institute for Disease Prevention, American Health Foundation

Dr. Richard D. Stewart, Corporate Medical Director,
S.C. Johnson & Son, Inc.

Professor Richard L. P. Custer, Associate Director, Center
for Fire Safety Studies, Worcester Polytechnic Institute

Dr. Edward Clougherty, Chemist, Boston Fire Department
(subsequently declined)

Dr. Clougherty had to drop out of participation because of funding problems in his city.

The Chairman feels he was fortunate in getting such a distinguished group on relatively short notice. Resumes of the remaining five active members are contained in Attachment 1.

Information Gathering

Prior to the first meeting of the Committee, the Chairman circulated articles, congressional testimony, and other materials relevant to the issue to the Committee members and to representatives of the different sides of the issues so that everyone had the same information and could comment on any of the various submissions from other parties. The idea was to put all of the information on the table, so all could review it.

The Chairman also met with various chiefs so he could better represent their collective opinion. He also sent a tentative agenda of issues to be discussed at the meeting to the Committee members and to numerous Metropolitan Chiefs. Many of the chiefs provided him with written or verbal comments on the issues. The tentative agenda of issues is attached (see Attachment 2). It was meant to be only a starting point for discussion and not a limitation.

The Chairman also sent letters requesting information on the issues to the U.S. Fire Administration, Consumer Product Safety Commission, the tobacco industry, leading proponents of self-extinguishing cigarettes, and others (see Attachment 3).

To provide technical information to the Committee on the nature of cigarette-related fires, the research on self-extinguishment, and other aspects of cigarette technology and to give it a chance to ask in-depth questions, several experts were invited to make presentations at the Committee meeting and also totally at their own expense.

The four experts selected from four different fields were:

Dr. John F. Krasny, Center for Fire Research, National Bureau of Standards -- to summarize the Center's research on the ignition propensity of cigarettes.

Dr. Alexander W. Spears, Executive Vice President, Operations and Research, Lorillard -- to summarize relevant aspects of cigarette technology and the tobacco industry's fire test experience.

Philip S. Schaeffer, President, TriData Corporation, and former Associate Administrator of the U.S. Fire Administration -- to summarize national data on cigarette-related fires.

Arthur C. Delibert, President, Citizens Committee for Fire Safety -- to summarize information backing the views of the proponents of fire-safe cigarette standards.

Resumes of the four technical experts are contained in Attachment 1.

These experts also were sent copies of the issues and available data, so they could be prepared to comment on the various information collected by the Committee, as well as their own.

The Chairman directed all parties connected with this Committee to be prepared to back up their comments with facts that were or could be documented.

The Meeting

The Committee met on November 16, 1983, in New York City at the offices of the American Health Foundation, courtesy of Dr. Hoffman. Klaus Brunneman, a research colleague of Dr. Hoffmann at the American Health Foundation, also attended and assisted Dr. Hoffmann.

The Committee met in private at the start of the meeting, then listened to the four invited experts, asked many detailed questions, and finally met in private again to close the meeting.

At the meeting, a large volume of technical papers was given to the Committee by Dr. Spears. These were the references in support of his previous Congressional testimony on behalf of the tobacco industry and on his presentation to the Committee. A listing of the references can be found in Attachment 4; most are from the open literature and are available to anyone who wants them. (The entire volume was too bulky to attach here, but the references are available from the Chairman if they cannot be obtained elsewhere.)

Dr. Krasny presented physical samples of the cigarette burn tests he performed and described his test procedures and their scope. Copies of his graphs are contained in Attachment 5.

Mr. Schaenman presented U.S. Fire Administration estimates for 1976-1981, plus the 1982 estimates he made for the Committee based on U.S. Fire Administration and NFPA data of the magnitude of smoking-related fire losses, trends, the materials involved in ignition, and other relevant statistics. His paper is Attachment 6.

Mr. Delibert presented remarks mostly on the political, legal, and administrative aspects of proposed legislation. His paper is Attachment 7.

At the end of the meeting, the Committee decided that each Committee member would submit an independent summary of his conclusions and recommendations in writing to the Chairman, who then would put together a draft report. These letters are Attachment 8. You will note the Chairman did not submit a summary to assure that the other members would not be swayed in their thinking; however, his thoughts are incorporated in the final report. The draft was then considered by each member. Comments received were incorporated into this final report.

* * * * *

The conclusions and recommendations of the IAFC Ad Hoc Committee on Fire-Safe Cigarettes are summarized as follows:

Conclusions

Leading Fire Problem 1. National data continue to indicate that cigarettes are the leading source of ignition in fire deaths. The typical scenario in 1982 continues to be a cigarette dropped on upholstered furniture (2/3) or bedding (1/3). A working smoke detector was not present in the vast majority of the deaths.

Trend

2. The national data also show that cigarette-related fire deaths and cigarette-related fires have been dropping over the last six years. Fire deaths dropped 20% according to the U.S. Fire Administration/Schaenman estimates, and 29% according to CPSC. Smoking-related fires dropped 33% according to USFA/Schaenman and 40% according to CPSC. (See Attachment 9 for the CPSC data.)

Causes of Trend

3. There is no definitive study of reasons for this decline but there must be something that is having a beneficial effect. It is not the cigarettes themselves. They have not been modified during this period in respect to self-extinguishing properties, and cigarette sales have not followed the pattern of deaths.

One thing that is clear is that smoke detector usage has increased dramatically. It went from 20% of households in 1977 to 67% of households in 1982. It is highly likely that this is having an effect on the number of fires and deaths. The safety effect could be further increased if smoke detectors are properly maintained and if the use of smoke detectors can be further spread among low income families, of whom only one-third now have detectors.

Other possible reasons for the decline in smoking-related fires and fire deaths are increased public education and increased usage of safer mattresses and upholstered furniture, but this is speculative at this point.

Medical Side Effects a Major Concern

4. There is considerable reason to believe that the proposed methods of making cigarettes self-extinguishing will substantially increase tar, nicotine, and carbon monoxide levels. Also, the amount and composition of the smoke may change. The medical experts on the Committee warned that self-extinguishing cigarettes might cause far more deaths and illnesses than the number of people who might be saved from fires, even if all fire deaths involving cigarettes were eliminated. The potential for doing more harm than good is very large and must be considered.

**Cigarette
Testing Not
Adequate
To Date**

5. Some tests indicate that a few brands of cigarettes "self-extinguish" in some circumstances; that is, they go out if not being puffed. Some brands of cigarettes may burn a smaller hole than others when placed on a simulated furniture substrate in the laboratory. However, the data are inconclusive as to whether there is a significant difference in ignition potentials among existing brands for real world situations. The laboratory tests have not been correlated with real world performance. In particular, no attempt has even been made to correlate with real world experience the tests proposed by Dr. Krasny at NBS for rank ordering the propensity of cigarettes to start fires. And his test did not consider crevices or "hot end down" positions. Doctor Krasny's initiative should be applauded, but he agrees, it was just the start of the testing that is needed. Unless a test can be linked to the real world, there can be no meaningful standard. Based on the available information, we conclude that this is an area that requires additional, thorough, third party testing.

**Burn
Temperature**

6. The temperature at which all brands burn is far above that needed to ignite virtually all existing mattresses or upholstered furniture materials. It has been shown that the burning temperature (about 800° C) can be varied somewhat ($\pm 50^\circ$) by altering various parameters of the cigarette, but not enough to make a significant difference in ignition propensity.

**Ignition
Propensity of
Existing
Brands**

7. All tested brands can ignite any of the easy-to-ignite materials such as cottons. (The tobacco industry says their tests show this is true for Sherman, Carlton, and More as well as other brands; no data were presented to either support or refute this.) Unfortunately, the low income groups that have the most fire deaths are also likely to have the cheaper, easier to ignite materials such as cotton. About 50% of all furniture in use today contains cotton batting.

All tested brands can ignite furniture if they land hot end down or land in a crevice in the furniture. You can get ignitions even with the "low propensity" cigarettes.

Unfortunately, there has not been adequate testing of cigarettes in these situations -- only scattered anecdotes. There is also no solid information as to whether these are the situations leading to fire deaths or whether the "landing flat" scenario is equally a problem in serious fires.

None of the existing brands of cigarettes are likely to ignite some types of material such as man-made upholstery materials if they fall flat on them.

As mentioned above, we repeat and emphasize that testing to date is inadequate to support either the claims that a satisfactory fire-safe cigarette can be made or that it cannot be made.

**Potential
for Improve-
ment Exists**

8. All parties believe that it may be possible to develop a more fire-safe cigarette without bad side effects, although no one has yet put evidence on the table that it can be done. Research by the industry (including research with varying diameters and packing density) has not yet found a solution. Additives are a possibility, but the ones proposed in patents for this are likely to prove toxic.

Neither the tobacco industry nor NBS researchers nor anyone on the Committee believes the situation is hopeless. All of us believe it is important to continue to search for a solution.

Additives

9. The tobacco industry maintains that it does not add salt-peter or anything else to tobacco to make it burn faster. They say that there is no additive that, if removed, would make cigarettes self-extinguishing. They do report that there are additives to cigarette paper to make it burn even with the tobacco; however, the deletion of these additives would not make cigarettes self-extinguishing but rather would create cigarettes with looser fire cones or irregular burning. Humectants are added to retain enough moisture to keep the tobacco from drying out and burning too fast, but removing them would not have the desired fire-safety effect.

There are nitrates in fertilizer used to grow tobacco. But the tobacco plants themselves contain nitrates, too, according to the industry. The Sherman cigarette, which claims to have no additives, was found to have the highest level of nitrates of any cigarettes tested by the industry. The Sherman cigarette uses tobacco that is more similar to pipe tobacco than to cigarette tobacco, which is why it burns slowly and usually self-extinguishes.

Some
Improvement
Would
Suffice

10. A "safer cigarette" does not have to eliminate all smoking-related fire deaths to be an improvement. If a way is found to make cigarettes that do not ignite fires in some situations where they now do, that would be a worthy goal -- so long as they do not cause more harm than good. On the other hand, a cigarette that does not affect most of the fires that now start or could start should not be labeled fire-safe. If people think cigarettes are truly "fire-safe," they may be more careless with them and that may lead to more fires than we have now.

Recommendations

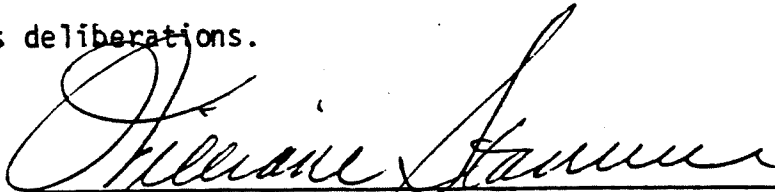
1. The IAFC should change the resolution it has passed regarding self-extinguishing cigarettes. The IAFC should not recommend to the federal government or state legislatures to pass legislation to set standards for cigarettes at this time. The IAFC should not support the Moakley bill or the Heinz bill as they were originally introduced. No one seems to know how to set standards with present knowledge. If a federal study finds a way to develop cigarettes that are more fire-safe, then standards should be set at that time. If no one can find a satisfactory way to make cigarettes safer, we would look foolish to be requiring standards, and might cause harm through health effects.
2. Instead the IAFC should support legislation that would require a comprehensive scientific federal study to be undertaken as soon as possible to see if there is a way to make cigarettes more fire-safe without side effects that are worse than the cure. The study should include testing of existing

brands for relative fire safety and should look at new ways to make a cigarette. The study should have no strings attached for any interested parties.

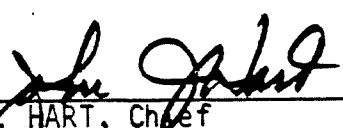
3. The study should include research to establish a methodology to measure the self-extinguishing characteristics of cigarettes. To be valid, the tests should cover the range of furniture substrates commonly found in the real world.
4. To be valid, any standard must be based on real world, full scale fire tests, or show that lab test results can be extrapolated to the real world. It is not enough to show differences using lab tests alone that have not been correlated with real world conditions.
5. Any proposal for a cigarette considered to be fire safe must be tested to ensure that it does not produce greater amounts of potentially harmful substances than are in the smoke of current cigarettes. If it does produce a greater quantity of potentially harmful substances, the cigarette should be tested further at least with animal toxicology studies before any legislation is considered for setting fire-safety-related standards. (An outline of such testing is included in Doctor Hoffmann's attached letter.)
6. The federal study should conduct all phases of research under the supervision of a panel of experts who have skills in fire science, medicine, tobacco science, and consumer interests. These should include people from federal government health, fire consumer safety, and standards agencies; the tobacco industry; the fire service; other relevant industry; and consumer advocacy groups or fire-related foundations. Specific federal agencies must include the Consumer Product Safety Commission, National Bureau of Standards, the Federal Management Agency, and the Department of Health and Human Services. Fire organizations to consider include the NFPA and the IAFC.

7. The federal study should include a risk analysis that considers all the ramifications of changing today's cigarettes -- not just in potential health impacts but also behavioral changes (e.g., more or less attention to care with cigarettes, relighting of cigarettes, changes in the usage of cigarettes, potential impact on number of smokers, etc.)
8. No state or political subdivision thereof shall establish, maintain or enforce any fire-safety standard for cigarette products until after the conclusion of the federal study. This should not keep them from doing their own research on the subject during the time of the federal study. Once the federal study is completed, individual states may or may not conclude that the facts warrant the enactment of state standards. The IAFC should reserve comment on state legislation until that time.

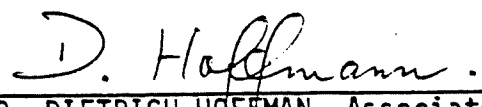
The Chairman greatly appreciates the thoughtful contribution and time of the Committee members. The Committee also wishes to thank the many people who contributed to its deliberations.



WILLIAM STAMM, Chairman
Chief, Milwaukee Fire Department



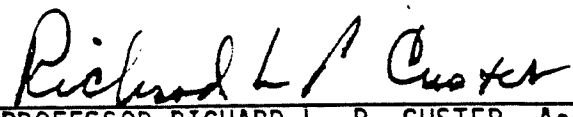
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Fire Department

William Stamm
Chief

Richard P. Seelen
Assistant Chief

October 1983

RESUME
of
WILLIAM STAMM

He is now completing almost 43 years of service, entered upon his career on December 20, 1940, when he was appointed as a firefighter with the Milwaukee Fire Department. Following is his progress through the department:

- April 1948 - Fire Lieutenant
- Oct. 1950 - Fire Captain
- July 1959 - Battalion Chief
- July 1962 - Deputy Chief, Fire Training & Special Services, in charge of the Bureau of Instruction & Training
- Oct. 5, 1970 - Appointed Chief of the Milwaukee Fire Department

While serving as Training Director for the Fire Department for 9 years, Chief Stamm expanded and developed community fire training programs. He also led in planning and instituting the higher education program which leads to an Associate in Science degree in Fire Technology at the Milwaukee Area Technical College, and himself is a recipient of the degree. He has had close contact with almost all of the colleges in the United States, which include fire training in their curriculum, and he has been a guest speaker in many schools, and seminars and conferences.

He was asked by the U.S. Government to travel to Nicaragua after the 1973 earthquake and evaluate their fire service, upgrade their firefighting and equipment, and select a site for and assist in planning a fire training center. He was then designated as Fire Equipment Relief Coordinator in the United States to assist the Organization of American States and the Government of Nicaragua to obtain replacement of essential fire apparatus and equipment destroyed in the devastating earthquake.

Chief Stamm is a member of several committees of the NFPA as a representative of the International Association of Fire Chiefs, and a member of the Metropolitan Committee of the IAFC.

He worked closely for 35 years with the Red Cross in the area of safety and disaster programs, and was Chairman of the Disaster Committee of the Greater Milwaukee Chapter for 10 years, where he was also on the Board of Directors. He also served on the Board of Directors of Good Samaritan Medical Center for 18 years.

Past chairman and current member of the 12-man Joint Council of National Fire Service Organizations. (These are members representing each of the various organizations, such as International Association of Fire Chiefs, International Association of Fire Fighters, Arson Investigators, Fire Service Instructors, etc.).

Consultant for McDonnell Douglas relative to fire-related problems of the Suspended Maneuvering System.

Fire service representative as a member of a committee to work with Shriner's Burn Centers to introduce a national program to prevent burns to children.

Received State Firefighter of the Year Award from Schlitz Brewery.

Received Distinguished Service Award from Partners of the Americans.

Received National Firefighter of the Year Award from Eagles.

Received Dictograph's Award for "outstanding contribution in the field of public safety."

Chief Stamm has visited most areas of the United States, as well as foreign countries in both hemispheres, calling at fire department training academies wherever he happens to be, to discuss ideas, successes and failures in the fire protection field, and to bring home new concepts and methods for evaluation and possible use in his own department.

Chief Stamm is affiliated with many other service organizations, but then, as he says . . . so is everybody else.

October 3, 1983

R E S U M E

JOHN J. HART

CHIEF OF DEPARTMENT
NEW YORK CITY FIRE DEPARTMENT

HOME: 872 Park Avenue
Huntington, N.Y. 11743
(516) 271-4656

OFFICE: 250 Livingston Street
Brooklyn, N.Y. 11201
(212) 403-1434

PERSONAL: Born May 29, 1931, U.S. Citizen, Excellent health,
Married, 3 children 25, 23, 15

EDUCATION: M.S. Business Administration
Columbia University, 1978

ASSOCIATION: Member of Society of Fire Protection Engineers, National Fire
Protection Association, International Association of Fire
Chiefs, New York State Fire Chiefs Association.
Vice-Chairman to Metropolitan Committee, International Asso-
ciation of Fire Chiefs.

EXPERIENCE: Current: Appointed Chief of Department, New York City Fire
Department on November 24, 1980

Direct the policy and management of the uniformed force in all
aspects of firefighting and fire prevention for the City of
New York.

Over the past thirty years I have served in all areas of the City and
in all ranks in line functions that have included continuous fire command.
My staff functions over the past ten years include:

1980 - Personnel Director, NYCFD

- a. Direct both the uniformed force of 11,800 and the civilian
force of 1,000 on all matters relative to personnel manage-
ment, administration, promotion, recruitment and vacancy
control. This entails interaction with other agencies
such as the Office of the Budget, Mayor's Office and the
Department of Personnel in obtaining their cooperation and
support in the administrative processing of matters affecting
personnel actions of the Fire Department.
- b. Serve as City-Wide Command Chief and as Administrative
Reserve Chief as scheduled at major fires and emergency
operations throughout the city.
- c. Agency examiner for the New York City Department of Personnel
representing the Fire Department in the preparation, evalu-
ation and rating of all examinations for civil service
fire personnel.

(Cont'd...)

1978/1979 - Borough Commander, Bronx

- a. Administer, manage and direct all firefighting resources in the Boro of the Bronx, which consists of 3 Divisions, 11 Battalions and 59 firefighting Engines, Ladders and special units. The personnel of this command consists of 72 Chief Officers, 209 Company Officers and 1543 Firefighters with an annual operating budget of 38 million dollars.

1977/1978 - Chief in Charge, Bureau of Support Services

- a. Executive Director of the Medical Division, Division of Fire Prevention, Division of Repairs and Transportation, and the Division of Planning and Operations Research. Inclusive in this position was the preparation and oversight of a combined annual operating budget of 15 million dollars.

1976/1977 - Director of Management Planning

- a. Planning and implementation of new management programs including the introduction and direction of a successful management by objectives system.
- b. Director - Development and implementation of personnel evaluation systems, approved by the New York City Department of Personnel and now operational for all ranks of the department.
- c. Liaison - New York City Mayor's Management Advisory Board
- d. Coordinator - Professional development systems implemented in conjunction with the Urban Academy of the University of the City of New York.

1975 - Deputy Borough Commander, Manhattan

- a. Developed a Field Performance Evaluation System now in use city-wide to assess the command performance of all Chief Officers at major operations.

1973/1974 - Developed and directed a Line Officers Training Program covering all major aspects of the supervisory requirements of Captains and Lieutenants in the Fire Department. Among the tasks involved were site selection, instructor recruitment, curriculum development and the daily operation of a school with over 100 students.

RICHARD L. P. CUSTER

Experience:

- 1982-Present Associate Professor of Fire Protection Engineering at Worcester Polytechnic Institute and Associate Director of the WPI Center for Firesafety Studies. In addition to an academic program leading to a Master of Science degree in Fire Protection engineering, the Center conducts research and offers seminar and continuing education programs in the fire safety area.
- 1981-Present President of Richard L. P. Custer and Company, consultants in fire protection, fire testing and fire research. Work has included fire testing, interpretation of codes and standards, conducting workshops and technical expert services.
- 1981 Executive Director of the National Center for Technology in Law, Inc., a company that was formed to serve as a clearing house for technical information used in personal injury litigation.
- 1979-1980 Recipient of Department of Commerce Science and Technology Fellowship. Served as Energy Aide on the staff of U.S. Senator John C. Culver.
- 1970-1981 Employed in a variety of capacities in the Office of Fire Research and Safety (later to become the Center for Fire Research) at the U.S. Department of Commerce National Bureau of Standards. From May 1970 to June 1971, full- and part-time consultant working on fire reporting systems, protective clothing and fire spread research. In June 1971 accepted full-time position. Work included fire testing, evaluation of fire protection equipment, participation in national and international standards-making groups, and technical management. While at NBS, positions held were fire prevention engineer, Chief of the Fire Detection and Control Systems Program, Acting Chief of the Fire Performance Evaluation Division and Associate Director of the Center.
- 1967-1971 Lecturer in Fire Protection Engineering Curriculum at the University of Maryland. Courses taught in principles of fire protection, building codes, fire department operations and special fire protection problems.
- 1966-1967 Engineering Geologist, North Carolina Highway Department. Conducted field studies of soil and rock conditions associated with proposed highway alignments.

Work consisted of surface and sub-surface investigations, soil sampling and measurements of load-bearing capacity. Responsible for preparing reports and cross section drawings.

Additional Experience:

- 1980-1981
(Spring) Taught Building Construction for the Fire Service at Montgomery College, Rockville, Maryland.
- 1968-1969
(Summers) Safety Officer and Fire Prevention Engineer for the U.S. Veteran's Administration conducting inspections, reviewing plans and specifications and carrying out special projects.
- 1969-1970 Participating faculty member in a project to teach the fundamentals of the National Fire Protection Association Life Safety Code at NASA facilities throughout the country.

Eleven years experience as a volunteer firefighter and fire officer in Pennsylvania, North Carolina and Maryland. Held positions as firefighter, Fire Captain, Training Officer and Fire Marshal. During this period, completed numerous courses relating to fire service activities including hazardous materials, tactics and emergency medical technology.

Education:

B.A., Geology, University of Pennsylvania, Philadelphia
M.S., Geological Engineering, North Carolina State University, Raleigh

Honors: Salamander Honorary Fire Protection Engineering Society

Professional Appointments:

Past member, National Fire Protection Association, Automatic Sprinkler Committee.

Past member, National Fire Protection Association, Sub-Committee on Residential Sprinkler Systems.

Past member, National Fire Protection Association, Life Safety Code Sub-Committee on Suppression System.

Past member, U.S. Delegation, International Standards Organization, Fire Suppression Equipment and Systems Committee.

Past chairman, National Fire Protection Association, Sprinkler Committee, Special Sub-Committee on Fire Loading.

Past chairman, Fire Science Advisory Committee for
Montgomery College, Rockville, Maryland.

Member of Advisory Board, Foundation for Fire Safety.

Professional Affiliations

National Fire Protection Association (Member, Fire
Services Section).

Standards Engineering Society

New England Chapter, Society of Fire Protection Engineers
(Chairman, Education Committee)

American Society for Testing and Materials (ASTM)

International Association of Arson Investigators

Publications:

1. Beach Sand Analysis, Island Beach State Park, Seaside Heights, NJ, 1965, Jour. Elisha Mitchell Sci. Soc., Vol. 81, No. 2.
2. Paleocurrents of the Triassic Durham Basin, NC, 1966, Jour. Elisha Mitchell Sci. Soc., Vol. 82, No. 2. (Also presented at Southeastern Section, GSA.)
3. Occurrence of Limestones in the Durham Triassic Basin, 1967, Jour. Elisha Mitchell Sci. Soc., Vol. 83, No. 3.
4. Hood and Custer, Use of the Frantz Isodynamic Separator for Semi-quantitative Analysis of Iron in Trioctahedral Micas, 1967, Jour. Elisha Mitchell Sci. Soc., Vol. 83.
5. Hood and Custer, Mass Magnetic Susceptibility of Some Trioctahedral Micas, 1967, American Mineralogist, Vol. 52, pp. 1643-1648.
6. Ignition and Combustion Phenomena, 1970. Conference on the Fire Protection of Steel, American Iron and Steel Institute.
7. Egress and Exits--Design Considerations with the NFPA Life Safety Code, a series of lectures at NASA Field Installations to Facilities Personnel, 1970-1971.
8. Principles of Industrial Fire Protection, Industrial Fire Protection Management Seminar, University of Maryland, May 1971.
9. Test Burn and Failure Mode Analysis of an Air-Supported Structure, Fire Technology, Vol. 8, No. 1, February 1972.
10. Open Windows and Thermal Inversions May Complicate a Fire Investigation, Fire and Arson Investigator, April-June 1972.
11. Oxidation is Only the Beginning, Fire Engineering, Vol. 125, No. 7, July 1972.
12. Ignition Source and Fire Cause--The Keys to Plant Fire Protection, American Institute of Plant Engineers, February 1973.
13. Overview of Automatic Sprinkler Systems, CFR Seminar, May 1974.
14. Custer, R. and Bright, R., Fire Detection: The State of the Art, National Bureau of Standards, Tech. Note 839 (NASA CR-134642), June 1974.
15. National Bureau of Standards Sprinkler Research Activities, American Society of Plumbing Engineers, June 14, 1974.

16. Corridor Sprinkler Research, Copper Development Association, June 18, 1974.
17. Detector Actuated Automatic Sprinkler Systems--A Preliminary Evaluation, National Bureau of Standards, Tech. Note 836, July 1974.
18. Smoke Detection Principles and National Bureau of Standards Research Efforts, HUD Field Engineers, October 1974.
19. Research in Automatic Suppression, Fire Protection Engineering Students, University of Maryland, October 1974.
20. Fire Detection and Suppression Systems, Fire Science Students, Prince George's County Community College, October 1974.
21. NFPA 13-D Sprinkler Installation in One- and Two-Family Dwellings and Mobile Homes, CFR Seminar, June 1975.
22. Fire Protection in Health-Care Facilities--The Researcher's Viewpoint, Seminar on Health-Care Facilities, Chesapeake Chapter Society, Fire Protection Engineers, June 1975.
23. R&D Leading to a Total Design Concept for Sprinkler Protection, Carolinas Chapter, Society for Fire Protection Engineers, September 1975.
24. Custer, R. and Wahle, K., Distribution of Water Through a Vertical Plane from Automatic Sprinkler Heads, National Bureau of Standards, NBSIR 75-920, December 1975.
25. Detector Actuated Automatic Sprinklers for Health Care Facilities, Building Official and Code Administrator, Vol. 10, No. 1, January 1976.
26. Smoke Detectors and Home Fire Prevention, Interview on WGAY Radio, June 13, 1976.
27. Automatic Sprinkler Systems Design--A Look Into the Future, Chicago Chapter, Society of Fire Protection Engineers, July 1976.
28. Participation in Talk Show, Systematic Selection of Fire Extinguishing Systems, NFPA Fall Meeting, October 1976.
29. Smoke Movement and Control in Buildings--An International Overview, NFPA Annual Meeting, Washington, DC, May 1977.
30. Water Distribution Data as an Input to Sprinkler System Design, Society of Fire Protection Engineers, Annual Meeting, Washington, DC, May 1977.

31. Hayes, W. and Custer, R., Evaluation of Light Duty Pipe Hangers for Automatic Sprinklers in Residential and Care Type Occupancies, NBSIR-77-1282.
32. Bukowski, R. W., Custer, R. and Bright, R. G., Fire Alarm Communications, published in handbook of Building Security Planning and Design, McGraw-Hill, New York, New York, March 1979.
33. Fire Test Methods for Use in Fire Investigations, pamphlet prepared by the Center for Fire Research, National Bureau of Standards, for meeting of the International Association of Fire Chiefs, Miami, Florida, September 1980.
34. Combustibility of Furniture: The Role in Fire Investigation, Maryland Arson Seminar, University of Maryland Fire Training Center, College Park, Maryland, Fall 19980.
35. "Unequal" Fire Protection Under Law: The Persistence of Outdated Codes and Standards, presented at The Art of Applying Technology in Personal Injury Lawsuits, Hunt Valley Inn, Hunt Valley, Maryland, June 1981.
36. Custer, R. and Kitzes, Wm. F., The Cliffside Report: Results of the Needs Assessment Workshop of the Foundation for Fire Safety, October 1 & 2, 1981, Richard L. P. Custer and Company, September 1981.
37. Custer, R. and Moore, W., Applications of Detection Technology, two-day workshop presented by the Center for Firesafety Studies, Worcester Polytechnic Institute, Worcester, Massachusetts, September 1982.

DIETRICH HOFFMANN

Associate Director and
Chief, Division of Environmental Carcinogenesis

Education:

Universität Kiel, Germany	B.S.	1952	Science
Universität Kiel, Germany	M.S.	1955	Chemistry
Max-Planck Institut fuer Biochemie der Universität Muenchen, Germany	Ph.D.	1957	Biochemistry

Professional Experience:

1955-1957	<u>Max Planck Institut fuer Biochemie, Muenchen, Germany</u> - Research Fellow
1957-1960	<u>Sloan Kettering Institute for Cancer Research, New York, N.Y.</u> - Visiting Research Associate
1960-1966	<u>Sloan Kettering Institute for Cancer Research, New York, N.Y.</u> - Associate
1966-1969	<u>Sloan Kettering Institute for Cancer Research, New York, N.Y.</u> - Associate Member
1970-present	<u>Sloan Kettering Institute for Cancer Research, New York, N.Y.</u> - Associate Scientist
1960-1962	<u>Cornell University Medical College, Graduate School of Medical Science, Sloan Kettering Division, New York, N.Y.</u> - Research Associate in Biochemistry
1962-1969	<u>Cornell University Medical College, Graduate School of Medical Science, Sloan Kettering Division, New York, N.Y.</u> - Assistant Professor of Biochemistry
1970-1980	<u>American Health Foundation, Naylor Dana Institute for Disease Prevention, Valhalla, N.Y.</u> - Member and Chief of the Division of Environmental Carcinogenesis
1980-present	<u>American Health Foundation, Naylor Dana Institute for Disease Prevention, Valhalla, N.Y.</u> - Associate Director of the Naylor Dana Institute for Disease Prevention and Chief of the Division of Environmental Carcinogenesis

Memberships:

American Association for Cancer Research	Air Pollution Control Association
American Chemical Society	Gesellschaft Deutscher Chemiker
American Chemical Institute, Fellow	New York Academy of Sciences
Phytochemical Society of America	Society of Toxicology

National and International Responsibilities 1970-Present:

1970-1972	Consultant Biologic Effects of Atmospheric Pollutants, National Academy of Sciences, Washington, D.C.
1973-1975	Member, Tobacco Working Group, National Cancer Institute, Bethesda, MD.
1976	Participant, Workshop on Lung Cancer, International Union Against Cancer
1977-present	Member, Expert Panel, Cosmetic Ingredient Review, Washington, D.C.
1978-1980	Member, Committee on Food Irradiation, National Academy of Sciences, Washington, D.C.
1979-1980	Member, Health Effects Panel, Diesel Impacts Study Committee, National Research Council, Washington, D.C.
1980-present	Member, Editorial Board "Carcinogenesis"
1981-1982	Panel Member, Marijuana Study Steering Committee, National Academy of Sciences, Washington, D.C.
1981-1982	Ad hoc Consultant, Board of Scientific Counselors, Division of Cancer Cause and Prevention, National Cancer Institute
1982-	Member, Board of Scientific Counselors, Division of Cancer Cause and Prevention, National Cancer Institute

BIBLIOGRAPHY

Dietrich Hoffmann, Ph.D.

1. Wynder, E.L. and Hoffmann, D.
A Study of Tobacco Carcinogenesis. VII. The role of higher polycyclic hydrocarbons.
Cancer 12: 1079-1086, 1959.
2. Wynder, E.L. and Hoffmann, D.
The carcinogenicity of benzofluoranthenes.
Cancer 12: 1194-1199, 1959.
3. Wynder, E.L. and Hoffmann, D.
Tobacco smoking as a cause of cancer. *Cancer Progress*, Butterworths, London, Vol. 1960, pp. 77-80.
4. Hoffmann, D. and Wynder, E.L.
Short-term determination of carcinogenic aromatic hydrocarbons.
Anal. Chem. 32: 295, 1960.
5. Wynder, E.L. and Hoffmann, D.
Some practical aspects of the smoking-cancer problem.
New Engl. J. Med. 262 540-545, 1960.
6. Hoffmann, D. and Wynder, E.L.
On the isolation and identification of polycyclic aromatic hydrocarbons.
Cancer 13: 1062-1073, 1960.
7. Wynder, E.L. and Hoffmann, D.
Present status of laboratory studies on tobacco carcinogenesis.
Acta Pathol. Microbiol. Scand. 52: 119-132, 1961.
8. Biekert, E., Hoffmann, D. and Meyer, F.J.
Ueber 1,4-Oxazine, I. Darstellung kondensierter 1,4-oxazinone-(2) durch Umsetzung von α -Aminophenolen mit α -Ketoestern.
Chem. Ber. 94: (6) 1676-1682, 1961.
9. Biekert, E., Hoffmann, D. and Meyer, F.J.
Ueber 1,4-Oxazine, II. Überführung der 1,4-Benzoxazinone-(2) in Phenmorpholone-(2) und N-substituiert Aminoalkohole.
Chem. Ber. 94: 1676-1682, 1961.
10. Hoffmann, D. and Wynder, E.L.
A Study of Air Pollution Carcinogenesis. II. The isolation and identification of polynuclear aromatic hydrocarbons from gasoline engine exhaust.
Cancer 15: 93-102, 1962.
11. Wynder, E.L. and Hoffmann, D.
A Study of Air Pollution Carcinogenesis. III. Carcinogenic activity of gasoline engine exhaust tar.
Cancer 15: 103-108, 1962.
12. Hoffmann, D. and Wynder, E.L.
Die quantitative Bestimmung von Phenolen im Tabakrauch.
Beitr. Tabakforsch. 1: 101-106, 1961.
13. Wynder, E.L. and Hoffmann, D.
A Study of Tobacco Carcinogenesis. VIII. The role of the acidic fractions as promoters.
Cancer 14: 1306-1315, 1961.
14. Biekert, E., Hoffmann, D. and Enslein, L.
Über 1,4-Oxazine, VI. Kondensation von 1,2-Aminoalkoholen mit α -Ketocarbonsäureestern zu 5,6-Dihydroxy-1,4-Oxazinen (2).
Chem. Ber. 94: 2778-2785, 1961.
15. Wynder, E.L. and Hoffmann, D.
Carcinogenicity of Dibenzo(a,l)pyrene.
Nature (London) 192: 1092-1093, 1961.
16. Hoffmann, D. and Wynder, E.L.
Analytical and biological studies on gasoline engine exhaust.
Natl. Cancer Inst. Monograph 9: 91-116, 1962.
17. Hoffmann, D. and Wynder, E.L.
Filtration of phenols from cigarette smoke.
J. Natl. Cancer Inst. 30: 67-84, 1963.
- 17a. Hoffmann, D. and Wynder, E.L.
Die Filtration von Phenolen aus Zigarettenrauch.
Beitr. Tabakforsch. 2: 51-66, 1963.
18. Hoffmann, D. and Wynder, E.L.
Studies on Gasoline Engine Exhaust.
J. Air Poll. Control Assoc. 17: 322-327, 1963.

19. Wynder, E.L. and Hoffmann, D.
The role of skin neoplasia in tobacco carcinogenesis. In: "Tobacco and Health", (G.G. James and R. Rosenthal, eds.), C.C. Thomas, Springfield, Ill., 1963, pp. 61-71.
20. Wynder, E.L. and Hoffmann, D.
Air pollution and lung cancer. Proc. Natl. Conf. Air Pollution, Washington, D.C., 1963, pp.143-148.
21. Hoffmann, D., Rathkamp, G. and Wynder E.L.
Comparison of the yields of several selected components in the smoke from different tobacco products. J. Natl. Cancer Inst. 31: 627-637, 1963.
- 21a. Hoffmann, D., Rathkamp, G. and Wynder, E.L.
Vergleich der Ausbeute an mehreren ausgewählten Komponenten im Rauch verschiedener Tabakerzeugnisse. Beitr. Tabakforsch. 2: 123-130, 1964.
22. Wynder, E.L. and Hoffmann, D.
Ein experimenteller Beitrag zur Tabakrauchkanzerogenese. Dtsch. Med. Wochenschr. 88: 623-628, 1963.
23. Wynder, E.L., Kaiser, H.E., Goodman, D.A. and Hoffmann, D.
A method for determining ciliastatic components in cigarette smoke. Cancer 16: 1222-1225, 1963.
24. Wynder, E.L. and Hoffmann, D.
Experimental aspects of tobacco carcinogenesis. Dis. Chest 44: 337-346, 1963.
25. Wynder, E.L. and Hoffmann, D.
Experimental tobacco carcinogenesis. Adv. Cancer Res. 8: 249-453, 1964.
26. Wynder, E.L. and Hoffmann, D.
Reduction of tumorigenicity of cigarette smoke. J. Am. Med. Assoc. 192: 88-94, 1965.
27. Hoffmann, D., Theisz, E. and Wynder, E.L.
Studies on the carcinogenicity of gasoline exhaust. J. Air Poll. Control Assoc. 15: 162-165, 1965.
28. Wynder, E.L. and Hoffmann, D.
Some laboratory and epidemiological aspects of air pollution carcinogenesis. J. Air Poll. Control Assoc. 15: 155-159, 1965.
29. Wynder, E.L., Goodman, D.A. and Hoffmann, D.
Ciliotoxic Components in Cigarette Smoke. II. Carboxylic acids and aldehydes. Cancer 18: 505-509, 1965.
30. Wynder, E.L., Goodman, D.A. and Hoffmann, D.
Ciliotoxic Components in Cigarette Smoke. III. In vitro comparison of different smoke components. Cancer 18: 1652-1658, 1965.
31. Wynder, E.L. and Hoffmann, D.
Current concepts of environmental cancer research. Med. Clin. North Am. 50: 631-650, 1966.
32. Hoffmann, D. and Wynder, E.L.
Beitrag zur carcinogenen Wirkung von Dibenzopyrenen. Z. Krebsforsch. 68: 137-149, 1966.
33. Wynder, E.L. and Hoffmann, D.
Beziehungen zwischen Epidemiologie und experimenteller Karzinogenese. Muench. Med. Wochenschr. 108: 1501-1512, 1966.
34. Hoffmann, D. and Rubin, J.
Chemical Studies on Tobacco Smoke. I. The quantitative determination of indoles in cigarette smoke. Beitr. Tabakforsch. 3: 409-414, 1966.
35. Hoffmann, D., Rathkamp, G. and Rubin, J.
Chemical Studies on Tobacco Smoke. II. Comparison of the yields of several selected components in the smoke from five major Turkish tobacco varieties. Food Cosmet. Toxicol. 5: 37-38, 1967.
36. Hoffmann, D. and Wynder, E.L.
The reduction of the tumorigenicity of cigarette smoke condensate by addition of sodium nitrate to tobacco. Cancer Res. 27: 172-174, 1967.
37. Wynder, E.L. and Hoffmann, D.
"Nutrition and Cancer." In: "Prevention of Cancer", (R.W. Raven and F.J.C. Roe, eds.), Butterworths, London, 1967, pp. 11-18.

38. Wynder, E.L. and Hoffmann, D.
"Tobacco and Tobacco Smoke. Studies in
Experimental Carcinogenesis."
Academic Press, New York, 1967, 730 p.
39. Wynder, E.L., Taguchi, K., Baden, V. and Hoffmann, D.
A Study in Tobacco Carcinogenesis. IX. The
effect of cigarette smoke on the respiratory tract
of mice after passive inhalation.
Cancer 21: 134-153, 1968.
40. Hoffmann, D. and Wynder, E.L.
Chemical analysis and carcinogenic bioassays of
organic particulate pollutants. Chapter 20, Vol.
II in "Air Pollution." (A.C. Stern, ed.), Academic
Press, New York, 1968, pp. 187-247.
41. Wynder, E.L. and Hoffmann, D.
Selected laboratory methods in tobacco
carcinogenesis. In: "Methods in Cancer Research."
(E.H. Busch, ed.), Academic Press, New York, 1968,
pp 3-52.
42. Hoffmann, D. and Rathkamp, G.
Chemical Studies on Tobacco Smoke. III. Primary
and secondary nitroalkanes in cigarette smoke.
Beitr. Tabakforsch. 4: 124-134, 1968.
43. Hoffmann, D. and Wynder, E.L.
Selective reduction of the tumorigenicity of
tobacco smoke. Experimental approaches.
Natl. Cancer Inst. Monogr. 28: 151-172, 1968.
44. Hoffmann, D. and Woziwodzki, H.
Chemical Studies on Tobacco Smoke. IV.
The quantitative determination of free
nonvolatile fatty acids in tobacco and tobacco
smoke.
Beitr. Tabakforsch. 4: 167-175, 1968.
45. Hoffmann, D. and Rathkamp, G.
Chemical Studies on Tobacco Smoke. V.
Quantitative determination of chlorinated
hydrocarbon insecticides in cigarette tobacco and
its smoke.
Beitr. Tabakforsch. 4: 201-214, 1968.
46. Wynder, E.L. and Hoffmann, D.
Experimental tobacco carcinogenesis.
Science 162: 862-871, 1968.
47. Wynder, E.L. and Hoffmann, D.
"Bioassays in Tobacco Carcinogenesis."
Progr. Exp. Tumor Res. 11: 163-193, 1968.
48. Hoffmann, D., Masuda, Y. and Wynder, E.L.
 α -Naphthylamine and β -naphthylamine in cigarette
smoke.
Nature 221: 254-256, 1969.
49. Hoffmann, D., Rathkamp, G. and Woziwodzki, H.
Chemical Studies on Tobacco Smoke. VI.
The determination of carbazoles in
cigarette smoke.
Beitr. Tabakforsch. 4: 253-263, 1968.
50. Masuda, Y. and Hoffmann, D.
Chemical Studies on Tobacco Smoke. VII.
Quantitative determination of 1-naphthylamine and
2-naphthylamine in cigarette smoke.
Anal. Chem. 41: 650-652, 1969.
51. Wynder, E.L. and Hoffmann, D.
Current studies on etiology and prevention. In:
"Lung Cancer: a study of 5,000 Memorial Hospital
cases." (E.L. Watson, ed.), Mosby Company, St.
Louis, MO, 1969, pp. 15-34.
52. Hoffmann, D., Rathkamp, G. and Nesnow, S.
Chemical Studies on Tobacco Smoke. VIII.
Quantitative determination of 9-methylcarbazoles
in cigarette smoke.
Anal. Chem. 41: 1256-1259, 1969.
53. Wynder, E.L. and Hoffmann, D.
A Study of Tobacco Carcinogenesis. X. Tumor
promoting activity.
Cancer 24: 289-301, 1969.
54. Hoffmann, D., Rathkamp, G. and Wynder, E.L.
Chemical Studies on Tobacco Smoke. IX.
Quantitative analysis of chlorinated hydrocarbon
insecticides.
Beitr. Tabakforsch. 5: 140-148, 1969.

55. Masuda, Y. and Hoffmann, D.
A method for the determination of primary amines of polynuclear aromatic hydrocarbons.
J. Chromatogr. Sci. 7: 694-697, 1969.
56. Hoffmann, D. and Rathkamp, G.
Chemical Studies on Tobacco Smoke. X.
Quantitative determination of 1-alkylindoles in cigarette smoke.
Anal. Chem. 42: 366-370, 1970.
57. Hoffmann, D. and Wynder, E.L.
Chamber development and aerosol dispersion.
U.S. Atomic Energy Symp. Ser. 18: 173-191, 1970.
58. Hoffmann, D. and Mazzola, V.
Chemical Studies on Tobacco Smoke. XI.
Dibenzofurans in cigarette smoke.
Beitr. Tabakforsch. 5: 183-188, 1970.
59. Hoffmann, D. and Rathkamp, G.
Chemical Studies on Tobacco Smoke. XII.
Quantitative determination of nitrobenzenes in cigarette smoke.
Anal. Chem. 42: 1643-1647, 1970.
60. Wynder, E.L. and Hoffmann, D.
The epidermis and the respiratory tract as bioassay systems in tobacco carcinogenesis.
Brit. J. Cancer 24: 574-587, 1970.
61. Hoffmann, D. and Wynder, E.L.
A Study of Tobacco Carcinogenesis. XI. Tumor initiators.
Cancer 27: 848-864, 1971.
62. Rathkamp, G. and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XIII.
Inhibition of the pyrosynthesis of several selective smoke constituents.
Beitr. Tabakforsch. 5: 302-306, 1970.
63. Marquardt, H., Bendich, A., Phillips, P.S. and Hoffmann, D.
Binding of [$G-^3H$]-7,12-dimethylbenz[*a*]anthracene to DNA of normal and of rapidly dividing hepatic cells of rats.
Chem. Biol. Interactions 3: 1-11, 1971.
64. Hoffmann, D. and Wynder, E.L.
Respiratory Carcinogens: Their Nature and Precursors. In: "Proc. Intern. Symp. on Identification and Measurements of Environmental Pollutants", (I. Hoffmann, ed.), Campbell Printing, Ottawa, Canada, 1972, pp. 9-16.
65. Wynder, E.L. and Hoffmann, D.
Carcinogens in the air. Proc. 24th Annual Symp. on Fundamental Cancer Research, Houston, Texas, 1972, pp. 118-138.
66. Hoffmann, D. and Rathkamp, G.
Chemical Studies on Tobacco Smoke. XIV.
Quantitative determination of fluorenes in cigarette smoke and their formation by pyrosynthesis.
Anal. Chem. 44: 899-904, 1972.
67. Hoffmann, D. and Wynder, E.L.
Chemical Studies on Tobacco Smoke. XV. Chemical composition and tumorigenicity of tobacco smoke. In "The Chemistry of Tobacco and Tobacco Smoke", (I. Schmelz, ed.), Plenum Press, N.Y. 1972, pp. 123-147.
68. Wynder, E.L. and Hoffmann, D.
Less Harmful ways of smoking.
J. Natl. Cancer Inst. 48: 1749-1758, 1972.
69. Hoffmann, D. and Wynder, E.L.
Selective Reduction of the Tumorigenicity of Tobacco Smoke. II. Experimental approaches.
J. Natl. Cancer Inst. 48: 1855-1868, 1972.
70. Hoffmann, D., Rathkamp, G., Nesnow, S., and Wynder, E.L.
Fluoranthenes: Quantitative determination in cigarette smoke, formation by pyrolysis and tumor initiating activity.
J. Natl. Cancer Inst. 49: 1165-1175, 1972.
71. Hoffmann, D. and Wynder, E.L.
Chemical Studies on Tobacco Smoke. XVIII. Smoke of cigarettes and little cigars: An analytical comparison.
Science 178: 1197-1199, 1972.

72. Hoffmann, D.
Benzo[a]pyrene in polluted air.
Prev. Med. 1: 450-451, 1972.
73. Liu, Y.Y. and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XIX.
Quantitative chromatographic determination of
maleic hydrazide in cigarette smoke.
Anal. Chem. 45: 2270-2273, 1973.
74. Rathkamp, G., Tso, T.C., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XX. Smoke
analysis of cigarettes made from Bright tobaccos
differing in variety and stalk positions.
Beitr. Tabakforsch. 7: 179-189, 1973.
75. Tso, T.C., Rathkamp, G., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XXI.
Correlation and multiple regression among selected
cigarette-smoke constituents and leaf characteris-
tics of Bright tobacco.
Beitr. Tabakforsch. 7: 190-194, 1973
76. Hoffmann, D., Rathkamp, G., Brunneemann, K.D., and
Wynder, E. L.
Chemical Studies on Tobacco Smoke. XXII. On the
profile analysis of tobacco smoke.
Sci. Total Environ. 2: 151-171, 1973
77. Hu, M. W., Bondinell, W. E., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XXIII.
Synthesis of carbon-14 labelled myosmine,
nornicotine, and N'-nitrosonornicotine.
J. Labelled Compd. 10: 79-88, 1974.
78. Hoffmann, D., Bondinell, W.E., and Wynder, E.L.
Carcinogenicity of methylchrysenes.
Science 183: 215-216, 1974
79. Brunneemann, K.D. and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XXIV.
A quantitative method for carbon monoxide and
carbon dioxide in cigarette and cigar smoke.
J. Chrom. Sci., 12: 70-75, 1974.
80. Brunneemann, K.D., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XXV.
The pH of tobacco smoke.
Food Cosmet. Toxicol. 12: 115-124, 1974.
81. Hoffmann, D., and Wynder, E. L.
Environmental respiratory carcinogenesis. In:
"Chemical Carcinogenesis" (C. E. Searle,
ed.), ACS Monograph, 173, American Chemical Society,
Washington, D. C., 1976, pp.324-365
82. Hoffmann, D., Rathkamp, G., and Liu, Y. Y.
Chemical Studies on Tobacco Smoke. XXVI.
On the isolation and identification of volatile and
non-volatile N-nitrosamines and hydrazines in cigarette
smoke.
Int. Agency Res. Cancer, Monogr. 9: 159-165, 1974.
83. Liu, Y. Y., Schmeltz, I., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XXVII.
Quantitative analysis of hydrazine in tobacco and
cigarette smoke.
Anal. Chem. 46: 885-889, 1974.
84. Hoffmann, D., Sanghvi, L. D., and Wynder, E. L.
Chemical Studies on Tobacco Smoke. XXVIII.
Comparative chemical analysis of Indian bidi
and American cigarette smoke.
Int. J. Cancer 14: 49-53, 1974.
85. Hecht, S. S., Bondinell, E. W., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XXIX.
Chrysene and methylchrysenes: Presence in
tobacco smoke and carcinogenicity.
J. Natl. Cancer Inst. 53: 1121-1133, 1974.
86. Hoffmann, D., Hecht, S. S., Orsafi, R. M., and Wynder, E. L.
Chemical Studies on Tobacco Smoke. XXX.
N'-Nitrosonornicotine in tobacco.
Science 186: 265-267, 1974.
87. Kobayashi, N., Hoffmann, D., and Wynder, E. L.
A Study of Tobacco Carcinogenesis. XII. Epithelial
changes induced in the upper respiratory tracts of
Syrian golden hamsters by cigarette smoke.
J. Natl. Cancer Inst. 53: 10-85-1089, 1974.
88. Schmeltz, I., Hoffmann, D., and Wynder, E. L.
Chemical studies on tobacco smoke. XXXII. Toxic and
tumorigenic agents in tobacco smoke: Analytical
methods and modes of origin.
Proc. 8. Ann. Conf. Trace Substances in Environ. Health
281-295, 1974.

89. Brunnemann, K. D., and Hoffman, D.
Chemical Studies on Tobacco Smoke. XXXIV. Gas chromatographic determination of ammonia in cigarette and cigar smoke.
J. Chromatogr. Sci. 13: 157-163, 1975.
90. Hecht, S. S., Orna, R. M., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XXXIII. N'-Nitrosonornicotine in tobacco: Analysis of possible contributing factors and biologic implications.
J. Natl. Cancer Inst. 54: 1237-1244, 1975
91. Hoffmann, D., and Wynder, E. L.
Positive controls in environmental respiratory carcinogenesis. In: "Carcinogenesis Testing of Chemicals", (L. Goldberg, ed.), CRC Press, Cleveland, Ohio, 1974, pp. 35-39.
92. Wynder, E. L., and Hoffmann, D.
The tenth anniversary of the Surgeon General's report on smoking and health Have we made any progress? Guest Editorial.
J. Natl. Cancer Inst. 54: 533-534, 1975.
93. Schmeltz, I., de Paolis, A., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XXXI. Phytosterols in tobacco: Quantitative analysis and fate in tobacco combustion.
Beitr. Tabakforsch. 8: 211-218, 1975.
94. Schmeltz, I., Hoffmann, D. and Wynder, E. L.
The influence of tobacco smoke on indoor atmospheres. I. An overview.
Prev. Med. 4: 66-82, 1975.
95. Hoffmann, D., Raineri, R., Hecht, S. S., Maronpot, R. R., and Wynder, E. L.
A Study of Tobacco Carcinogenesis. XIV. Effect of N-Nitrosonornicotine and N'-nitrosoanabasine in rats.
J. Natl. Cancer Inst. 55: 977-981, 1975.
96. Wynder, E. L., Mabuchi, K., and Hoffmann, D.
Tobacco. In: "Cancer Epidemiology and Prevention", (D. Schottenfeld, ed.), Charles C. Thomas Publ., Springfield, Ill., 1974, pp. 102-125.
97. Hecht, S. S., Thorne, R. Maronpot, R. R., and Hoffmann, D.
A Study of Tobacco Carcinogenesis. XIII. Tumor promoting subfractions of the weakly acidic fraction.
J. Natl. Cancer Inst. 55: 1329-1336, 1975.
- *98. Schmeltz, I., Tosk, J., Jacobs, G., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XXXV. The redox potential and quinone content of cigarette smoke.
Anal. Chem. 49: 1924-1929, 1977.
99. Hecht, S. S., Orna, R. M., and Hoffmann, D.
Determination of N'-nitrosonornicotine in tobacco by high speed liquid chromatography.
Anal. Chem. 47: 2046-2048, 1975.
100. Hoffmann, D., Patrianakos, C. P., Brunnemann, K. D., and Gori, G. B.
Chemical Studies on Tobacco Smoke. XXXVI. Chromatographic determination of vinyl chloride in tobacco smoke.
Anal. Chem. 48: 47-50, 1976.
101. Brunnemann, K. D., Hoffmann, D., Wynder, E. L., and Gori, G. B.
Chemical Studies on Tobacco Smoke. XXXVII. Determination of tar, nicotine, and carbon monoxide in cigarette smoke. A comparison of international smoking conditions. In: "Smoking and Health: I. Modifying the Risk for the Smoker." Proc. Third World Conf. on Smoking and Health. (E. L. Wynder, D. Hoffmann and G. B. Gori, eds.) DHEW Publ. No. (NIH) 76-1221, U. S., Government Printing Office, Washington, D. C., 1976, pp., 441-449.
102. Schmeltz, I., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XXXVIII. The physico-chemical nature of cigarette smoke. In: "Smoking and Health: I. Modifying the Risk for the Smoker." Proc. Third World Conf. on Smoking and Health. (E. L. Wynder, D. Hoffmann, and G. B. Gori, eds.) DHEW Publ. No. (NIH) 76-1221, U. S. Government Printing Office, Washington, D. C., 1976, pp.. 13-34.
103. Hoffmann D., Schmeltz, I., Hecht, S. S., and Wynder, E. L.
Chemical studies on tobacco smoke. XXXIX. On the identification of carcinogens, tumor promoters, and cocarcinogens in tobacco smoke. In "Smoking and Health: I. Modifying the Risk for the Smoker." Proc. Third World Conf. on Smoking and Health. (E. L. Wynder, D. Hoffmann, and G. B. Gori, eds.) DHEW Publ. No. (NIH) 76-1221, U. S. Government Printing Office, Washington, D. C. 1976, pp.125-145.

104. Hecht, S. S., Schmeltz, I., Hoffmann, D., and Wynder, E. L. Chemical Studies on Tobacco Smoke. XL. Identification of carcinogens in tobacco. In: "Smoking and Health: I. Modifying the Risk for the Smoker." Proc. Third World Conf. on Smoking and Health. (E. L. Wynder, D. Hoffmann, and G. B. Gori, eds.) DHEW Publ. No. (NIH) 76-1221, U. S. Government Printing Office, Washington, D. C., 1976, pp. 191-202.
105. Hoffmann, D., and Wynder, E. L. Selective reduction of tumorigenicity of tobacco smoke. III. The reduction of polynuclear aromatic hydrocarbons in cigarette smoke. In "Smoking and Health: I. Modifying the Risk for the Smoker." Proc. Third World Conf. on Smoking and Health. (E. L. Wynder, D. Hoffmann, and G. B. Gori, eds.) DHEW Publ. No. (NIH) 76-1221, U. S. Government Printing Office, Washington, D. C., 1976, pp. 495-504.
106. Hecht, S. S., Tso, T. C., and Hoffmann, D. Selective reduction of tumorigenicity of tobacco smoke. IV. Reduction of N-nitrosamines and aromatic amines. In: "Smoking and Health: I. Modifying the Risk for the Smoker." Proc. Third World Conf. on Smoking and Health. (E. L. Wynder, D. Hoffmann, and G. B. Gori, eds.) DHEW Publ. No. (NIH) 76-1221, U. S. Government Printing Office, Washington, D.C., 1976, 535-545.
107. Tso, T. C., Gori, G. B. and Hoffmann, D. Reduction of nicotine and tar in tobacco and in cigarettes through agricultural techniques. In: "Smoking and Health: I. Modifying the Risk for the Smoker." Proc. Third World Conf. on Smoking and Health. (E. L. Wynder, D. Hoffmann, and G. B. Gori, eds.) DHEW Publ. No. (NIH) 76-1221, U. S. Government Printing Office, Washington, D.C., 1976, p. 35-48.
108. Hoffmann, D., Brunneemann, K. D., Gori, G. B., and Wynder, E. L. On the carcinogenicity of marijuana smoke. Recent Adv. Phytochem. 9: 63-81, 1975
109. Hoffmann, D., Hecht, S. S., Orna, R. M., Tso, T. C., and Wynder, E. L. Chemical Studies on Tobacco Smoke. XLII. N-Nitrosornicotine: Presence in tobacco, formation and carcinogenicity. Int. Agency Res. Cancer Sci. Publ. No. 14: 307-320, 1976.
110. Hoffmann, D., and Wynder, E. L. Chemical Studies on Tobacco Smoke. XLIII. The active fractions of cigarette smoke in experimental tobacco carcinogenesis. A review. Tobacco Res. (India) 1: 88-97, 1975.
111. Hoffmann, D., Hecht, S. S., Schmeltz, I., Brunneemann, K. D., and Wynder, E. L. Chemical Studies on Tobacco Smoke. XLIV. New separation techniques for classes of smoke compounds. Recent Adv. Tobacco Sci. 1: 97-122, 1975.
112. Schmeltz, I., and Hoffmann, D. Formation of polynuclear aromatic hydrocarbons from combustion of organic matter. In: "Carcinogenesis - A Comprehensive Survey", Vol. I, (R. I. Freudenthal and P. W. Jones, ed.), Raven Press, New York 1976, pp. 225-239.
113. Hecht, S. S., Loy, M., and Hoffmann, D. On the structure and carcinogenicity of the methylchrysenes. In: "Carcinogenesis - A Comprehensive Survey", Vol. I, (R. I. Freudenthal and P. W. Jones, eds.) Raven Press, New York 1976, pp. 325-340.
114. Brunneemann, K. D., and Hoffmann, D. Analysis of polynuclear aromatic hydrocarbons in the respiratory environment. In: "Carcinogenesis - A Comprehensive Survey", Vol. I, (R. I. Freudenthal and P. W. Jones, eds.), Raven Press, New York, 1976, pp. 283-297.
115. Schmeltz, I., Brunneemann, K. D., Hoffmann, D., and Cornell, A. Chemical Studies on Tobacco Smoke. XLV. On the chemistry of cigar smoke: Comparisons between experimental little and large cigars. Beitr. Tabakforsch. 8: 367-377, 1976.
116. Schmeltz, I., Tosk, J., and Hoffmann, D. Chemical Studies on Tobacco Smoke. XLVI. Formation and determination of naphthalenes in cigarette smoke. Anal. Chem. 48: 645-650, 1976.
117. Hecht, S. S., Chen, C. B., and Hoffmann, D. Synthesis of N-nitrosamino aldehydes. Tetrahedron Lett. No. 8: 593-596, 1976.

118. Hoffmann, D., and Wynder, E. L.
Smoking and occupational cancers.
Prev. Med. 5: 245-261, 1976.
119. Wynder, E. L., Hoffmann, D., Chan, P., and Reddy, B.
Interdisciplinary and experimental approaches:
Metabolic epidemiology. In: "Persons at High Risk of
Cancer, An Approach to Cancer Etiology and Control",
(J. F. Fraumeni, ed.), Academic Press, New York, 1975,
pp.485-501.
120. Hecht, S. S., Loy, M., Maronpot, R. R., and Hoffmann, D.
A Study of Chemical Carcinogenesis: Comparative
carcinogenicity of 5-methylchrysene, benzo(a)pyrene,
and modified chrysenes.
Cancer Lett. 1: 147-154, 1976.
121. Schmeltz, I., Abidi, S., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XLVIII.
Tumorigenic agents in unburned processed
tobacco: N-nitrosodiethanolamine and 1,1-dimethyl-
hydrazine.
Cancer Lett. 2: 125-132, 1977.
122. Brunneemann, K. D., Yu, L., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XLIX.
Gas chromatographic determination of hydrogen cyanide
and cyanogen in tobacco smoke.
J. Anal. Toxicol. 1: 38-42, 1977.
123. Wynder, E. L., and Hoffmann, D.
Tobacco and tobacco smoke.
Semin. Oncol. 3: 5-15, 1976.
124. Hoffmann, D., Schmeltz, I., Hecht, S. S., Brunneemann, K.
D., and Wynder, E. L.
Volatile carcinogens: Occurrence, formation and
analysis. In: "Prevention and Detection of Cancer",
Part I Prevention, Vol. 2, (Herbert E. Nieburgs, ed.)
Marcel Dekker, New York, 1978, pp. 1943-1959.
125. Schmeltz, I., Brunneemann, K. D., and Hoffmann, D.
Analytical methods for polynuclear hydrocarbons. In:
"Prevention and Detection of Cancer", Part I
Prevention, Vol. 2, (Herbert S. Nieburgs, ed.), Marcel
Dekker, New York, 1978, pp. 1973-1992.
126. Hoffmann, D., and Wynder, E. L.
Organic particulate pollutants. Chemical analysis and
bioassays for carcinogenicity. In: "Air Pollution",
3rd edition. (A. C. Stern, ed.), Vol. II, Part B,
Academic Press, New York, 1977, pp. 361-455.
127. Schmeltz, I., and Hoffmann, D.
Chemical Studies on Tobacco Smoke L.
Nitrogen-containing compounds in tobacco
and tobacco smoke.
Chem. Rev. 77: 295-311, 1977.
128. Brunneemann, K. D., Lee, H. C., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. XLVII.
On the quantitative analysis of catechols
and their reduction.
Anal. Lett. 9: 939-955, 1976.
129. Hilfrich, J., Hecht, S. S., and Hoffmann, D.
A Study of Tobacco Carcinogenesis. XV.
Effects of N'-nitrosornicotine and
N'-nitrosoanabasine in Syrian golden hamsters.
Cancer Lett. 2: 169-176, 1977.
130. Dong, M., Locke, D. C., and Hoffmann, D.
Separation of aza-arenes by high pressure liquid
chromatography.
J. Chromatogr. Sci. 15: 32-35, 1977.
131. Hoffmann, D., Dong, M., and Hecht, S. S.
Chemical Studies on Tobacco Smoke. LII.
Origin in tobacco smoke of N'-nitrosornicotine, a
tobacco-specific carcinogen: Brief Communication.
J. Natl. Cancer Inst. 58: 1841-1844, 1977.
132. Weiss, L., Loy, M., Hecht, S. S., and Hoffmann, D.
A Study of Chemical Carcinogenesis. IV.
Synthesis of the carbon-14 labelled carcinogens
5-methylchrysene, 2-methylaniline, and
3-methyl-2-naphthylamine.
J. Labelled Compd. Radiopharm. 14: 191-131, 1978.
133. Dong, M., Locke, D. C., and Hoffmann, D.
Characterization of aza-arenes in the basic organic
portion of suspended particulate matter.
Environ. Sci. Technol. 11: 612-618, 1977.
134. Dong, M., Hoffmann, D., Locke, D. C., and Ferrand, E.
Short Communication: The occurrence of caffeine in the
air of New York City.
Atmos. Environ. 11: 651-653, 1977.

135. Hoffmann, D., Schmeltz, I., Hecht, S. S., and Wynder, E. L. Polynuclear aromatic hydrocarbons in tobacco carcinogenesis. In: "Polycyclic Hydrocarbons and Cancer, Vol. I "Chemistry, Molecular Biology and Environment." (G. Gelboin and P.O. Ts'o, eds.) Academic Press, New York, 1978, pp. 85-117.
136. Hecht, S. S., Loy, M., Mazzaresse, R., and Hoffmann, D. A Study of Chemical Carcinogenesis. 5. On the carcinogenicity of 5-methylchrysene: structure-activity studies and metabolism. In: "Polycyclic Hydrocarbons and Cancer," Vol. I (H. Gelboin and P.O. Ts'o, eds.) Academic Press, New York.
137. Hecht, S. S., Chen, C. B., Dong, M., Orna, R. M., Hoffmann, D. and Ts'o, T. C. Chemical Studies on Tobacco Smoke. LI. Studies on non-volatile nitrosamines in tobacco. Beitr. Tabakforsch. 9: 1-6, 1977.
138. Hecht, S. S., Chen, C. B., and Hoffmann, D. A Study of Chemical Carcinogenesis. 6. Evidence for metabolic α -hydroxylation of N-nitrosopyrrolidine. Cancer Res. 38: 215-218, 1978.
139. Brunneemann, K. D., Yu, L., and Hoffmann, D. Assessment of carcinogenic volatile N-nitrosamines in tobacco and in mainstream and sidestream smoke from cigarettes. Cancer Res. 37: 3218-3222, 1977.
140. Wynder, E. L., and Hoffmann, D. Tobacco and Health. A societal challenge. New Engl. J. Med. 300: 894-903, 1979.
141. Hecht, S. S., Chen, C. B., Orna, R. M., Jacobs, E., Adams, J. D., and Hoffmann, D. Chemical Studies on Tobacco Smoke. LVII*. Reaction of nicotine and sodium nitrite: Formation of nitrosamines and fragmentation of the pyrrolidine ring. J. Org. Chem. 43: 72-76, 1978.
142. Schmeltz, I., Wenger, A., Hoffmann, D., and Tso, T.C. Chemical Studies on Tobacco Smoke. LVIII. Use of radioactive tobacco isolates for studying the formation of smoke components. J. Agr. Food Chem. 26: 234-239, 1978.
143. Dong, M., Schmeltz, I., and Hoffmann, D. Purification of quinolines for bioassay by preparative high pressure liquid chromatography. J. Chromatogr. 150: 269-272, 1978.
144. Brunneemann, K. D., and Hoffmann, D. Chemical Studies on Tobacco Smoke. LIX. Analysis of volatile nitrosamines in tobacco smoke and polluted indoor environments. Int. Agency Res. Cancer Sci. Publ. No. 19, 343-356, 1978.
145. Dong, M., Schmeltz, I., Jacobs, E., and Hoffmann, D. Chemical Studies on Tobacco Smoke LV. Aza-arenes in cigarette smoke. J. Anal. Toxicol. 2: 21-25, 1978.
146. Hecht, S. S., Chen, C. B., Orna, R. M., Hoffmann, D., and Tso, T. C. Chemical Studies on Tobacco Smoke. LVI. Tobacco specific nitrosamines: origins, carcinogenicity and metabolism. Int. Agency Res. Cancer Sci. Publ. No. 19, 395-413, 1978.
147. Hilfrich, J., Schmeltz, I., and Hoffmann, D. Effects of N'-nitrosodiethanolamine and 1,1-diethanolhydrazine in Syrian golden hamsters. Cancer Lett. 4: 55-60, 1978.
148. Toth, B., Wallcave, L., Patil, K., Schmeltz, I., and Hoffmann, D. Induction of tumors in mice with the herbicide succinic acid 2,2-dimethylhydrazide. Cancer Res. 37: 3497-3500, 1977.
149. Hecht, S. S., Schmeltz, I., and Hoffmann, D. Chemical Studies on Tobacco Smoke. LVIII. Nitrogenous compounds in cigarette smoke and their possible precursors. Recent Adv. Tobacco Sci. 3: 59-63, 1977.
150. Hecht, S. S., Loy, M., Mazzaresse, R., and Hoffmann, D. A Study of Chemical Carcinogenesis. 7. Synthesis and mutagenicity of modified chrysenes related to the carcinogen, 5-methylchrysene. J. Med. Chem. 21: 38-44, 1978.

151. Hecht, S. S., Hirota, N., Loy, M., and Hoffmann, D.
A Study of Chemical Carcinogenesis. 8.
Tumor initiating activity of fluorinated
5-methylchrysenes.
Cancer Res. 38: 1694-1698, 1978.
152. Brunnemann, K. D., Adams, J. D., Ho, D.P.S., and
Hoffmann, D.
The influence of tobacco smoke on indoor atmospheres
II. Volatile and tobacco-specific nitrosamines in
main- and sidestream smoke and their contribution to
indoor pollution. Proc. 4th Joint Conf. on Sensing of
Environ. Pollutants, New Orleans, LA., 1978, pp.
876-880.
153. Schmeltz, I., Tosk, J., Hilfrich, H., Hirota, N.,
Hoffmann, D., and Wynder, E. L.
Bioassays of naphthalene and alkylnaphthalene for
co-carcinogenic activity. Relation to tobacco
carcinogenesis. In: "Carcinogenesis - A Comprehensive
Survey" Vol. 3, (R.W. Jones and R.I. Freudenthal,
eds.), Raven Press, New York, 1978, pp. 47-60.
154. Dong, M., Schmeltz, I., LaVoie, E., and Hoffmann, D.
Aza-arenes in the respiratory environment: Analysis
and assays for mutagenicity. In: "Carcinogenesis - A
Comprehensive Survey" Vol. 3, (R.W. Jones and R.I.
Freudenthal, eds.) Raven Press, New York, 1978, pp.
97-108.
155. Hoffmann, D. and Wynder, E. L.
The less harmful cigarette: Present and future.
World Smoking and Health, Vol. 2, No. 2, Am. Cancer
Soc. 1977, pp. 30-34.
156. Hoffmann, D., and Wynder, E. L.
Identification and reduction of carcinogens in the
respiratory environment.
Zentralbl. Bakteriologie, Parasitenkd., Infektionskr.,
Hyg., Abt. I, Orig. Reihe B 166, 1978, pp. 113-135.
157. Hecht, S. S., Carmella, S., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. LIV.
Determination of hydroxybenzyl alcohols and
hydroxyphenyl ethanols in tobacco and tobacco smoke.
J. Anal. Toxicol. 2: 56-59, 1978.
158. Hoffmann, D. Hecht, S. S., Schmeltz, I., and
Wynder, E. L.
Polynuclear aromatic hydrocarbons: Occurrence,
formation and carcinogenicity. Proc. Symp.
"Structural Correlates of Carcinogenesis and
Mutagenesis: A Guide to Testing Priorities." FDA,
Annapolis, MD., 1977, pp. 120-128.
159. Schmeltz, I., Hoffmann, D., and Toth, B.
Hydrazines: Occurrence, analysis and carcinogenic
activity as related to structure. Proc. Symp.
"Structural Correlates of Carcinogenesis and
Mutagenesis: A Guide to Testing Priorities." FDA,
Annapolis, MD., 1977, pp.172-178.
160. Hoffmann, D., Rivenson, A., Hecht, S. S., Hilfrich, J.,
Kobayashi, N., and Wynder, E. L.
Model studies in tobacco carcinogenesis with the
Syrian golden hamster.
Prog. Exp. Tumor Res. 24: 370-390 Karger, Basel,
1979.
161. Hecht, S.S., Chen, C.B., Hirota, N., Orna, R.M., Tso,
T.C., and Hoffmann, D.
A Study of Tobacco Carcinogenesis. XVI. Tobacco-
specific nitrosamines: Formation from nicotine in
vitro and during tobacco curing and carcino-
genicity in strain A. mice.
J. Natl. Cancer Inst. 60: 819-824, 1978.
162. Wynder, E.L., Hoffmann, D., McCoy, G.D., Cohen, L.A.,
and Reddy, B.S.
Tumor promotion and cocarcinogenesis as related to
man and his environment. In "Carcinogenesis - A
Comprehensive Survey, Vol. II, Mechanisms of Tumor
Promotion and Cocarcinogenesis." (.J. Slaga, A.
Sivak, and R.K. Boutwell, eds.) Raven Press, New
York, 1978, pp 59-77.
163. Hecht, S.S., LaVoie, E., Mazzaresse, R., Amin, S.,
Bedenko, V., and Hoffmann, D.
1,2-Dihydro-1,2-dihydroxy-5-methylchrysene, a
major activated metabolite of the environmental
carcinogen, 5-methylchrysene.
Cancer Res. 38: 2191-2194, 1978.
164. Brunnemann, K.D., Stahnke, G., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. LXI. Volatile
pyridines: Quantitative analysis in mainstream
and sidestream smoke of cigarettes and cigars.
Anal. Lett. A-11 (7), 545-560, 1978.

165. Schmeltz, I., Chiong, K.G., and Hoffmann, D.
Formation and determination of ethyl carbamate in tobacco and tobacco smoke.
J. Anal. Toxicol. 2: 265-268, 1978.
166. Hecht, S.S., Chen, C.B., McCoy, G.D., and Hoffmann, D.
A Study of Tobacco Carcinogenesis. XVII. Tobacco specific nitrosamines: Occurrence, carcinogenicity, and metabolism.
American Chemical Society Symp. Ser. 101, 125-152, 1979.
167. Hecht, S.S., Chen, C.B., and Hoffmann, D.
A Study of Tobacco Carcinogenesis. XVIII. Tobacco specific nitrosamines: Occurrence, formation, carcinogenicity, and metabolism.
Acc. Chem. Res. 12: 92-98, 1979.
168. Chen, C. B., McCoy, G. D., Hecht, S. S., Hoffmann, D., and Wynder, E. L.
A Study of Chemical Carcinogenesis. 10. High pressure liquid chromatographic assay for α -hydroxylation of N-nitrosopyrrolidine by isolated rat liver microsomes.
Cancer Res. 38: 3812-3816, 1978.
169. Chen, C. B., Hecht, S. S., and Hoffmann, D.
A Study of Chemical Carcinogenesis. 11. Metabolic α -hydroxylation of the tobacco-specific carcinogen N'-nitrososornicotine.
Cancer Res. 38: 3639-3645, 1978.
170. Hecht, S.S., Hirota, N., and Hoffmann, D.
A Study of Chemical Carcinogenesis. 12. Comparative tumor initiating activity of 10-methylbenzo(a)pyrene, 7,10-dimethylbenzo(a)pyrene and benzo(a)pyrene.
Cancer Letters 5: 179-183, 1978.
171. Hecht, S.S., LaVoie, E., and Hoffmann, D.
A Study of Chemical Carcinogenesis. 13. Structure-activity relationships in polynuclear aromatic hydrocarbons. Proc. of the Lawrence Berkeley Laboratory Conference on Carbonaceous Particles in the Atmosphere, (T. Novakov, ed.) Natl. Techn. Inform. Serv., U.S. Dept. Commerce, Springfield, VA., 177-186, 1979.
172. Hoffmann, D., Adams, J.D., Brunneemann, K.D., and Hecht, S.S.
Chemical Studies on Tobacco Smoke. LXII. Assessment of tobacco-specific N-nitrosamines in tobacco products.
Cancer Res. 39: 2505-2509, 1979.
173. Schmeltz, I., Brunneemann, K.D., and Hoffmann, D.
Trace analysis in agricultural products: Methods for hydrazines, carbamates, N-nitrosodiethanolamine, and other compounds. In: "Trace Organic Analysis: A New Frontier in Analytical Chemistry", (H.S. Hertz, and S.N. Chester, eds.), Natl. Bureau of Standards Special Publ. No. 519, U.S. Govt. Printing Office, (No. 003-003-02054-1), Washington, D.C., 1979, pp. 297-309.
174. Hoffmann, D., Brunneemann, K.D., Schmeltz, I. and Wynder, E.L.
Trace analysis in respiratory carcinogenesis. In: "Trace Organic Analysis: A New Frontier in Analytical Chemistry", (H.S. Hertz, and S.N. Chester, eds.), Natl. Bureau of Standards Special Publ. No. 519, U.S. Govt. Printing Office (No. 003-003-02054-1), Washington, D.C., 1979, pp. 131-141.
175. Schmeltz, I., Brunneemann, K.D., and Hoffmann, D.
Aza-arenes and other nitrogen-containing compounds in the respiratory environment. Proc. AIChE Symp. Ser. 196: 312-320, 1980.
176. LaVoie, E., Tulley, L., Pow, E. and Hoffmann, D.
Mutagenicity of Aminophenyl and Nitrophenyl Ethers, Sulfides, and Disulfides.
Mutat. Res. 67: 123-131, 1979.
177. Tosk, J., Schmeltz, I., and Hoffmann, D.
Hydrazines as Mutagens in a Histidine-Requiring Auxotroph of *Salmonella typhimurium*.
Mutat. Res. 66: 247-252, 1979.
178. Hecht, S.S., Mazzaresse, R., Amin, S., LaVoie, E. and Hoffmann, D.
A Study of Chemical Carcinogenesis 15. On the Metabolic Activation of 5-Methylchrysene. "Polynuclear Aromatic Hydrocarbons", (P.W. Jones and P. Leber, eds.), Ann Arbor Sci. Publ., Ann Arbor, MI, 733-752, 1979.

179. LaVoie, E., Bedenko, V., Hirota, N., Hecht, S.S. and Hoffmann, D.
A Comparison of the Mutagenicity, Tumor-Initiating Activity and Complete Carcinogenicity of Polynuclear Aromatic Hydrocarbons. In "Polynuclear Aromatic Hydrocarbons", (P.W. Jones and P. Leber, eds.), Ann Arbor Sci. Publ., Ann Arbor, MI, 705-721, 1979.
180. Schmeltz, I., Wenger, A., Hoffmann, D. and Tso, T.C.
Chemical Studies on Tobacco Smoke LXIII. On the Fate of Nicotine During Pyrolysis and in a Burning Cigarette.
J. Agr. Food Chem. 27, 602-608, 1979.
181. Hecht, S.S., LaVoie, E., Mazzaresse, R., Hirota, N., Ohmori, T. and Hoffmann, D.
A Study of Chemical Carcinogenesis 16. Comparative Mutagenicity, Tumor-Initiating Activity, Carcinogenicity, and In Vitro Metabolism of Fluorinated 5-Methylchrysenes.
J. Natl. Cancer Inst. 63: 855-861, 1979.
182. Hoffmann, D., Adams, J.D. and Wynder, E.L.
Chemical Studies on Tobacco Smoke XLV. Formation and Analysis of Carbon Monoxide in Cigarette Mainstream and Sidestream Smoke.
Prev. Med. 8: 344-350, 1979.
183. Patrianakos, C., and Hoffmann, D.
Chemical Studies on Tobacco Smoke. LXIV. On the analysis of aromatic amines in cigarette smoke.
J. Anal. Toxicol. 3: 150-154, 1979.
184. Wynder, E.L. and Hoffmann, D.
Smoking and Health: Pathogenic and Preventive Considerations.
Bull. Schweiz. Akad. Med. Wiss. 35: 83-98, 1979.
185. Wynder, E.L. and Hoffmann, D.
Rauchen und Gesundheit. Die Epidemiologie tabakbedingter Erkrankungen.
Therapiewoche 29: 8747-8857, 1979.
186. Hecht, S.S., Chen, C.B., McCoy, G.D., Hoffmann, D. and Domellöf, L.
A Study of Chemical Carcinogenesis. 18. α -Hydroxylation of N-Nitrosopyrrolidine and N'-nitrosonornicotine by Human Liver Microsomes.
Cancer Letters 8: 35-41, 1979.
187. Amin, S., Hecht, S.S., LaVoie, E., and Hoffmann, D.
A Study of Chemical Carcinogenesis. 19. Synthesis and Mutagenicity of 5,11-Dimethylchrysene and Some Methyl-Oxidized Derivatives of 5-Methylchrysene.
J. Med. Chem. 22: 1336-1340, 1979.
188. Hecht, S.S., Amin, S., Rivenson, A. and Hoffmann, D.
A Study of Chemical Carcinogenesis. 20. Tumor Initiating Activity of 5,11-Dimethylchrysene, 5,12-Dimethylchrysene and 5-Methylchrysene.
Cancer Letters 8: 65-70, 1979.
189. Hecht, S.S., Chen, C.B., Ohmori, T., and Hoffmann, D.
A Study of Tobacco Carcinogenesis XIX. Comparative Carcinogenicity in F344 Rats of the Tobacco-Specific Nitrosamines, N'-Nitrosonornicotine and 4-(N-Methyl-N-Nitrosamino)-1-(3-Pyridyl)-1-Butanone.
Cancer Res. 40: 298-302, 1980.
190. Hoffmann, D., and Hecht, S.S.
Tobacco and tobacco smoke (volatile and tobacco-specific nitrosamines). In: H. Egan, R. Preussmann, I.K. O'Neill, G. Eisenbrand, B. Spiegelhalder, and H. Bartsch (eds.), Environmental Carcinogens Selected Methods of Analysis. Vol. 6 - N-Nitroso Compounds. IARC Sci. Publ. No. 45: 63-101, 1983.
191. Hoffmann, D. and Brunnemann, K.D.
Gas chromatography (GC) of volatile nitrosamines. GC-TEA of volatile nitrosamines from tobacco products. In: H. Egan, R. Preussmann, I.K. O'Neill, G. Eisenbrand, B. Spiegelhalder, and H. Bartsch (eds.), Environmental Carcinogens Selected Methods of Analysis. Vol. 6 - N-Nitroso Compounds. IARC Sci. Publ. No. 45: 363-366, 1983.
192. Schmeltz, I., Wenger, A., and Hoffmann, D.
TLC in the Analysis of the Respiratory Environment. (J.C. Touchstone and D. Rogers, eds.), J. Wiley and Sons, New York, 1980, pp. 325-347.
193. Hecht, S.S., Carmella, S., Mori, H., and Hoffmann, D.
A Study of Tobacco Carcinogenesis XX. Role of Catechol as a Major Cocarcinogen in the Weakly Acidic Fraction of Smoke Condensate.
J. Natl. Cancer Inst. 66: 163-169, 1981.
194. Hoffmann, D., Tso, T.C. and Gori, G.B.
The Less Harmful Cigarette.
Prev. Med. 9: 287-296, 1980.

195. Röhl, C., Adams, J.D. and Hoffmann, D.
Chemical Studies on Tobacco Smoke LXVI.
Comparative assessment of volatile and tobacco-specific N-nitrosamines in the smoke of selected cigarettes from the U.S.A., West Germany and France.
J. Anal. Toxicol. **4**: 255-259, 1980.
196. Wynder, E.L. and Hoffmann, D.
"Tobacco" Chapter 15, In: "Cancer Epidemiology and Prevention", (D. Schottenfeld and J.F. Fraumeni, Jr., eds.), Saunders, Philadelphia, PA. 1982, pp 277-292.
197. Hoffmann, D., Hecht, S.S. and Wynder, E.L.
The role of polynuclear aromatic hydrocarbons in tobacco carcinogenesis. Presented at the "Polycyclic Aromatic Hydrocarbons Conference" of the Verein Deutscher Ingenieure, Hannover, Federal Republic of Germany, Sept. 18-21, 1979.
VDI-Ber. **358**: 335-350, 1980.
198. Amin, S., Bedenko, V., LaVoie, E., Hecht, S.S. and Hoffmann, D.
Synthesis of dihydro diols as potential proximate carcinogens of benzofluoranthenes.
J. Org. Chem. **46**: 2573-2578, 1981.
199. LaVoie, E., Tulley, L., Bedenko, V., and Hoffmann, D.
Mutagenicity, tumor initiating activity and metabolism of tricyclic polynuclear aromatic hydrocarbons. In: "Polynuclear Aromatic Hydrocarbons: Chemistry and Biological Effects." A. Bjorseth and A.J. Dennis, eds., Battelle Press, Columbus, Ohio, 1980, pp. 1041-1057.
200. Hecht, S.S., LaVoie, E., Amin, S., Bedenko, V., and Hoffmann, D.
On the metabolic activation of the benzofluoranthenes. In: "Polynuclear Aromatic Hydrocarbons: Chemistry and Biological Effects." A. Bjorseth and A.J. Dennis, eds., Battelle Press, Columbus, Ohio, 1980, pp. 417-433.
201. Hoffmann, D., Chen, C.B., and Hecht, S.S.
The role of volatile and nonvolatile N-nitrosamines in tobacco carcinogenesis. Banbury Report 3: A Safe Cigarette? Cold Spring Harbor Laboratory Publ., Cold Spring Harbor, New York, 1980, pp. 113-127.
202. LaVoie, E.J., Hecht, S.S., Hoffmann, D. and Wynder, E.L.
The less harmful cigarette and tobacco smoke flavors. Banbury Report 3: A Safe Cigarette? Cold Spring Harbor Laboratory Publ., Cold Spring Harbor, New York, 1980, pp. 251-260.
203. Hoffmann, D., Adams, J.D., Piade, J.J. and Hecht, S.S.
Chemical Studies on Tobacco Smoke LXVIII.
Analysis of volatile and tobacco-specific nitrosamines in tobacco products. In: "N-Nitroso Compounds: Analysis, Formation and Occurrence," IARC Scientific Publications No. 31 (E.A. Walker, L. Griciute, M. Castegnaro, M. Börzsönyi, eds.) International Agency for Research on Cancer, Lyon, 1980, pp. 507-514.
204. Hecht, S.S., Chen, C.B., Young, R., Lin, D., and Hoffmann, D.
Metabolism of the tobacco-specific nitrosamines, N'-nitrosanornicotine and 4-(N-methyl-N-nitrosamino)-1-(3-pyridyl)-1-butanone. In: "N-Nitroso Compounds: Analysis, Formation and Occurrence," IARC Scientific Publications No. 31, (E.A. Walker, L. Griciute, M. Castegnaro, and M. Börzsönyi, eds.) International Agency for Research on Cancer, Lyon, 1980, pp. 755-763.
205. Chen, C.B., Hecht, S.S., McCoy, G.D., and Hoffmann, D.
Assays for metabolic α -hydroxylation of N'-nitrosanornicotine and N-nitrosopyrrolidine and the influence of modifying factors. In: "N-Nitroso Compounds: Analysis, Formation and Occurrence," IARC Scientific Publications No. 31, (E.A. Walker, L. Griciute, M. Castegnaro, and M. Börzsönyi, eds.) International Agency for Research on Cancer, Lyon, 1980, pp. 349-357.
206. Hecht, S.S., Rivenson, A., and Hoffmann, D.
Tumor-initiating activity of dihydrodiols formed metabolically from 5-methylchrysene.
Cancer Res. **40**: 1396-1399, 1980.
207. Rivenson, A., Ohmori, T., Hecht, S.S., and Hoffmann, D.
Organotropic carcinogenicity of tobacco specific N-nitrosamines. In: "Biology of the Cancer Cell", (K. Letnansky, ed.), Kugler Publ., Amsterdam, 1980 pp. 51-62.

208. Piade, J.J., and Hoffmann, D.
Chemical Studies on Tobacco Smoke LXVII.
Quantitative Determination of Alkaloids in Tobacco
by Liquid Chromatography.
J. Liquid Chromatog. 3: 1505-1515, 1980.
209. LaVoie, E.J., Tulley, L., Bedenko, V. and Hoffmann, D.
Mutagenicity of Methylated Fluorenes and
Benzofluorenes.
Mutat. Res. 91: 167-176, 1981.
210. Hecht, S.S., Carmella, S., and Hoffmann, D.
Chemical Studies on Tobacco Smoke VXX.
Quantitative Analysis of Alkyl-2-Hydroxy-
2-Cyclopenten-1-Ones in Tobacco Smoke.
J. Agr. Food. Chem. 29: 401-404, 1981.
211. El-Bayoumy, K., LaVoie, E.J., Hecht, S.S., Fow, E.A.,
and Hoffmann, D.
The influence of methyl substitution on the
mutagenicity of nitronaphthalenes and
nitrobiphenyls.
Mutat. Res. 81: 143-153, 1981.
212. Hoffmann, D. and Wynder, E.L.
Radioactivity in cigarette smoke.
New Engl. J. Med. 307: 312, 1982.
213. LaVoie, E.J., Hecht, S.S., Amin, S., Bedenko, V., and
Hoffmann, D.
Identification of mutagenic dihydrodiols as
metabolites of benzo(j)fluoranthene and
benzo(k)fluoranthene.
Cancer Res. 40: 4528-4532, 1980.
214. Hecht, S.S., Chen, C.B., and Hoffmann, D.
A Study of Chemical Carcinogenesis. 29.
Metabolic β -hydroxylation and N-oxidation of
N'-nitrosohornicotine.
J. Med. Chem. 23: 1175-1178, 1980.
215. Hecht, S.S., LaVoie, E.J., Bedenko, V., Hoffmann, D.,
Sardella, D.J., Boger, E. and Lehr, R.E.
A Study of Chemical Carcinogenesis. 32.
On the metabolic activation of dibenzo[a,i]pyrene
and dibenzo[a,h]pyrene. In: "Polynuclear Aromatic
Hydrocarbons: Chemical Analysis and Biological
Fate", (M. Cooke and A.J. Dennis, eds.), Battelle
Press, Columbus, Ohio, 1981, pp. 43-54.
216. Hoffmann, D. and Wynder, E.L.
The low yield cigarette. Editorial.
Am. J. Publ. Health 70: 1143-1144, 1980.
217. LaVoie, E.J., Tulley-Freiler, L., Bedenko, V., Girach,
Z., and Hoffmann, D.
Comparative studies on the tumor-initiating
activity and metabolism of methylfluorenes and
methylbenzofluorenes. In: "Polynuclear Aromatic
Hydrocarbons: Chemical Analysis and Biological
Fate", (M. Cooke and A.J. Dennis, eds.), Battelle
Press, Columbus, Ohio, 1981, pp. 417-427.
218. Hecht, S.S., Chen, C.B., Young, R. and Hoffmann, D.
Mass spectra of tobacco-specific nitrosamines,
their metabolites, and related compounds.
Beitr. Tabakforsch. 11: 57-66, 1981.
219. LaVoie, E.J., Rivenson, A., Bedenko, B., Kolb, E.,
Ohmori, T. and Hoffmann, D.
Carcinogenicity in Syrian golden hamsters of
N-nitrosamines formed during nitrosation of
spermidine.
Cancer Detection and Prevention 4: 79-84, 1981.
220. Amin, S., Hecht, S.S. and Hoffmann, D.
Synthesis of angular ring methoxy-5-
methylchrysenes.
J. Org. Chem. 46: 2394-2398, 1981.
221. Hoffmann, D. and Wynder, E.L.
Tobacco and tobacco smoke. A continuing public
health issue. Tobacco J. Internatl. (1): 83-85,
1982.
222. Hoffmann, D., Castonguay, A., Rivenson, A. and
Hecht, S.S.
Comparative carcinogenicity and metabolism of
4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone and
N'-nitrososornicotine in Syrian golden hamsters.
Cancer Res. 41: 2386-2393, 1981.

223. LaVoie, E.J., Tulley-Freiler, L., Bedenko, V. and Hoffmann, D.
Mutagenicity, tumor initiating activity and metabolism of methylphenanthrenes.
Cancer Res. 41: 3441-3447, 1981.
224. Melikian, A., LaVoie, E.J., Hoffmann, D. and Wynder, E.L.
Volatile nitrosamines: analysis in breast fluid and blood of nonlactating women.
Food Cosm. Toxicol. 19: 757-759, 1981.
225. LaVoie, E.J., Govil, A., Briggs, G. and Hoffmann, D.
Mutagenicity of aminocarbazoles and nitrocarbazoles.
Mutat. Res. 90: 337-344, 1981.
226. Hecht, S.S., LaVoie, E.J., Bedenko, V., Pingaro, L., Katayama, S., Hoffmann, D., Sardella, D.J., Boger, E. and Lehr, R.E.
Reduction of tumorigenicity and of dihydrodiol formation by fluorine substitution in the angular rings of dibenzo[a,1]pyrene.
Cancer Res. 41: 4341-4345, 1981.
227. LaVoie, E.J., Hecht, S.S. and Hoffmann, D.
Molecular basis for the structure-carcinogenicity relationships of polynuclear aromatic hydrocarbons. In: L. Golberg (ed.), *Structure-Activity Correlation as a Predictive Tool in Toxicology. Fundamentals, Methods, and Application.* Hemisphere Publishing Corp., New York, NY, 1983, pp. 263-274.
228. LaVoie, E.J., Briggs, G., Bedenko, V. and Hoffmann, D.
Mutagenicity of substituted carbazoles towards *Salmonella typhimurium*.
Mutat. Res. 101: 141-150, 1982.
229. Hoffmann, D., Adams, J.D. Brunnemann, K.D. and Hecht, S.S.
Formation, occurrence and carcinogenicity of N-nitrosamines in tobacco products. In: *N-Nitroso Compounds*, (R.A. Scanlan and S.R. Tannenbaum, eds.), ACS Symp. Ser. 174: 247-273, 1981.
230. Hecht, S.S., McCoy, G.D., Chen, B.C. and Hoffmann, D.
The metabolism of cyclic nitrosamines. In: *N-Nitroso Compounds*, (R.A. Scanlan and S.R. Tannenbaum, eds.), ACS Symp. Ser. 174: 49-75, 1981.
231. Hoffmann, D. and Adams, J.D.
A Study of Tobacco Carcinogenesis XXIII. Carcinogenic tobacco-specific N-nitrosamines in snuff and in the saliva of snuff dippers.
Cancer Res. 41: 4305-4308, 1981.
232. Brunnemann, K.D. and Hoffmann, D.
Chemical Studies on Tobacco Smoke LXIX. Assessment of the carcinogenic N-nitrosodiethanolamine in tobacco products and tobacco smoke.
Carcinogenesis 2: 1123-1127, 1981.
233. Hecht, S.S., Young, R., Rivenson, A. and Hoffmann, D.
On the metabolic activation of N-nitrosomorpholine and N'-nitrososornicotine: effects of deuterium substitution. In: H. Bartsch, I.K. O'Neill, M. Castegnaro, M. Okada and L. Davis, eds., *N-Nitroso Compounds: Occurrence and Biological Effects.* Lyon, France, IARC Sci. Publ. 41: 499-507, 1982.
234. LaVoie, E.J., Amin, S., Hecht, S.S., Furuya, K., and Hoffmann, D.
A Study of Chemical Carcinogenesis 38. Tumor-initiating activity of dihydrodiols of benzo(b)fluoranthene, benzo(j)fluoranthene, and benzo(k)fluoranthene.
Carcinogenesis 3: 49-52, 1982.
235. Melikian, A.A., LaVoie, E.J., Hecht, S.S., and Hoffmann, D.
Influence of a bay region methyl group on formation of 5-methylchrysene dihydrodiol epoxide: DNA adducts in mouse skin.
Cancer Res. 42: 1239-1242, 1982.
236. Hoffmann, D., Brunnemann, K.D., Rivenson, A., and Hecht, S.S.
N-Nitrosodiethanolamine: analysis, formation in tobacco products and carcinogenicity in Syrian golden hamsters. In: H. Bartsch, I.K. O'Neill, M. Castegnaro, M. Okada and L. Davis, eds., *N-Nitroso Compounds: Occurrence and Biological Effects.* Lyon, France, IARC Sci. Publ. 41: 299-308, 1982.
237. Tso, T.C., Chaplin, J.F., Adams, J.D., and Hoffmann, D.
Simple correlation and multiple regression among leaf and smoke characteristics of Burley tobaccos.
Beitr. Tabakforsch. Internatl. 11: 141-150, 1982.

238. Hoffmann, D., Adams, J.D., Brunnemann, K.D., Rivenson, A., and Hecht, S.S.
Tobacco specific N-nitrosamines: occurrence and bioassays. In: H. Bartsch, I.K. O'Neill, M. Castegnaro, M. Okada and L. Davis, eds., N-Nitroso Compounds: Occurrence and Biological Effects. Lyon, France, IARC Sci. Publ. 41: 309-318, 1982.
239. Adams, J.D., LaVoie, E.J., and Hoffmann, D.
Analysis of methylated polynuclear aromatic hydrocarbons by capillary gas chromatography. Influence of temperature on the pyrosynthesis of anthracene, phenanthrene, and their methylated derivatives. J. Chromatog. Sci. 20: 274-277, 1982.
240. Hoffmann, D. and Hoffmann, I.
Oncology Overview on Organ Specific Carcinogenicity of Tobacco Products:
1. Epidemiology of Non-Respiratory Tract Cancer and Related Clinical Observations. Internatl. Cancer Res. Data Bank PB80-922907, U.S. Dept. H.H.S., 1980.
241. Hoffmann, D. and Hoffmann, I.
Oncology Overview on Organ Specific Carcinogenicity of Tobacco Products: 2. Bioassays, physicochemical analysis, and other experimental evidence. Internatl. Cancer Res. Data Bank PB81-922902, U.S. Dept. H.H.S., 1981.
242. Hoffmann, D., Hecht, S.S., and Wynder, E.L.
Tumor promoters and cocarcinogens in tobacco carcinogenesis. Environ. Health Perspectives 50: 247-257, 1983.
243. Hoffmann, D. and Hoffmann, I.
"Experimental Carcinogenesis with Tobacco Products". Part III. In "Health Consequences of Smoking - Cancer." A Report of the Surgeon General. U.S. Department of Health and Human Services, Washington, D.C., 1982. DHHS (PHS) 82-50179.
244. Hoffmann, D., LaVoie, E.J., and Hecht, S.S.
Polynuclear aromatic hydrocarbons: effect of chemical structure on tumorigenicity. In: "Polynuclear Aromatic Hydrocarbons: Physical and Biological Chemistry", (M. Cooke, A.J. Dennis, and G.L. Fisher, eds.), Battelle Press, Columbus, OH, 1982, 1-19.
245. LaVoie, E.J., Hecht, S.S., Bedenko, V., and Hoffmann, D.
Identification of the mutagenic metabolites of fluoranthene, 2-methylfluoranthene, and β -methylfluoranthene. Carcinogenesis 3: 841-846, 1982.
246. Hoffmann, D., Wynder, E.L., Rivenson, A., LaVoie, E.J., and Hecht, S.S.
Skin Bioassays in Tobacco Carcinogenesis. Progress in Experimental Tumor Research, Vol. 26, Skin Painting Techniques and *in vivo* Carcinogenesis Bioassays, (F. Romburger, ed.), Karger, Basel, 1983, pp. 43-67.
247. LaVoie, E.J., Tulley-Freiler, L., Bedenko, V., and Hoffmann, D.
Mutagenicity of substituted phenanthrenes in *Salmonella typhimurium*. Mutat. Res. 116: 91-102, 1983.
248. LaVoie, E.J., Bedenko, V., Tulley-Freiler, L., and Hoffmann, D.
Tumor-initiating activity and metabolism of polymethylated phenanthrenes. Cancer Res. 42: 4045-4049, 1982.
249. Rivenson, A., Furuya, K., Hecht, S.S., and Hoffmann, D.
Experimental nasal cavity tumors induced by tobacco-specific nitrosamines. In: G. Reznik (ed.), Nasal Tumors in Animals and Man, Vol. 3, pp. 79-113, CRC Press, Inc., Boca Raton, FL, 1983.
250. Hecht, S.S., Castonguay, A., and Hoffmann, D.
Nasal cavity carcinogens: possible routes of metabolic activation. In: G. Reznik (ed.), Nasal Tumors in Animals and Man, Vol. 3, pp. 201-232, CRC Press, Inc., Boca Raton, FL, 1983.
251. Gutenmann, W.H., Bache, C.A., Lisk, D.J., Hoffmann, D., Adams, J.D., and Elfving, C.
Cadmium and nickel in smoke of cigarettes prepared from tobacco cultured on municipal sludge-amended soil. J. Tox. Environ. Health 10: 423-431, 1982.

252. Hoffmann, D., Adams, J.D., and Haley, N.J.
Chemical Studies on Tobacco Smoke LXXVI.
Reported cigarette smoke values: a closer look.
Amer. J. Public Health 73: 1050-1053, 1983.
253. Brunnemann, K.D., Scott, J.C., and Hoffmann, D.
N-Nitrosomorpholine and other volatile N-nitrosamines in snuff tobacco.
Carcinogenesis 3: 693-696, 1982.
254. Hoffmann, D., Brunnemann, K.D., Adams, J.D., Rivenson, A., and Hecht, S.S.
N-Nitrosamines in tobacco carcinogenesis.
Banbury Report 12: "Nitrosamines and Human Cancer", Cold Spring Harbor Laboratory Publ., Cold Spring Harbor, N.Y., 211-225, 1982.
255. Hecht, S.S., Castonguay, A., Chung, F.-L., Hoffmann, D., and Stoner, G.D.
Recent studies on the metabolic activation of cyclic nitrosamines. Banbury Report 12: "Nitrosamines and Human Cancer", Cold Spring Harbor Laboratory Publ., Cold Spring Harbor, N.Y., 103-120, 1982.
256. El-Bayoumy, K., Hecht, S.S., and Hoffmann, D.
A Study of Chemical Carcinogenesis. 46.
Comparative tumor initiating activity on mouse skin of 6-nitrobenzo[a]pyrene, 6-nitrochrysene, 3-nitroperylene, 1-nitropyrene and their parent hydrocarbons.
Cancer Letters 16: 333-337, 1982
257. Brunnemann, K.D., Hecht, S.S., and Hoffmann, D.
Chemical Studies on Tobacco Smoke LXXIV.
N-Nitrosamines: Environmental occurrence, in vivo formation and metabolism.
J. Toxicol. - Clin. Toxicol. 19: 661-668, 1982.
258. Adams, J.D., Lee, S.J., Vinchkoski, N., Castonguay, A., and Hoffmann, D.
Chemical Studies on Tobacco Smoke LXXIII.
On the formation of the tobacco-specific carcinogen 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone during smoking.
Cancer Letters 17: 339-346, 1983.
259. Adams, J.D., Brunnemann, K.D., and Hoffmann, D.
Chemical Studies on Tobacco Smoke LXXV.
Rapid method for the analysis of tobacco specific N-nitrosamines by GLC-TEA.
J. Chromatography 256: 347-351, 1983.
260. Brunnemann, K.D. and Hoffmann, D.
Chemical Studies on Tobacco Smoke LXXIV.
Pyrolytic origins of major gas phase constituents of cigarette smoke.
Recent Advan. Tobacco Sci. 8: 103-140, 1982.
261. Hoffmann, D., Hecht, S.S., Haley, N.J., Brunnemann, K.D., Adams, J.D., and Wynder, E.L.
Tobacco carcinogenesis: Metabolic studies in human. In: "Human Carcinogenesis", (J. Autrup, ed.), Academic Press, New York, NY., 1983. In press.
262. Wenke, G. and Hoffmann, D.
A Study of Betel Quid Carcinogenesis 1. On the in vitro N-nitrosation of arecoline.
Carcinogenesis 4: 169-172, 1983.
263. Rice, J.E., LaVoie, E.J., and Hoffmann, D.
Synthesis of the isomeric phenols and trans-2,3-dihydrodiol of fluoranthene.
J. Org. Chem. 48: 2360-2363, 1983.
264. Adams, J.D., Brunnemann, K.D., Hecht, S.S., Hoffmann, D., and Tao, T.C.
Biogenesis and chemistry of alkaloid derived N-nitrosamines.
Presented at the 184th National American Chemical Society Meeting, Kansas City, MO, Sep. 12-17, 1982.
265. LaVoie, E.J., Shigematsu, A., and Hoffmann, D.
Aromatic amines and N-heterocyclics in tobacco distillates.
Presented at the 184th National American Chemical Society Meeting, Kansas City, MO, Sep. 12-17, 1982.
266. Brunnemann, K.D., Scott, J.C., and Hoffmann, D.
N-Nitrosoproline, an indicator for N-nitrosation of amines in processed tobacco.
J. Agric. Food Chem. 31: 905-909, 1983.

267. Rice, J.E., Bedenko, V., LaVoie, E.J., and Hoffmann, D. Studies on the metabolism of fluoranthene, 2-methylfluoranthene, and 3-methylfluoranthene. Presented at the 7th International Symp. on Polynuclear Aromatic Hydrocarbons, Columbus, OH, Oct. 26-28, 1982.
268. LaVoie, E.J., Coleman, D.T., Tonne, R.L., and Hoffmann, D. Mutagenicity, tumor initiating activity and metabolism of methylated anthracenes. Presented at the 7th International Symp. on Polynuclear Aromatic Hydrocarbons, Columbus, OH, Oct. 26-28, 1982.
269. Adams, E.A., LaVoie, E.J., and Hoffmann, D. Mutagenicity and metabolism of azaphenanthrenes. Presented at the 7th International Symp. on Polynuclear Aromatic Hydrocarbons, Columbus, OH, Oct. 26-28, 1982.
270. Melikian, A.A., LaVoie, E.J., Hecht, S.S., and Hoffmann, D. On the enhancing effect of a bay-region methyl group in 5-methylchrysene carcinogenesis. Presented at the 7th International Symp. on Polynuclear Aromatic Hydrocarbons, Columbus, OH, Oct. 26-28, 1982.
271. Hoffmann, D., Rivenson, A., Adams, J.D., Juchatz, A., Vinchkoaki, N., and Hecht, S.S. A Study of Tobacco Carcinogenesis. XXIV. Effects of route of administration and dose on the carcinogenicity of N-nitrosodiethanolamine in the Syrian golden hamster. *Cancer Res.* **43**: 2521-2524, 1983.
272. Hecht, S.S., Castonguay, A., Rivenson, A., Mu, B., and Hoffmann, D. Tobacco specific nitrosamines: carcinogenicity, metabolism, and possible role in human cancer. *J. Environ. Sci. Health C1* (1): 1-54, 1983.
273. LaVoie, E.J., Adams, E.A., and Hoffmann, D. Identification of the metabolites of benzo(f)-quinoline and benzo(h)quinoline formed by rat liver homogenate. *Carcinogenesis* **4**: 1133-1138, 1983.
274. Melikian, A.A., LaVoie, E.J., Hecht, S.S., and Hoffmann, D. 5-Methylchrysene metabolism in mouse epidermis *in vivo*, diol epoxide-DNA adduct persistence, and diol epoxide reactivity with DNA as potential factors influencing the predominance of 5-methylchrysene-1,2-diol-3,4-epoxide-DNA adducts in mouse epidermis. *Carcinogenesis* **4**: 843-849, 1983.
275. Adams, J.D., LaVoie, E.J., Shigematsu, A., Owens, P., and Hoffmann, D. Quinoline and methylquinolines in cigarette smoke: Comparative data and the effect of filtration. *J. Anal. Toxicol.*, 1983. In press.
276. Carmella, S.G., Hecht, S.S., and Hoffmann, D. Pyrolysis studies on the formation of catechol in cigarette smoke. *J. Agric. Food Chem.*, 1983. Submitted.
277. Carmella, S.G., Hecht, S.S., Hoffmann, D., and Tso, T.C. Identification of cellulose as a major precursor to catechol in cigarette smoke. *J. Agric. Food Chem.*, 1983. Submitted.
278. LaVoie, E.J., Adams, E.A., Shigematsu, A., and Hoffmann, D. On the metabolism of quinoline and isoquinoline: possible molecular basis for differences in biological activities. *Carcinogenesis* **4**: 1169-1173, 1983.
279. Hecht, S.S., Adams, J.D., Numoto, S., and Hoffmann, D. A Study of Tobacco Carcinogenesis. XXV. Induction of respiratory tract tumors in Syrian golden hamsters by a single dose of 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK) and the effect of smoke inhalation. *Carcinogenesis*, 1983. In press.

280. Hoffmann, D. and Brunnemann, K.D.
A Study of Tobacco Carcinogenesis. XXVI.
On the endogenous formation of N-nitrosoproline in
cigarette smokers.
Cancer Res., 1983. In press.
281. Brunnemann, K.D., Masaryk, J., and Hoffmann, D.
The role of tobacco stems in the formation of
N-nitrosamines in tobacco and cigarette mainstream
and sidestream smoke.
J. Agric. Food Chem., 1983. In press.
282. Wynder, E.L., Goodman, M.T., and Hoffmann, D.
Epidemiologic aspects of the low-yield cigarette.
J. Natl. Cancer Inst., 1983. Submitted.
283. Tso, T.C., Adams, J.D., Haley, N.J., and Hoffmann, D.
The Smokers' dependence on nicotine and the fate
of nicotine during tobacco curing and smoking and
its reduction.
Proceedings of the 5th World Conference on Smoking
and Health, Winnipeg, Canada, July 10th-15th,
1983.
284. Hoffmann, D., Brunnemann, K.D., Adams, J.D., and
Hecht, S.S.
Formation and analysis of N-nitrosamines in tobac-
co products and their endogenous formation in
tobacco consumers.
Presented at the 8th Internatl. Meeting on
N-Nitroso Compounds: Occurrence and Biological
Effects, Banff, Alberta, Canada, Sept. 4-9, 1983.
285. Hecht, S.S., Castonguay, A., Chung, F-L., and
Hoffmann, D.
Carcinogenicity and metabolic activation of tobac-
co-specific nitrosamines: current status and
future prospects.
Presented at the 8th Internatl. Meeting on
N-Nitroso Compounds: Occurrence and Biological
Effects, Banff, Alberta, Canada, Sept. 4-9, 1983.
286. Adams, J.D., Lee, S.J., and Hoffmann, D.
Carcinogenic agents in cigarette smoke and the
influence of nitrate on their formation.
Carcinogenesis, 1983. Submitted.
287. Wenke, G., Rivenson, A., Brunnemann, K.D., and
Hoffmann, D.
A Study of Betel Quid Carcinogenesis II.
On the Formation of N-nitrosamines during betel
quid chewing.
Proc. 8th Internatl. Meeting on N-Nitroso
Compounds - Occurrence and Biological Effects,
Banff, Alberta, Canada, Sept. 4-9, 1983.
288. Brunnemann, K.D., Scott, J.C., Haley, N.J., and
Hoffmann, D.
On the endogenous formation of N-nitrosoproline
upon cigarette smoke inhalation.
Proc. 8th Internatl. Meeting on N-Nitroso
Compounds - Occurrence and Biological Effects,
Banff, Alberta, Canada, Sept. 4-9, 1983.
289. Adams, J.D., LaVoie, E.J., O'Donnell, M., and
Hoffmann, D.
On the pharmacokinetics of tobacco-specific
N-nitrosamines.
Proc. 8th Internatl. Meeting on N-Nitroso
Compounds - Occurrence and Biological Effects,
Banff, Alberta, Canada, Sept. 4-9, 1983.

CURRICULUM VITAE

RICHARD D. STEWART, M.D., M.P.H., M.A., F.A.C.P.

Corporate Medical Director, S. C. Johnson & Son, Inc., Racine, Wisconsin

Corporate Product Safety Director

Corporate Representative, Board of Directors, S. C. Johnson & Son, Inc.,
Centroamerica (1977-)

Corporate Representative, Board of Directors, S. C. Johnson de Columbia
(1977-)

Director, Chagas' Project, Argentina (1978-1983)

Corporate Representative, Board of Directors, Ceras Johnson de Argentina,
S.A.I.C. (1981-)

Clinical Professor, Department of Internal Medicine; and Adjunct Professor,
Department of Pharmacology and Toxicology, The Medical College of
Wisconsin (1978-)

Senior Attending Staff, Internal Medicine, Milwaukee County Medical
Complex (1967-)

Visiting Professor, Department of Pharmacology, University of Hawaii
Medical School (1980-)

Graduate Faculty, Biomedical Engineering, Marquette University (1969-)

Adjunct Professor, Industrial Hygiene Program, University of Wisconsin--
Parkside (1978-)

Visiting Staff, Hyperbaric Medicine, St. Luke's Hospital, Milwaukee
(1970-)

Courtesy Staff, Internal Medicine, St. Mary's Hospital, Racine (1983-)

Associate Staff, Internal Medicine, St. Luke's Hospital, Racine (1983-)

Business Address: S. C. Johnson & Son, Inc.

1525 Howe Street

Mail Station #303

Racine, Wisconsin 53403 Telephone: (414) 631-3675

Birthplace: Lakeland, Florida (December 26, 1926)

Marital Status: Married Mary Leeuw (June 14, 1952)
Three children: R. Scot, Gregory D. and Mary E.

Military Service: Air Cadet, U.S. Army Air Force (June 9, 1945-
December 16, 1946)

Education: University of Michigan, A.B. (with distinction) (1951)
University of Michigan Medical School, M.D. (1955)
University of Michigan, School of Public Health,
M.P.H., Industrial Health (1962)
University of Wisconsin-Milwaukee, M.A., English, (1979)

Rotating Internship: Saginaw General Hospital, Saginaw, Michigan (July 1, 1955-
July 1, 1956)

Residency: Internal Medicine, University of Michigan Medical Center
(July, 1959-September, 1962)

Post-Graduate
Fellowship:

Atomic Energy Commission, University of Michigan,
School of Public Health (1961-62)

Licensure:

State of Michigan: License No. 21811 (Issued June 29, 1956)
State of Wisconsin: License No. 15887 (Issued Jan. 11, 1967)

Certification:

Diplomate, American Board of Internal Medicine (1974)
Diplomate, American Board of Medical Toxicology (1976)
Diplomate, General Toxicology, The Academy of Toxicological
Sciences (1983)

Fellowships:

Fellow, American College of Physicians (1975)
Fellow, American Occupational Medical Association (1975)
Fellow, American Academy of Occupational Medicine (1976)
Fellow, American Academy of Clinical Toxicology (1982)

Prior Experience:

Staff Physician, Medical Department, The Dow Chemical Company (1956-1959)
Director of the Medical Research Section, Biochemical Research Laboratory,
The Dow Chemical Company (1962-1966)
Active Staff, Internal Medicine, Midland Hospital (1962-1966)
Associate Professor of Preventive Medicine; Chairman, Department of
Environmental Medicine, Marquette School of Medicine (July, 1966-
June, 1969)
Professor and Chairman, Department of Environmental Medicine (1969-1978) with
secondary appointments in Internal Medicine and Pharmacology,
The Medical College of Wisconsin
Corporate Medical Advisor, S. C. Johnson & Son, Inc. (1971-1978)
Chief of Clinical Toxicology Service, Milwaukee County Medical Complex
(1975-78)
Member of Corporate Research Board, S. C. Johnson & Son, Inc. (1976-80)

Honorary Societies:

Phi Theta Kappa (1949)
Phi Kappa Phi (1951, 1962)
Sigma Tau Delta Honorary English Fraternity (1982)

Honors and Awards:

1963 Authorship Award: Honorable mention winning paper from Industrial
Medicine and Surgery's First Annual Awards Competition, 1963:

Stewart, R. D.: "The Evolution of the Industrial Physician - Ascent
or Decline?" Ind. Med. Surg., 34:39-42, (Jan.), 1965.

1965 Authorship Award for the most outstanding paper published in the
American Industrial Hygiene Association Journal, 1964:

Stewart, R. D., and Dodd, H. C.: "Absorption of Carbon Tetrachloride, Trichloroethylene, Tetrachloroethylene, Methylene Chloride, and 1,1,1-Trichloroethane through the Human Skin," Am. Ind. Hyg. Assoc. J., 25:439-446, (Sept.-Oct.), 1964.

1967 Authorship Award: Presented by the Research Society of America, Midland Branch, for the most outstanding and original research paper published, 1965-1967:

Stewart, R. D., Dodd, H. C., Erley, D. S., and Holder, B. B.:
"The Diagnosis of Solvent Poisoning," JAMA, 193:1097-1100,
(Sept.), 1965.

Honorary Member, Milwaukee Fire Department (1970)
Milwaukee Fire Department Distinguished Service Award (1971)
Distinguished Service Award from the Committee of Public Health, Montero, Bolivia, ". . . for conducting the investigation of Chagas' Disease in our community and for teaching our doctors." (1972)
A.M.A. Physician's Recognition Award in Continuing Education: (1973-1976), (1976-1979), (1979-1982)
The Third Simon C. Weisfeldt Memorial Award (Co-recipient with Herbert E. Stokinger, Ph.D.), The Medical College of Wisconsin (1975)
Milwaukee Fire Department Distinguished Service Award in Recognition of an Outstanding Contribution to the Fire Service (Second DS Award) (1975)
Milwaukee Fire Department Distinguished Service Award, "In Recognition of the Development of a Program of Medical Surveillance to Protect the Lives of Fire Fighters." Separate award each year 1976-1980.
Founders' Day Award for the invention and development of the hollow fiber artificial kidney, 1979.
National Kidney Foundation Dialysis Pioneering Award "In Recognition of Your Historic Contribution to the Development of Kidney Dialysis as a Life-Saving Therapy," December, 1982.

Community Activities

Chairman, Citizens' Advisory Council on Air Pollution Control, Milwaukee County, 1971-1973.

Technical Advisory & Coordinating Research Committee, Southeastern Wisconsin Regional Planning Commission, 1974-75.

Boy Scouts of America:

Scoutmaster, Troop 55, Brookfield, Wisconsin, 1967-1971
Post Advisor, Post 155, Brookfield, Wisconsin, 1971-1972
Elmbrook District Advancement Chairman, 1973

Church:

Chairman, Commission on Missions, Elm Grove Community
United Methodist Church, 1967-1968

Chairman, Pastor-Parish Relations Committee, Elm Grove Community United
Methodist Church, 1972

Board of Benevolences, First Congregational Church, Wauwatosa, 1974-76

Rotary International:

Brookfield, 1975-78
Racine, Wisconsin, 1978-

St. Andrew's Society of the City of Milwaukee, 1979-

Advisory Medical Staff, Milwaukee Fire Department (1975-)

Hobbies:

Creative writing
English literature
Wilderness hiking and camping
Canoeing

Current Additional Professional Activities:

Medical Editorial Boards:

Editor, Environmental-Occupational Medicine Section, Clinical Medicine,
Harper & Row (1980-)
Editorial Board, Poisindex (1976-)
Consultant for Chest (1978-)
Contributing Editor, American Journal of Industrial Medicine (1979-)

Current Memberships:

American College of Physicians (1965)
American Medical Association (1957)
Wisconsin State Medical Society (1967)
Racine County Medical Society (1980)
American Society for Artificial Internal Organs (1966)
American Occupational Medicine Association (1972)
American Academy of Occupational Medicine (1972)
Society of Toxicology (1965)
American Academy of Clinical Toxicology (1972)

Current Medical Research Projects

1. Five-Year Prospective Epidemiological Study of Chagas Disease in Cruz del Eje, Argentina (1978-83).
2. Ten-Year Prospective Epidemiological Study of Heart and Lung Disease in Milwaukee Fire Fighters (1975-84).
3. Ten-Year Prospective Epidemiological Study of Heart and Lung Disease in Racine Fire Fighters (1980-90).
4. Development of an Artificial Skin.
5. Measurement of DEET Absorption Through Human Skin.

Research Projects Completed While Full-Time Faculty, The Medical College of Wisconsin (1966-1978)

1966

"Artificial Kidney Research" The design and development of the Hollow Fiber Artificial Kidney: Animal Studies and First Human Dialyses
The Dow Chemical Co.: \$25,000

1967

"Artificial Lung Development" The design and development of the first capillary artificial lung. The Hartford Co.: \$30,000

1968

"The Effects of Carbon Monoxide on Human Behavior and Performance"
Coordinating Research Council: \$70,000

"Facility Development" (Partial Funding for 3rd Floor Addition to A-BMSL)
Allen-Bradley Foundation, Inc.: \$20,000

1969

"The Effects of Carbon Monoxide on Human Behavior and Performance"
Coordinating Research Council: \$70,000 (2nd year)

1970

"The Effects of Carbon Monoxide on Human Behavior and Performance"
Coordinating Research Council: \$70,000 (3rd year)

"Study to Determine the Range of Carboxyhemoglobin in Various Segments of the American Population"
Coordinating Research Council: \$75,000

1971

"The Effects of Carbon Monoxide on Human Behavior and Performance"
Coordinating Research Council: \$70,000 (4th year)

"Study to Determine the Range of Carboxyhemoglobin in Various Segments of the American Population"
Coordinating Research Council: \$75,000 (2nd year)

"Evaluation of Automobile Restraint Bag Carbon Monoxide Hazard"
Thiokol Chemical Co.: \$25,000

1972

"The Effects of Carbon Monoxide on Human Behavior and Performance"
Coordinating Research Council: \$66,000 (5th year)

"Study to Determine the Range of Carboxyhemoglobin in Various Segments of the American Population"
Coordinating Research Council: \$75,000 (3rd year)

"Evaluation of Automobile Restraint Bag Carbon Monoxide Hazard"
Thiokol Chemical Co.: \$25,000 (2nd year)

"Development and Evaluation of a Physiologic Readiness-to-Drive Tester"
General Motors Corp.: \$75,000

"Experimental Human Exposure to Propylene Glycol Dinitrate"
U. S. Navy: \$11,576

"Bioplast Research"
S. C. Johnson and Son, Inc.: \$1,000

"Special Research Project Support"
The Johnson Wax Fund, Inc.: \$15,000

1973

"Development and Evaluation of a Physiologic Readiness-to-Drive Tester"
General Motors Corp.: \$75,000 (2nd year)

"Experimental Human Exposure to Propylene Glycol Dinitrate"
U. S. Navy: \$24,516 (2nd year)

"Acute and Repetitive Human Exposure to Fluorocarbon-11 and Fluorocarbon-12"
The Cosmetic, Toiletory, and Fragrance Assn., Inc.: \$70,000

"Development of Biological Standards with Breath Analysis"
National Institute for Occupational Safety and Health: \$250,000

"The Epidemiology of Chagas' Disease in Montero, Bolivia"
The Johnson Wax Fund, Inc.: \$15,000

1974

"Acute and Repetitive Human Exposure to Fluorocarbon-11 and Fluorocarbon-12"
The Cosmetic, Toiletory, and Fragrance Assn., Inc.: \$70,000 (2nd year)

"The Absorption, Excretion, and Physiological Effects of Isobutane and Propane on Human Subjects"
The Cosmetic, Toiletory, and Fragrance Assn., Inc.: \$73,000

"Development of Biological Standards with Breath Analysis"
National Institute for Occupational Safety and Health: \$250,000 (2nd year)

"The Epidemiology of Chagas' Disease in Montero, Bolivia"
The Johnson Wax Fund, Inc.: \$15,000 (2nd year)

"Artificial Lung-Clinical Research"
National Institutes of Health (UW-M): \$3,500

"Facilities Development" (Partial funding for Environmental Medicine Addition to A-BMSL)
Allen-Bradley Foundation, Inc.: \$100,000

1975

"The Absorption, Excretion, and Physiological Effects of Isobutane and Propane on Human Subjects"
The Cosmetic, Toiletry, and Fragrance Assn., Inc.: \$73,000 (2nd year)

"Research Study to Determine the 1970-1974 Trend in Carboxyhemoglobin Saturation in Blood Donors in Chicago and St. Louis"
Coordinating Research Council: \$28,000

"Carboxyhemoglobin Levels in Mexico City"
Pan American Health Organization: \$15,000

"Development of Biological Standards with Breath Analysis"
National Institute for Occupational Safety and Health: \$250,000 (3rd year)

"Development of a Rapid System of Medical Surveillance for Fire Fighters"
The Johnson Wax Fund, Inc.: \$20,000

1976

"Perchloroethylene/Drug/Alcohol Interaction"
National Institute for Occupational Safety and Health: \$132,000

"Capital Projects Support (Clinical Toxicology Facility)"
The Johnson Wax Fund, Inc.: \$25,000

"Development of a Rapid System of Medical Surveillance for Fire Fighters"
The Johnson Wax Fund, Inc.: \$20,000 (2nd year)

1977

"Effects of Low Levels of Carbon Monoxide on Cardiac Function"
Coordinating Research Council: \$100,000

"Capital Projects Support (Clinical Toxicology Facility)"
The Johnson Wax Fund, Inc.: \$25,000 (2nd year)

"Development of a Rapid System of Medical Surveillance for Fire Fighters"
The Johnson Wax Fund, Inc.: \$20,000 (3rd year)

"Methyl Salicylate Study"
S. C. Johnson and Son, Inc.: \$1,000

1978

"The Cardiovascular Response to Elevated Carboxyhemoglobin Levels"
Coordinating Research Council: \$50,000

"Experimental Human Exposure to Halon 1301"
E. I. DuPont De Nemours and Co.: \$23,500

"The Epidemiology of Chagas' Disease in Central Argentina"
The Johnson Wax Fund, Inc.: \$50,000 from funds previously committed to Capital Projects support.
Ceras Johnson, Argentina: \$30,000 support commitment for transportation and housing of volunteer personnel in Argentina.

"Development of a Rapid System of Medical Surveillance for Fire Fighters"
The Johnson Wax Fund, Inc.: \$20,000 (4th year)

Past Professional Activities:

Committee on Toxicology of the National Research Council, National Academy of Sciences (1971-75)
Sub-Committee on Atmosphere Quality Standards for Long-Duration Manned Space Flights
Member, Commission on Safe Transportation, State Medical Society of Wisconsin (1971)
Consultant to the United States Department of Transportation (1971)
Committee of Occupational Toxicology, American Medical Association (1972)
Bureau of Community Environmental Management of the Public Health Service, Ad Hoc Committee to establish a safe limit for carbon monoxide concentrations in homes, institutions, and other places of occupancy (1972)
Consultant Toxicology Committee, American Industrial Hygiene Association (1969-73)
Technical Advisory and Coordinating Research Committee, Southeastern Wisconsin Regional Planning Commission (1974-75)
Consultant to the Minister of Environmental Improvement, Mexico, sponsored by Pan American Health Organization (1975)
Science and Technology Utilization Council of the City of Milwaukee (1975-76)
Consultant in Toxicology to Vice Admiral D. L. Custis, The Surgeon General of the Navy (1973-76)
TLV Committee, American Conference of Governmental Industrial Hygienists, Inc. (1978-80)
Advisory Medical Staff, Milwaukee Fire Department (1975-80)
Director and Co-Host WFMR's Medicine and the Arts, a weekly program dedicated to exploring the influence of medicine on music, art and history (1977-80).
Consultant in Toxicology and Occupational Medicine to Vice Admiral W. P. Arentzen, The Surgeon General of the Navy (1977-78)

Consultant to the National Institute for Occupational Safety and Health
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Consultant to the Department of Labor (1973-78)
Editor, Environmental Medicine Section, Practice of Medicine, Harper & Row
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Editorial Board, Toxicology and Applied Pharmacology (1975-78)
Editorial Board, The Journal of Fire and Flammability--Combustion Toxicology
Supplement (1975-78)
Editorial Board, A.M.A. Archives of Environmental Health (1976-78).

Editor, Environmental Medicine Section, Practice of Medicine, Harper & Row
(1974-79)
Editorial Board, Toxicology and Applied Pharmacology (1975-78)
Editorial Board, The Journal of Fire and Flammability--Combustion Toxicology
Supplement (1975-78)
Editorial Board, A.M.A. Archives of Environmental Health (1976-78)

PUBLICATIONS

- Merchant, D. J., Stewart, R. D., Kempe, L. L., and Graikoski, J. T.: "Use of Tissue Culture Mediums Sterilized with Gamma Radiation from Cobalt-60," Proceedings of the Society for Experimental Biology and Medicine, 86:128-131, 1954.
- Stewart, R. D., Erley, D. S., Torkelson, T. R., and Hake, C. L.: "Post-Exposure Analysis of Organic Compounds in the Blood by a Rapid Infrared Technique," Nature, 184:192-193, (July), 1959.
- Stewart, R. D., Erley, D. S., Skelly, N. E., and Wright, W.: "Infrared Analysis of Blood Serum, Red Blood Cells and Other Body Fluids," J. Lab. Clin. Med., 54:644-658, (Oct.), 1959.
- Stewart, R. D., and Gohlke, R. S.: "The Analysis of Volatile Compounds in the Blood by Conventional Mass Spectrometry," The U. Mich. Med. Bulletin, 26:110-116, (April), 1960.
- Stewart, R. D., Torkelson, T. R., Hake, C. L., and Erley, D. S.: "Infrared Analysis of Carbon Tetrachloride and Ethanol in Blood," J. Lab. Clin. Med., 56:148-156, (July), 1960.
- Stewart, R. D., Skelly, N. E., and Erley, D. S.: "Infrared Analysis of Serum Protein from One Hundred and Five Healthy Adults," J. Lab. Clin. Med., 56:391-400, (Sept.), 1960.
- Stewart, R. D., Gay, H. H., Erley, D. S., Hake, C. L., and Schaffer, A. W.: "Human Exposure to Tetrachloroethylene Vapor: Relationship of Expired Air and Blood Concentrations to Exposure and Toxicity," Arch. Environ. Health, 2:516-522, (May), 1961.
- Stewart, R. D., and Erley, D. S.: "Comparative Infrared Spectra of Vertebrate Red Blood Cells," Exp. Cell. Res., 23:460-470, (Aug.), 1961.
- Stewart, R. D., Erley, D. S., Schaffer, A. W., and Gay, H. H.: "Accidental Vapor Exposure to Anesthetic Concentrations of a Solvent Containing Tetrachloroethylene," Ind. Med. Surg., 30:327-330, (Aug.), 1961.
- Stewart, R. D., Gay, H. H., Erley, D. S., Hake, C. L., and Schaffer, A. W.: "Human Exposure to 1,1,1-Trichloroethane Vapor: Relationship of Expired Air and Blood Concentrations to Exposure and Toxicity," Am. Ind. Hyg. Assoc. J., 22:252-262, (Aug.), 1961.
- Stewart, R. D., Boettner, E. A., and Stubbs, B. T.: "Rapid Infrared Determination of Acetone in the Blood and the Exhaled Air of Diabetic Patients," Nature, 191:1008-1009, (Sept.), 1961.
- Stewart, R. D., Gay, H. H., Erley, D. S., Hake, C. L., and Peterson, J. E.: "Human Exposure to Carbon Tetrachloride Vapor: Relationship of Expired Air Concentration to Exposure and Toxicity," J. Occup. Med., 3:586-590, (Dec.), 1961.
- Stewart, R. D., and Sanislow, C. A.: "Silastic Intravenous Catheter," N. Engl. J. Med., 265:1283-1285, (Dec.), 1961.
- Stubbs, B. T., Stewart, R. D., and Boettner, E. A.: "Infrared Analysis of Dicumarol in Blood Serum," J. Lab. Clin. Med., 59:667-671, (April), 1962.
- Stewart, R. D., Gay, H. H., Erley, D. S., Hake, C. L., and Peterson, J. E.: "Observations on the Concentration of Trichloroethylene in Blood and Expired Air Following Exposure of Humans," Am. Ind. Hyg. Assoc. J., 23:167-170, (April), 1962.
- Stewart, R. D., and Erley, D. S.: "Detection and Toxic Compounds in Humans and Animals by Rapid Infrared Techniques," J. Forensic Sci., 8:31-45, (Jan.), 1963.
- Stewart, R. D., Boettner, E. A., Southworth, R. R., and Cerny, J. C.: "Acute Carbon Tetrachloride Intoxication," JAMA, 183:994-997, (March), 1963.
- Stewart, R. D.: "The Toxicology of Methyl Chloroform," J. Occup. Med., 5:259-262, (May), 1963.
- Erley, D. S., and Stewart, R. D.: "Emergency Room Infrared Spectroscopic Analysis," Arch. Intern. Med., 111:656-660, (May), 1963.
- Stewart, R. D., Swank, J. D., Roberts, C. B., and Dodd, H. C.: "The Detection of Halogenated Hydrocarbons in the Expired Air of Humans Using the Electron Capture Detector," Nature, 198:696-697, (May), 1963.
- Stewart, R. D. and Erley, D. S.: "Infrared Spectroscopy in Medical Diagnosis," Analyzer, 4:1-3, (Nov.), 1963.
- Rowe, V. K., Mukjowski, T., Wolf, M. A., Sadek, S. E., and Stewart, R. D.: "Toxicity of a Solvent Mixture of 1,1,1-Trichloroethane and Tetrachloroethylene as Determined by Experiments on Laboratory Animals and Human Subjects," Am. Ind. Hyg. Assoc. J., 24:541-554, (Nov.-Dec.), 1963.
- Stewart, R. D., Sadek, S. E., Swank, J. D., and Dodd, H. C.: "Diagnosis of Trichloroethylene Exposure After Death," Arch. Pathol., 77:101-104, (Jan.), 1964.

- Stewart, R. D., and Boettner, E. A.: "Expired Air Acetone in Diabetes Mellitus," N. Engl. J. Med., 270:1035-1038, (May), 1964.
- Stewart, R. D., Cerny, J. E., and Mahon, H. I.: "The Capillary Kidney," U. Mich. Med. Center J., 30:116-118, (May-June), 1964.
- Stewart, R. D., and Dodd, H. C.: "Absorption of Carbon Tetrachloride, Trichloroethylene, Tetrachloroethylene, Methylene Chloride, and 1,1,1-Trichloroethane Through the Human Skin," Am. Ind. Hyg. Assoc. J., 25:439-446, (Sept.-Oct.), 1964.
- Stewart, R. D., and Mahon, H. I.: "Research on the Capillary Kidney," Proceedings of the Conference on Hemodialysis, Public Health Service Publication No. 1349-221-227, (Nov.), 1964.
- Stewart, R. D., and Erley, D. S.: "Detection of Volatile Organic Compounds and Toxic Gases in Humans by Rapid Infrared Techniques," Progress in Chemical Toxicology, Vol. 1, pp. 183-220, Academic Press, New York, 1965.
- Stewart, R. D.: "The Evolution of the Industrial Physician - Ascent or Decline?" Ind. Med. Surg., 34:39-42, (Jan.), 1965.
- Stewart, R. D.: "Improved Neurological Hammer," JAMA, 193:774, (Aug.), 1965.
- Stewart, R. D., Dodd, H. C., Erley, D. S., and Holder, B. B.: "The Diagnosis of Solvent Poisoning," JAMA, 193:1097-1100, (Sept.), 1965.
- Stewart, R. D., and Batdorf, D. B.: "Slotted Needle for Catheter Introduction," Arch. Surg., 92:310, (Feb.), 1966.
- Stewart, R. D., and Andrews, J. T.: "Acute Intoxication With Methylchloroform," JAMA, 195:904-906, (March 14), 1966.
- Stewart, R. D., Baretta, E. D., Cerny, J. E., and Mahon, H. I.: "An Artificial Kidney Made from Capillary Fibers," Invest. Urology, 3:614-624, (May), 1966.
- Stewart, R. D.: "Quinze ans d'Etudes sur le 1,1,1-Trichloroethane," Arch. Mal. Professionnelles, 28:194-201, 1967.
- Stewart, R. D.: "Chlorinated Hydrocarbon Solvent Poisoning," Am. J. Nurs., 67: No. 1, (Jan.), 1967.
- Lipps, B. J., Stewart, R. D., Perkins, H. A., Holmes, G. W., McLain, E. A., Rolfs, M. R., and Oja, P. D.: "The Hollow Fiber Artificial Kidney," Trans. Am. Soc. Artif. Intern. Organs, 13:200-207, 1967.
- Stewart, R. D., Cerny, J. E., and Lipps, B. J.: "Hemodialysis with the 'Capillary Kidney'," U. Mich. Med. Center J., 34:80-83, (March-April), 1968.
- Stewart, R. D., Dodd, H. C., Baretta, E. D., and Schaffer, A. W.: "Human Exposure to Styrene Vapor," Arch. Environ. Health, 16:656-662, (May), 1968.
- Stewart, R. D., Lipps, B. J., Baretta, E. D., Piering, W. F., and Roth, D.: "Short-Term Hemodialysis with the Capillary Kidney," Trans. Am. Soc. Artif. Intern. Organs, 14:121-125, (June), 1968.
- Stewart, R. D.: "Toxicology of 1,1,1-Trichloroethane," Ann. Occup. Hyg., 11:71-79, 1968.
- Stewart, R. D.: "Die Toxikologie von 1,1,1-Trichloroethan," Zentralbl. Arbeitsmed., 18:262-266, (Sept.), 1968.
- Baretta, E. D., Stewart, R. D., and Mutchler, J. E.: "Monitoring Exposures to Vinyl Chloride Vapor: Breath Analysis and Continuous Air Sampling," Am. Ind. Hyg. Assoc. J., 30:537-544, (Nov.-Dec.), 1969.
- Stewart, R. D., and Baretta, E. D.: "Artificial Capillary Lung," U. Mich. Med. Center J., 34:194-196, (July-Sept.), 1968.
- Stewart, R. D.: "Acute Tetrachloroethylene Intoxication," JAMA, 208:1490-1492, (May 26), 1969.
- Stewart, R. D., Gay, H. H., Schaffer, A. W., Erley, D. S., and Rowe, V. K.: "Experimental Human Exposure to Methyl Chloroform Vapor," Arch. Environ. Health, 19:467-472, (Oct.), 1969.
- Stewart, R. D., Baretta, E. D., Dodd, H. C., and Torkelson, T. R.: "Experimental Human Exposure to the Vapor of Propylene Glycol Monomethyl Ether," Arch. Environ. Health, 20:218-223, (Feb.), 1970.
- Stewart, R. D., Gay, H. H., Erley, D. S., and Dodd, H. C.: "Experimental Human Exposure to Trichloroethylene," Arch. Environ. Health, 20:64-71, (Jan.), 1970.
- Stewart, R. D., Baretta, E. D., Dodd, H. C., and Torkelson, T. R.: "Experimental Human Exposure to Tetrachloroethylene," Arch. Environ. Health, 20:224-229, (Feb.), 1970.
- Stewart, R. D., Peterson, J. E., Baretta, E. D., Dodd, H. C., Hosko, M. J., and Herrmann, A. A.: "Experimental Human Exposure to Carbon Monoxide," Arch. Environ. Health, 21:154-164, (Aug.), 1970.

- Peterson, J. E., and Stewart, R. D.: "Absorption and Elimination of Carbon Monoxide by Inactive Young Men," Arch. Environ. Health, 21:165-171, (Aug.), 1970.
- Stewart, R. D., Fisher, T. N., Peterson, J. E., Hosko, M. J., Baretta, E. D., Dodd, H. C., Newton, P. E., and Herrmann, A. A.: "Experimental Human Exposure to Carbon Monoxide," Proceedings of the First Annual Conference on Environmental Toxicology, 9-11 September, 1970, Aerospace Medical Research Laboratory, Publication No. AMRL-TR-70-102, pp. 49-75, (Dec.), 1970.
- Stewart, R. D.: "Clinical Toxicology: Outline of General Principles," J. Occup. Med. 13-19-21, (Jan.), 1971.
- Stewart, R. D.: "Methyl Chloroform Intoxication: Diagnosis and Treatment," JAMA, 215:1789-1792, (March 15), 1971.
- Stewart, R. D., Fisher, T. N., Hosko, M. J., Peterson, J. E., Baretta, E. D., and Dodd, H. C.: "Carboxyhemoglobin Elevation After Exposure to Dichloromethane," Science, 176:295-296, (April 21), 1972.
- Stewart, R. D.: "1,1,1-Trichloroethane," Occupational Health and Safety, Vol. II, pp. 1432-1433, International Labour Office, Geneva, 1972.
- Stewart, R. D.: "The Use of Human Volunteers for the Toxicological Evaluation of Materials," Symposium on an Appraisal of Halogenated Fire Extinguishing Agents, Washington, D. C., April 11-12, 1972.
- Stewart, R. D., Peterson, J. E., Hosko, M. J., Baretta, E. D., Dodd, H. C., Newton, P. E., and Herrmann, A. A.: "Effect of Carbon Monoxide Upon Human Performance," Transactions of the Rochester Symposium on Behavioral Psychology, May, 1972.
- Stewart, R. D.: "Breath Analysis in Biologic Threshold Limits," Proceedings of the Seventeenth International Congress on Occupational Health, Buenos Aires, Argentina, August, 1972.
- Stewart, R. D.: "Breath Analysis in Biologic Threshold Limit Determination," Proceedings of the Third Annual Conference on Environmental Toxicology, 25-27 October, 1970, Aerospace Medical Research Laboratory, Publication No. AMRL-TR-72-130, pp. 17-27, 1972.
- Stewart, R. D., Fisher, T. N., Hosko, M. J., Peterson, J. E., Baretta, E. D., and Dodd, H. C.: "Experimental Human Exposure to Methylene Chloride," Arch. Environ. Health, 25:342-348, (Nov.), 1972.
- Stewart, R. D.: "The Capillary Artificial Kidney," Hemodialysis: Principles and Practices, Ed. by G. L. Bailey, Chapt. 12, Academic Press, 1972.
- Stewart, R. D., and Peterson, J. E.: "Human Absorption of Carbon Monoxide from High Concentrations in Air," Am. Ind. Hyg. Assoc. J., pp. 293-297, (May), 1972.
- Stewart, R. D., Peterson, J. E., Fisher, T. N., Hosko, M. J., Baretta, E. D., Dodd, H. C., and Herrmann, A. A.: "Experimental Human Exposure to High Concentrations of Carbon Monoxide," Arch. Environ. Health, 26:1-7, (Jan.), 1973.
- Stewart, R. D.: "The Health Basis for Carbon Monoxide Standards," Proceedings Automotive Emissions Seminar, Detroit, June 19, 1973.
- Stewart, R. D., Newton, P. E., Hosko, M. J., and Peterson, J. E.: "Effect of Carbon Monoxide on Time Perception," Arch. Environ. Health, 27:155-160, (Sept.), 1973.
- Stewart, R. D., Baretta, E. D., Platte, L. R., Stewart, E. B., Kalbfleisch, J. H., Van Iserloo, B., and Rimm, A. A.: "Carboxyhemoglobin Concentration in Blood Donors in Chicago, Milwaukee, New York, and Los Angeles," Science, 182:1362-1364, 1973.
- Rytel, M. W., Stewart, R. D., and Rose, H.: "Absence of Circulating Interferon in Patients with Malaria and with American Trypanosomiasis," Proceedings of the Society of Experimental Biology & Medicine, 144:122-123, (Oct.), 1973.
- Stewart, R. D.: "The Use of Breath Analysis in Clinical Toxicology," Essays in Toxicology, Ed. by W. Hayes, Vol. V, Chapt. 5, Academic Press, 1974.
- Stewart, R. D., "Solvent Seminar Keynote Address," Behavioral Toxicology: Early Detection of Occupational Hazards, Ed. by C. Xintaras, B. L. Johnson and I. de Groot, HEW Publication No. (NIOSH) 74-126, pp. 35-40, 1974.
- Stewart, R. D., Hake, C. L., Peterson, J. E., Forster, H. V., Newton, P. E., Soto, R. J., and Lebrun, A. J.: "Development of Biologic Standards for Trichloroethylene," Behavioral Toxicology: Early Detection of Occupational Hazards, Ed. by C. Xintaras, B. L. Johnson and I. de Groot, HEW Publication No. (NIOSH) 74-126, pp. 81-91, 1974.
- Stewart, R. D., et al.: "Effects of Trichloroethylene on Behavioral Performance Capabilities," Behavioral Toxicology: Early Detection of Occupational Hazards, Ed. by C. Xintaras, B. L. Johnson and I. de Groot, HEW Publication No. (NIOSH) 74-126, pp. 96-129, 1974.
- Stewart, R. D., Peterson, J. E., Hake, C. L., Lebrun, A. J., and Newton, P. E.: "Measurement of Physiological and Behavioral Responses in a Controlled-Environment Chamber," Behavioral Toxicology: Early Detection of Occupational Hazards, Ed. by C. Xintaras, B. L. Johnson and I. de Groot, HEW Publication No. (NIOSH) 74-126, pp. 361-375, 1974.

- Stewart, R. D., Hake, C. L., Forster, H. V., Lebrun, A. J., Peterson, J. E., and Wu, A.: "Tetrachloroethylene: Development of a Biologic Standard for the Industrial Worker by Breath Analysis," NIOSH Report #NIOSH-MCOW-ENVM-PCE-74-6, National Institute for Occupational Safety and Health, Cincinnati, OH, 1974, 170 pgs.
- Stewart, R. D., Hake, C. L., Forster, H. V., Lebrun, A. J., Peterson, J. E., and Wu, A.: "Methylene Chloride: Development of a Biologic Standard for the Industrial Worker by Breath Analysis," NIOSH Report #NIOSH-MCOW-ENVM-MC-74-9, National Institute for Occupational Safety and Health, Cincinnati, OH, 1974, 86 pgs.
- Stewart, R. D., Hake, C. L., and Peterson, J. E.: "Degreasers' Flush," Arch. Environ. Health, 29:1-5, (July), 1974.
- Stewart, R. D., Hake, C. L., and Peterson, J. E.: "Use of Breath Analysis to Monitor Trichloroethylene Exposures," Arch. Environ. Health, 29:6-13, (July), 1974.
- Stewart, R. D.: "Noxious Gases," Practice of Medicine, Vol. IX, Chapt. 29, Harper & Row, Maryland, 1974.
- Stewart, R. D., Baretta, E. D., Platte, L. R., Stewart, E. B., Kalbfleisch, J. H., Van Yserloo, B., and Rimm, A. A.: "Carboxyhemoglobin Levels in American Blood Donors," JAMA, 229:1187-1195, (Aug.), 1974. (Also reprinted in J. Fire and Flamm.--Combustion Toxicology Suppl. 2:151-167, (May), 1975.)
- Stewart, R. D.: "The Effect of Carbon Monoxide on Man", Proceedings of the Symposium on Carbon Monoxide, Pittsburgh, Pennsylvania, Dec. 12-13 Industrial Health Foundation, 1974.
- Stewart, R. D.: "The Effects of Low Concentrations of Carbon Monoxide in Man," Scand. J. Respir. Dis. [Suppl.], 91:56-62, (Oct.), 1974.
- Stewart, R. D.: "The Effect of Carbon Monoxide on Man," J. Fire and Flamm.--Combustion Toxicology Suppl., 1:167-175, (Aug.), 1974.
- Stewart, R. D., Peterson, J. E., Newton, P. E., Hake, C. L., Hosko, M. J., Lebrun, A. J., and Lawton, G. M.: "Experimental Human Exposure to Propylene Glycol Dinitrate," Toxicol. Appl. Pharmacol., 30:377-395, 1974.
- Stewart, R. D., Hake, C. L., Forster, H. V., Lebrun, A. J., Peterson, J. E., and Wu, A.: "Toluene: Development of a Biologic Standard for the Industrial Worker by Breath Analysis," NIOSH Report #NIOSH-MCOW-ENVM-MC-75-3, National Institute for Occupational Safety and Health, Cincinnati, OH, 1975, 118 pgs.
- Stewart, R. D., Hake, C. L., Wu, A., Graff, S. A., Forster, H. V., Lebrun, A. J., Newton, P. E., and Soto, R. J.: "1,1,1-Trichloroethane: Development of a Biologic Standard for the Industrial Worker by Breath Analysis," NIOSH Report #NIOSH-MCOW-ENVM-1,1,1-T-75-4, National Institute for Occupational Safety and Health, Cincinnati, OH, 1975, 102 pgs.
- Stewart, R. D., Baretta, E. D., Herrmann, A. A., Forster, H. V., Crespo, J. H., Newton, P. E., and Soto, R. J.: "Acute and Repetitive Human Exposure to Fluorotrichloromethane," Report #PB279203/LLC, U. S. Dept. of Commerce, The National Technical Information Service, Springfield, VA, 1978, 104 pgs.
- Stewart, R. D.: "Viewpoint: Editorial on Southeastern Wisconsin Medical Center," Investor, 6:42, (Jan.), 1975.
- Stewart, R. D., Newton, P. E., Hosko, M. J., Peterson, J. E., and Mellender, J. W.: "The Effect of Carbon Monoxide on Time Perception, Manual Coordination, Inspection, and Arithmetic," Behavioral Toxicology, Ed. by Weiss and Laties, pp. 29-60, Plenum Press, New York, 1975.
- Stewart, R. D., Hake, C. L.: "Carboxyhemoglobin Levels," JAMA, 232:488, (May 5), 1975.
- Stewart, R. D., Hake, C. L., Wu, A., and Kalbfleisch, J. H.: "Carboxyhemoglobin Trend in Chicago Blood Donors, 1970-1975," Proceedings Environmental Protection Agency Scientific Seminar on Automotive Pollutants, Washington, D. C., Feb. 10-12, 1975. EPA-600-9-75-003.
- Stewart, R. D., and Stewart, R. S.: "Breath Analyzer Used to Test CO Levels in Firemen's Blood," Fire Eng., 128:92-94, (Aug.), 1975.
- Peterson, J. E., and Stewart, R. D.: "Predicting the Carboxyhemoglobin Levels Resulting from Carbon Monoxide Exposures," J. Appl. Physiol., 39:633-638, (Oct.), 1975.
- Stewart, R. D., Herrmann, A. A., Baretta, E. D., Forster, H. V., Crespo, J. H., Newton, P. E., and Soto, R. J.: "Acute and Repetitive Human Exposure to Difluorodichloromethane," Report #PB279204/LLC, U. S. Dept. of Commerce, The National Technical Information Service, Springfield, VA, 1978, 82 pgs.
- Stewart, R. D., Stewart, R. S., Stamm, W., and Seelen, R. P.: "Rapid Estimation of Carboxyhemoglobin Level in Fire Fighters," JAMA, 235:398-401, (January 26), 1976.
- Stewart, R. D., and Hake, C. L.: "Paint-Remover Hazard," JAMA, 235:398-401, (January 26), 1976.

- Stewart, R. D.: "The Effect of Carbon Monoxide on Humans," J. Occup. Med., 18:304-309, (May), 1976.
- Hosko, M. J. and Stewart, R. D.: "Drug Toxicity and Chronic Drug Intoxications--Central Nervous System Depressants," Practice of Medicine, Vol. IX, Chapter 24, Section 1, Harper & Row, Maryland, 1976.
- Stewart, R. D., and Van Cleave, B. L.: "Drug Toxicity and Chronic Drug Intoxications--Salicylate Poisoning in the Adult Male," Practice of Medicine, Vol. IX, Chapter 24, Section 4, Harper & Row, Maryland, 1976.
- Stewart, R. D.: "Toxic Solvents," Practice of Medicine, Vol. IX, Chapter 27, Harper & Row, Maryland, 1976.
- Stewart, R. D.: "Drowning and Near-Drowning," Practice of Medicine, Vol. IX, Chapter 36, Harper & Row, Maryland, 1976.
- Stewart, R. D., Hake, C. L., and Wu, A.: "Use of Breath Analysis to Monitor Methylene Chloride Exposure," Scand. J. Work, Environ. & Health, 2:57-70, 1976.
- Stewart, R. D., Hake, C. L., Wu, A., Stewart, T. A., and Kalbfleisch, J. H.: "Carboxyhemoglobin Trend in Chicago Blood Donors, 1970-1974," Arch. Environ. Health, 31:280-286, (Nov./Dec.), 1976.
- Stewart, R. D., Hake, C. L., Wu, A., Graff, S. A., Forster, H. V., Keeler, W. H., Lebrun, A. J., Newton, P. E., and Soto, R. J.: "Methyl Chloride: Development of a Biologic Standard for the Industrial Worker by Breath Analysis," NIOSH Report #NIOSH-MCOW-ENVM-MCM-77-1, National Institute for Occupational Safety and Health, Cincinnati, OH, 1977, 164 pgs.
- Stewart, R. D., Hake, C. L., Wu, A., Graff, S. A., Forster, H. V., Keeler, W. H., Lebrun, A. J., Newton, P. E., and Soto, R. J.: "Styrene: Development of a Biologic Standard for the Industrial Worker by Breath Analysis," NIOSH Report #NIOSH-MCOW-ENVM-STY-77-2, National Institute for Occupational Safety and Health, Cincinnati, OH, 1977, 132 pgs.
- Hake, C. L., Stewart, R. D., Wu, A., Graff, S. A., Forster, H. V., Keeler, W. H., Lebrun, A. J., Newton, P. E., and Soto, R. J.: "p-Xylene: Development of a Biologic Standard for the Industrial Worker by Breath Analysis," NIOSH Report #NIOSH-MCOW-ENVM-XY-77-3, National Institute for Occupational Safety and Health, Cincinnati, OH, 1977, 125 pgs.
- Stewart, R. D., Newton, P. E., Baretta, E. D., Herrmann, A. A., Forster, H. V., Sikora, J. J., and Soto, R. J.: "Acute and Repetitive Human Exposure to Isobutane and Propane," Report #PB279205/LLC, U. S. Dept. of Commerce, The National Technical Information Service, Springfield, VA, 1978, 95 pgs.
- Stewart, R. D.: "Drug Toxicity and Chronic Drug Intoxications - General Principles of Diagnosis and Management of Acute Poisoning and Drug Overdose," Practice of Medicine, Vol. IX, Chapter 24, Section 1, Harper & Row, Maryland, 1977.
- Stewart, R. D.: "Health Information for International Travel," Practice of Medicine, Vol. IX, Chapter 43, Harper & Row, Maryland, 1977.
- Stewart, R. D., Hake, C. L., Wu, A., Kalbfleisch, J., Newton, P. E., Marlow, S. K., and Vucicevic-Salama, M.: "Effects of Perchloroethylene/Drug Interaction on Behavior and Neurological Function," U. S. Dept. of Health, Education, and Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, Division of Biomedical and Behavioral Science, Publication No. 77-191, April, 1977.
- Stewart, R. D., Herrmann, A. A., Baretta, E. D., Sikora, J. J., Newton, P. E., and Soto, R. J.: "Acute and Repetitive Human Exposure to Isobutane," Scand. J. Work, Environ. & Health, 3:234-243, 1977.
- Hake, C. L., and Stewart, R. D.: "Human Exposure to Tetrachloroethylene: Inhalation and Skin Contact," Environ. Health Perspectives, 21:231-238, 1977.
- Baretta, E. D., Stewart, R. D., Graff, S. A., and Donahoo, K. K.: "Methods Developed for the Mass Sampling Analysis of CO and Carboxyhemoglobin in Man," Am. Ind. Hyg. Assoc. J., 39:202-209, (Mar.), 1978.
- Stewart, R. D., Newton, P. E., Baretta, E. D., Herrmann, A. A., Forster, H. V., and Soto, R. J.: "Physiological Response to Aerosol Propellants," Environ. Health Perspectives, 26:275-285, 1978.
- Schlueter, D. P., Soto, R. J., Baretta, E. D., Herrmann, A. A., Ostrander, L. E., and Stewart, R. D.: "Airway Response to Hair Spray in Normal Subjects and Subjects with Hyperreactive Airways," Chest, 75:544-548, 1979.
- Stewart, R. D.: "Tricyclic Antidepressant Poisoning," American Family Physician, Practical Therapeutics Series, 19:136-144, 1979.
- Stewart, R. D.: "Drug Toxicity and Chronic Drug Interactions, Section 3, 'Tricyclic Antidepressants,'" Practice of Medicine, Harper & Row, Vol. IX, Chapter 24, 1977.
- Stewart, R. D., Newton, P. E., Wu, A., Stewart, T. A., Stamm, W., Heindl, R. J., and Seelen, R. P.: "The Milwaukee Program for Detecting Carboxyhemoglobin Levels in Fire Fighters," Proceedings of the Fifth Annual Redmond Symposium on the Occupational Health and Hazards of the Fire Service, June 13, 1979.
- Wu, A., Pearson, M. L., Shekoski, D. L., Soto, R. J., and Stewart, R. D.: "High Resolution Gas Chromatography/Mass Spectrometric Characterization of Urinary Metabolites of N,N-diethyl-m-toluamide (DEET) in Man," Journal of High Resolution Chromatography and Chromatography Communications, Vol. 2, September, 1979.

Stewart, R. D., Herrmann, A. A., Baretta, E. D., Forster, H. V., Crespo, J. H., Newton, P. E., and Soto, R. J.: "Human Exposure to Aerosol Propellants," Aerosols, Airways and Asthma, Chapter 3, Edited by Joseph J. Trautlein, M. D., F.A.C.P., SP Medical & Scientific Books, New York, 1981.

Stewart, R. D.: "The Diagnosis and Management of Acute Poisoning and Drug Overdose," Clinical Medicine, Harper & Row, Vol. XII, Chapter 66, 1981.

Stewart, R. D.: "Near-Drowning: Pathophysiology and Treatment," Clinical Medicine, Harper & Row, Vol. XII, Chapter 65, 1981.

Stewart, R. D.: "Toxic Gases," Clinical Medicine, Harper & Row, Vol. XII, Chapter 68, 1981.

Stewart, R. D.: "Toxic Solvents," Clinical Medicine, Harper & Row, Vol. XII, Chapter 69, 1981.

Stewart, R. D.: "International Travel," Clinical Medicine, Harper & Row, Vol. XII, Chapter 81, 1981.

Stewart, R. D.: "Carbon Monoxide," Transactions of the Clean Air Act Conference, Hartford, Connecticut, June 30, 1981.

Stewart, R. D.: "Fire Fighters Health Monitoring," Transactions of Sixth Redmond Symposium, International Association of Fire Fighters, Hollywood, Florida, November 8-11, 1981.

Stewart, R. D.: "The Diagnosis and Management of Insecticide Poisoning," Clinical Medicine, Harper & Row, Chapter 72 for the Environmental and Occupational Medicine Section, 1982.

Stewart, R. D.: "The Diagnosis and Management of Acute Poisoning and Drug Overdose," Chapter 15, Textbook of Medicine, John Wiley & Sons, Inc., 1982.

Stewart, R. D.: "Trichloroethane," a chapter for the third edition of the Encyclopaedia on Occupational Health and Safety, International Labour Office, Geneva, Switzerland, 1982.

Soto, R. J.; Kalan, D. A.; Crisostomo, B.; Falbo, L. L.; Groh, W. J., Smith, L. W.; Stewart, R. D.: "Data Base Management System for Tracking Occupational Health," AIHA Journal, 1983.

Stewart, R. D.: "Toxicology," Textbook of General Medicine, John Wiley & Sons, Inc., Chapter 15, 1983.

Stewart, R. D.: "Acute Illnesses of High Altitude," Clinical Medicine, J. B. Lippincott, Chapter 82, 1983.

PATENT DISCLOSURES

Richard D. Stewart, M. D.

1. New Solvents for Polyacrylonitrile and Copolymers Thereof, Disclosure 7895, Received 10-3-52 -- Dropped 11-6-53; Co-inventors: D. H. Clarke, and A. F. Roche.

2. Ear Protector - U. S. Patent No. 2,910,980; Issued 11-3-59.

This invention describes a method of ear protection which utilizes a foamed-in-place Silicone rubber for the pinna of the ear, which prevents the entrance of sound waves or liquids into the external auditory canal.

3. Breath Sampling Pipette, Disclosure No. 17716, 2-23-65; Case 10993; filed in U. S. Patent Office, 3-1-65.

4. Improved Intravenous Catheter, Disclosure No. 16217, 7-17-63. Case 10985; filed in U. S. Patent Office, 3-17-65.

Canadian Patent, No. 808, 984; Issued 3-25-69; Italian Patent No. 765, 670; French Patent No. 1,483, 989; Belgian Patent No. 680,806; Swiss Patent No. 454,363. Co-inventor: D. Batdorf.

5. Improved Body Organ Apparatus - U. S. Patent No. 3,373,876, issued March 19, 1968.

This invention describes the hollow fiber artificial kidney and the artificial capillary lung.

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RESUME of ALEXANDER WHITE SPEARS III

SPEARS, Alexander White, III: Executive Vice President, Operations and Research; Lorillard, A Division of Loews Theatres, Inc.; 2525 East Market Street, Greensboro, N. C. 27401. RESIDENCE: 3513 Henderson Road, Greensboro, N. C. 27410; PLACE OF BIRTH: Grindstone, Pa. (Sept. 29, 1932); EDUCATION: B.S. Allegheny College, 1953, Ph.D. State University of New York at Buffalo, 1960; MARRIED: Shirley Spears; EXPERIENCE: Research Associate, State University of N.Y. at Buffalo, 1956-58; Research Fellow, State University of N.Y. at Buffalo, 1958-59; Instructor at Millard Fillmore College, 1958-59; Research Associate, P. Lorillard Co., 1959-61; Asst. Professor at Guilford College, 1961-65; Senior Research Chemist, P. Lorillard Co., 1961-65; Director of Basic Research, P. Lorillard Co., 1965-68; Director, Research and Development, Lorillard, A Div. of Loews Theatres, Inc., 1968-71; Vice President, Research and Development, Lorillard, 1971-75; Senior Vice President, Operations and Research, Lorillard, 1975-79; Executive Vice President, Operations and Research, Lorillard, 1979-Present. PROFESSIONAL MEMBERSHIPS: American Chemical Society, Society for Applied Spectroscopy, Plant Phenolic Group of North America, Coblenz Society, American Management Association, New York Academy of Science, Sigma Xi, ASTM, Scientific Commission of CORESTA (International Cooperative Center for Scientific Research Relative to Tobacco - 1972-1976). CONTRIBUTIONS: 25 publications in patent and scientific literature. CURRENT COMMUNITY ACTIVITIES: Board of Directors, United Way of Greater Greensboro, Inc.; Member of the North Carolina Humanities Committee, 1978-Present; Board of Directors, Greensboro National Bank.

BIOGRAPHY

John F. Krasny

EXPERIENCE:

Textile Technologist, Center for Fire Research, National Bureau of Standards, Washington, D. C. Work on development of flammability test methods for general apparel, upholstered furniture, and protective clothing.

Group Leader, Harris Research Laboratory Division, Gillette Research Institute, Rockville, Maryland, 1951-1972. Contract research and development for the fiber, textile, and chemical industry and the U. S. government.

Various positions in textile manufacture, testing, and research in the U. S. and Central Europe, 1936-1941, 1945-1951.

EDUCATION:

B.S. in Physics, University of Denver, 1948.

B. S. in Statistics, American University, 1958.

Diploma, European Textile Schools, 1936.

Born in Vienna, Austria, October 1914.

MILITARY SERVICE: U. S. Army, Infantry and Military Intelligence Service (Interrogator of German Prisoners, European Theater of War), 1941-1945

MEMBERSHIPS: American Association for the Advancement of Science;
American Association of Textile Chemists and Colorists;
American Physical Society;
American Society for Testing and Materials;
Cellulose Section of the American Chemical Society;
Fiber Society;
Information Council on Fabric Flammability;
National Fire Protection Association;
National Smoke, Fire, and Burn Institute

PUBLICATIONS: About 65 publications, of which 35 are in the area of flammability and protective clothing. Two patents.

ARTHUR C. DELIBERT

Bar Memberships: New York State and the District of Columbia.

Legal Education: New York University Law School, J.D. degree, June 1978.

Activities: Editor, Moot Court Board; Alternate Member, National Moot Court Team, 1977.

Pre-legal Education: Cornell University, B.S. degree in electrical engineering, June 1968.

Honors: Tau Beta Pi (engineering honorary).
Eta Kappa Nu (electrical engineering honorary).

Activities: Watermargin House (cooperative living unit with interracial and international emphasis): President, 1967-68; Vice-president, 1966-67.

Employment History

Citizens Committee for Fire Protection
2000 P Street N.W.
Washington, D.C. 20036

President, March 1982 to date. Responsible for substantive, administrative, and fund-raising activities of a new public interest group established to press for changes in public policies related to America's excessive fire losses.

U.S. Securities and Exchange Commission
450 Fifth Street N.W.
Washington, D.C. 20549

Legal Assistant to Commissioner Barbara S. Thomas, October 1980 to February 1982. Principal aide to Commissioner of a major federal regulatory agency. Analyzed and discussed with Commissioner many proposed court cases, administrative proceedings and rulemaking actions which staff presented to Commission for approval; prepared Commissioner's speeches, articles, and other public statements; and assisted Commissioner with congressional relations, staff liaison, and office operations.

Employment History (continued):

Staff Attorney, Office of the General Counsel,
October 1978 to October 1980. Responsible for review and legal analyses of court actions and administrative rulemaking proposed to the Commission by various staff divisions. Frequently prepared short memoranda to the Commission exploring selected aspects of proposed cases; prepared in-depth memoranda exploring issues of unusual or recurring importance; and appeared at Commission meetings to present the position of the Office of the General Counsel. Also analyzed requests for release of information under the Freedom of Information Act and, occasionally, prepared appellate briefs. Performance rating: Outstanding.

New York University
School of Law
40 Washington Square South
New York, New York 10012

Research Assistant to Professor Robert C. Pozen,
April to November, 1977. Research, proofreading, and some editing for new law school text, Financial Institutions: Cases, Materials & Problems on Investment Management, West Publishing Co., 1978.

Center for Auto Safety
1223 Dupont Circle Building
Washington, D.C. 20036

Associate Director, May 1974 to August 1975. Second in charge of a public interest auto safety group with a staff of 14 and an annual budget of \$250,000. Served approximately three months as Acting Director.

Staff Engineer, September 1971 to May 1974. Responsible for several projects or portions of projects requiring technical analysis, including studies of highway design and snowmobile safety.

Selected Reports and Articles:

Civil Liability for Arson Fires (a study of owners' liability for fires in vacant and partially-occupied structures), to be released shortly by the Battelle Memorial Institute.

Reports and Articles (continued):

"Preventing Fires in America's Inner Cities," Ways and Means, May/June 1983 (lead article).

"The Long, Unfinished Fire Agenda of the Consumer Product Safety Commission," The International Fire Chief, April 1983.

"What's Wrong With Highway Engineering," Traffic Engineering, May 1975.

The Yellow-Book Road -- The Failure of America's Roadside Safety Program, Center for Auto Safety, 1974 (an in-depth study of the neglect of safety in the federal-aid highway program, focusing on the complex interaction between the Federal Highway Administration and the various state highway departments; principal author).

Other Qualifications and Associations:

Member, National Fire Protection Association.

Member of the Takoma Park, Maryland, Volunteer Fire Department.

Emergency Medical Technician (Ambulance), certified by the State of Maryland.

References: Available upon request.

PHILIP S. SCHAENMAN

Education: B.S., Engineering and Liberal Arts, Queens College, 1961,
magna cum laude
B.S., Electrical Engineering, Columbia University, 1961
M.S., Electrical Engineering, Stanford University, 1962
Professional Degree of Electrical Engineer, Columbia
University, 1963

Experience:

Mr. Schaenman is President and Founder of TriData Corporation of Arlington, Virginia, which specializes in information systems and data analysis for government and industry, especially in fire protection. He is an expert in fire data analysis and advises many industries and fire departments as well as the federal government. He is a Member of the NFPA's Fire Reporting Standards Committee.

From 1976-1981, he was Associate Administrator of the U.S. Fire Administration and head of the National Fire Data Center. He was responsible for the development of the National Fire Incident Reporting System and for the national estimates of the fire problem. Before becoming Associate Administrator, Mr. Schaenman founded and headed the Analysis and Evaluation Division in the Fire Administration.

Mr. Schaenman was the coauthor and manager for the series of data reports, Fire in the United States. He taught fire data analysis at the National Fire Academy to over 500 fire chiefs and developed materials for the data portion of its Executive Development III course. He wrote the data chapter in Managing Fire Services, published by the International City Management Association.

Mr. Schaenman previously was a senior research associate at The Urban Institute, and was head of various groups at Bellcomm, Inc., which worked on data information systems issues in the manned spaceflight program and in corporate management for AT&T.

Statement of Philip S. Schaenman
President, TriData Corporation
November 16, 1983

Statistics on Smoking-related Fires

I would like to present a summary of the latest statistics on smoking-related fires and the implications of the data for the various approaches to reducing the problem. Also, I would like to discuss the sources and quality of the data being used. Just last week, TriData completed the first detailed analysis of the newly available 1982 NFIRS data so that this committee could have the best information to work with. It shows a change in the situation, and I will present the details later on.

First, let us be clear that the problem is real. While the precise number of smoking-related fires is not known and probably cannot be known, smoking-related fires are the leading cause of fire deaths in the United States and this has been the case for years. Careless smoking also appears to be the leading cause of fire deaths in the majority of individual states. (The big exception is the southeastern states where heating is the number one cause.)

Careless smoking is among the leading causes of fire deaths in every nation in the Western world for which we have data, though not necessarily the number one cause. It is also one of the significant causes of fires and injuries from fires in other countries, just as it is in the United States.

Let us look at the specific data, starting with the national estimates of the big picture so that we can put the smoking-related fire data in proper perspective.

The estimated numbers of fires and fire deaths in the United States in 1981 and 1982 were as follows:

Table 1.
U.S. Fires and Fire Deaths

	<u>Total Fires</u>	<u>Residential Fires</u>	<u>Total Fire Deaths</u>	<u>Residential Fire Deaths</u>
<u>1981</u>				
USFA estimate	2,828,000	714,000	7,600	6,100
NFPA estimate	2,894,000	733,000	6,700	5,500
<u>1982</u>				
USFA estimate	NA	NA	(6,800) ¹	(5,600) ²
NFPA estimate	2,438,000	677,000	6,000	4,900

Change from 1981 to 1982 (NFPA only)	-356,000 -12%	-56,000 -8%	-700 -10%	-600 -11%
=====				

¹ USFA has not made 1982 estimates; this TriData estimate assumes that the USFA-to-NFPA ratio of 1981 would have been the same in 1982.

² TriData estimate based on residential being 80% of the total fire deaths.

The "fires" shown in Table 1 are fires reported to the fire service. This is important to keep in mind when we discuss the sharp drop in reported smoking-related fires. Note also that 80% of all fire deaths occur in residences. Even a greater percentage (95%) of smoking-related fire deaths occurs in residences, so we will concentrate on the residential data.¹

Despite the 10% drop in fire deaths and the drop in fires, the United States probably continues to be first or second in fire deaths per capita in the world. We had more than double the average death rate for countries

¹ NFIRS 1982: only 18 out of 379 deaths with smoking materials (i.e., cigarettes, cigars, pipes) as the ignition source were not in residences.

in the Western world throughout the last decade, as Figure 1 shows. And we had one of the highest number of structural fires per capita among any nation, as shown in Figure 1. More recent data on other countries has not been published; however, the situation is likely to be similar, since the gap was so large.

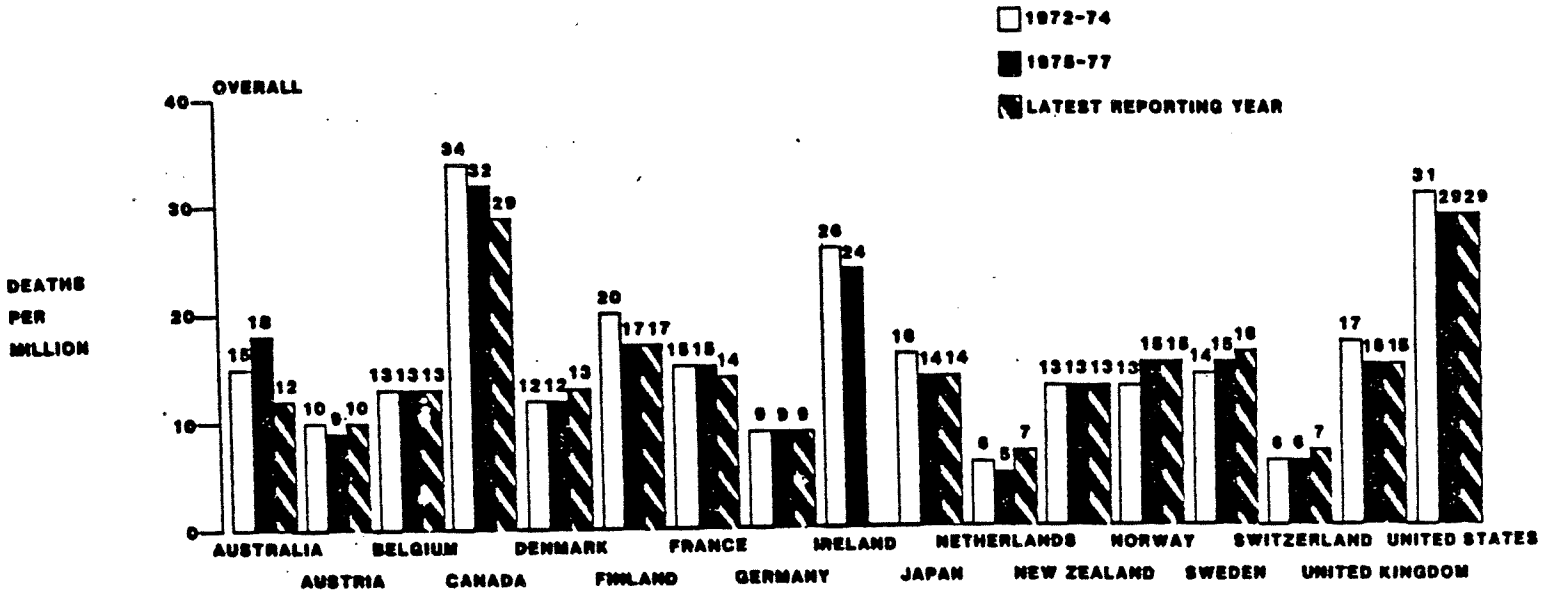
In December 1982, I published a report on International Concepts in Fire Protection, with which some of you are familiar. This report discussed the approaches European countries have used to reduce their fire problem, such as more attention to public education on fire safety, holding the careless consumer responsible for his/her actions through court fines and insurance penalties, etc. Smoking is the leading cause of fire deaths in England, and one of the highest in other countries, according to the fire services with whom I visited. (Data by cause are not available for most countries in a readily comparable form.)

However, while there has not been a definitive study to statistically demonstrate why their death rate is so much lower than ours, we can eliminate some reasons. There is only a weak and not statistically significant correlation of their cigarette consumption per capita to their fire death rate per capita.¹ In England, the cigarette consumption per capita is 84% of ours, yet the fire death rate is only 54% of ours. In the U.S., there also is no correlation between cigarette consumption and smoking-related fire deaths, as we shall see later. The Europeans use U.S. tobaccos in making most of their cigarettes; the little testing done has not found their cigarettes to be safer -- and they smoke many U.S.-made cigarettes. In France, where the government has a monopoly on cigarette production, as in other European countries, they are doing no research on fire-safe cigarettes, having achieved their desired safety goals through other means -- especially by focusing on consumer carelessness. We do not, of course, have to follow their pattern, but they do provide a multitude of examples where other approaches have worked.

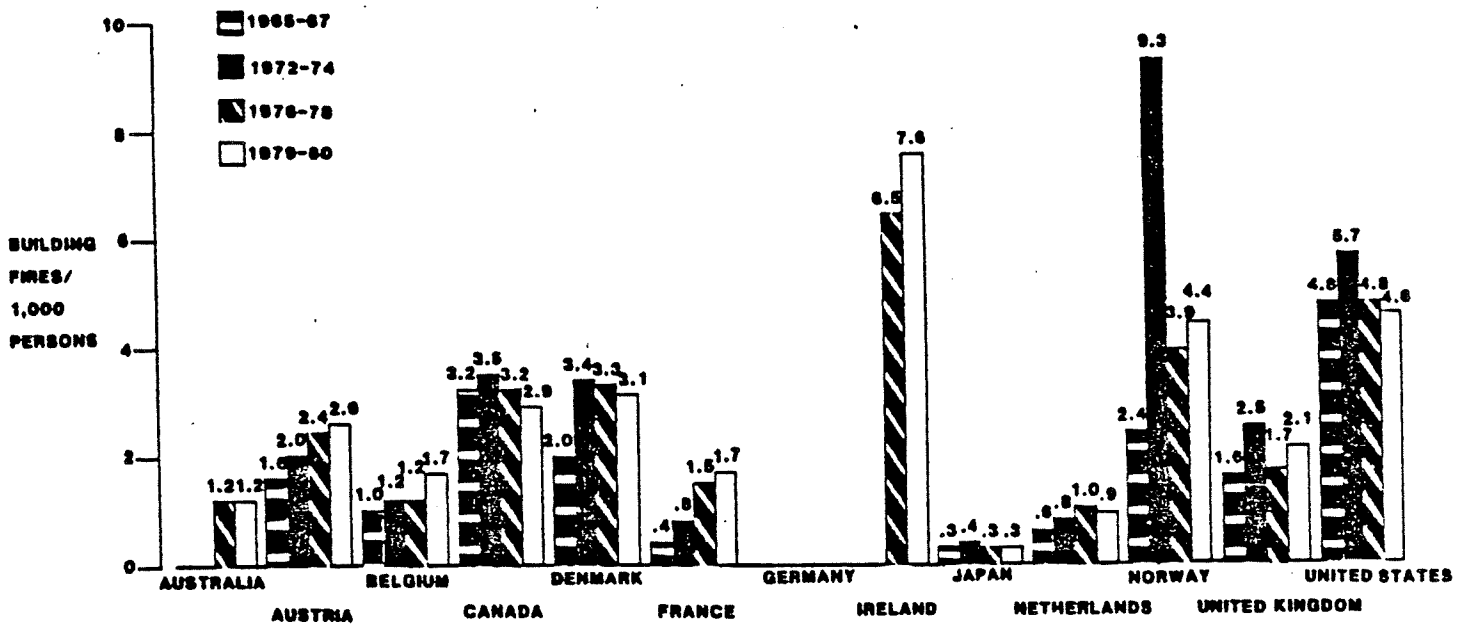
¹ Schaenman letter to Congressman John Moakley, July 25, 1983.

Figure 1. International Fire Statistics

COMPARISON OF FIRE DEATH RATES



COMPARISON OF BUILDING FIRE INCIDENCE



Source: Selected International Comparisons of Fire Loss 1979-1980, Jerry Banks, Georgia Institute of Technology, Atlanta, Georgia, September 1982.

Smoking Totals

Let us turn now to smoking-related fire statistics in the United States. "Smoking-related" is defined following the U.S. Fire Administration definition. It includes fires involving cigarettes, cigars or pipes that were not incendiary or suspicious (i.e., over 98% of all fires in NFIRS in which cigarettes, etc., were the ignition source). The definition does not include fires started by matches or lighters. Over 95% of the smoking-related fires have cigarettes rather than cigars or pipes as the ignition source, so we will not break them out separately (though the data are available to do so should it be so desired).

Table 2 shows the smoking fire death data for 1981 and 1982. Two different estimates for the total deaths are presented, one based on USFA estimates and the other on NFPA estimates. All of the estimates use NFIRS data to apportion the total number of residential deaths to smoking.

The proportion of residential fire-related deaths attributable to smoking went down to 31.5% from 35%. It is still the leading cause, but the reductions are encouraging.

There has been a sharp drop in residential smoking-related fire deaths from 1981 to 1982, by 18-20%, or about 400 deaths. (Earlier we saw that overall residential fire deaths dropped by 11%, so smoking-related deaths went down even more sharply.) Thus, the absolute magnitude of the problem is dropping sharply.

About three-quarters (73%) of residential smoking-related fire deaths occur in one- and two-family residences, about the same proportion as the proportion of the population living in them.

Table 3 shows the data on smoking-related residential fires for 1981 and 1982. Similar to deaths, the number and percentage of smoking-related fires are sharply down by about the same percentage as deaths.

**Table 2.
Smoking-related Fire Deaths**

<u>Class</u>	<u>1981</u>		<u>1982</u>		<u>Change</u>
	<u>Number of Deaths</u>	<u>% Class</u>	<u>Number of Deaths</u>	<u>% Class</u>	
<u>All Occupancies</u>				18.3	
<u>Residences</u>					
NFPA	1,939	} 35%	1,555 ¹	} 31.5%	-384 (-20%)
USFA	2,144		1,764 ²		-380 (-18%)
		<u>% Res. Smoking Deaths</u>		<u>% Res. Smoking Deaths</u>	
1-2 family	1,385	} 73%		} 73%	
Mobile Home	171				
Apartment	418	19%		25%	
Hotel	110	5%		1%	
Other	<u>60</u>	<u>3%</u>		<u>1%</u>	
	2,144	100%		100%	

1 Based on TriData analysis of the 1982 NFIRS data and the NFPA 1982 fire death estimate.

2 Based on TriData analysis of the 1982 NFIRS data and an assumption that the USFA-type of death estimate would be proportionally higher than NFPA's in 1982 as it was in 1981.

**Table 3.
Smoking-related Residential Fires**

	<u>1981</u>		<u>1982</u>		<u>Change</u>
	<u>Number Fires</u>	<u>% Res. Fires</u>	<u>Number Fires</u>	<u>% Res. Fires</u>	
Residential	65,000	9.1	51,300	7.6 ¹	-13,700 -21%

1 Percentage developed by TriData analysis of NFIRS 1982 tapes, then multiplied by estimates of total residential fires from the NFPA 1982 survey to obtain the estimate of smoking-related fires.

Long-Term Trends

Figure 2 shows the trends in total fire deaths and smoking-related fire deaths over the past six years. Fire deaths have trended downward from 1977 to 1981, and continued to do so in 1982. The estimates of smoking-related fire deaths have larger variance than the total because of their small proportion of the total, and it was hard to discern a trend until the 1982 data became available -- and the trend is downward.

Figure 3 shows the trends in the causes of fires in one- and two--family dwellings. The chart for 1977-1981 is from the USFA; TriData computed the 1982 figure for smoking. (Data on the other causes is available but was not computed simply because of lack of time.)

Smoking-related fires have decreased each year now for six years, with 1982 being the largest percentage drop. The trend is smoother partly because of the much larger number of fires than deaths, and possibly because the number of "unknowns" is smaller for fires than for deaths.

Smoking is the fifth cause in frequency of fires, though first in fire deaths (and injuries).

Smoke Detectors

What are the reasons for the decreases shown in Figures 3 and 4, and especially the sharp drop in 1982?

One major contributing factor most likely is smoke detectors, which increased in coverage from less than 5% of households in 1975 to 20% in 1977, to 50% in 1980, to 67% in 1982 (based on USFA-sponsored national surveys). Of particular significance may be that at least one-third of the poor and elderly had detectors in 1982, and they have been the disproportionate victims of fires, especially smoking-related fires.

Table 4 shows the latest findings on the presence of smoke detectors in smoking-related fire deaths.

Figure 2. Fire Deaths

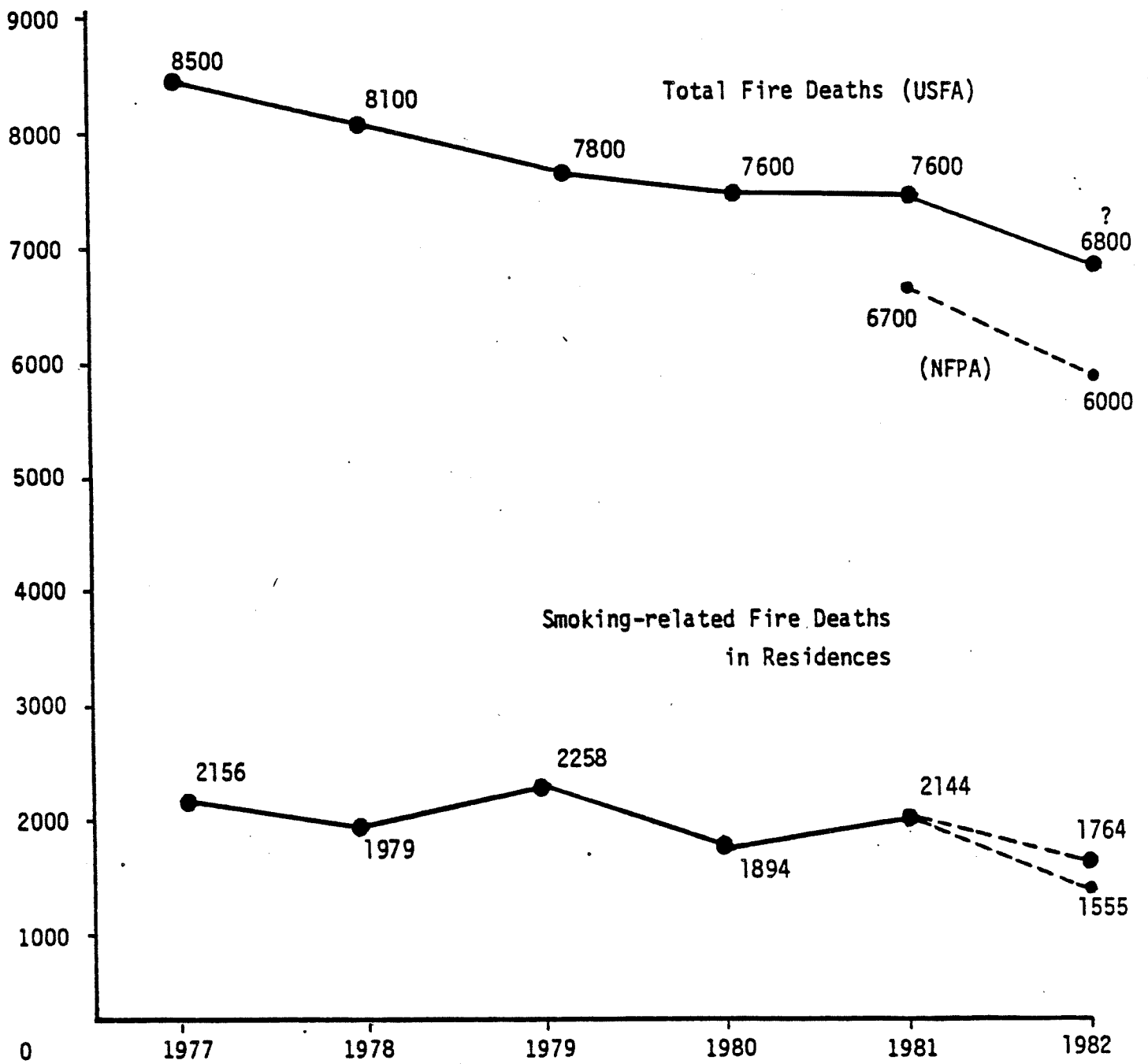


Figure 3. Trends in Selected Causes of Fires
in One- and Two-Family Dwellings

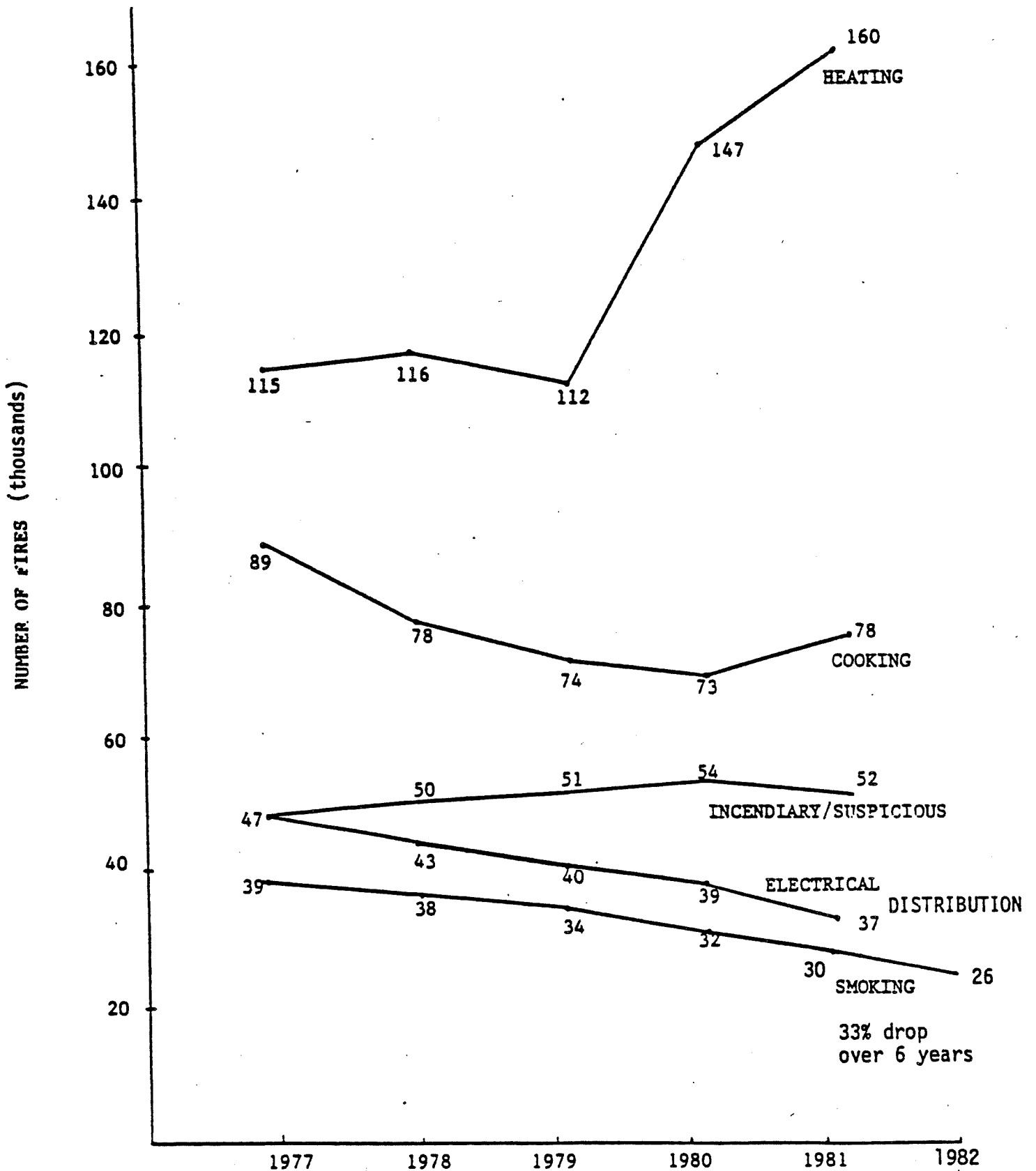


Table 4.
Detectors in Smoking-related Residential Fire Deaths
(1982 NFIRS)

	<u>Deaths</u>	<u>%</u>
No detector	194	83
Detector present but did not work	12	5
Detector worked	<u>28</u>	<u>12</u>
	234	100

Of the 234 smoking-related deaths (about two-thirds of all smoking-related deaths) for which the fire service reported on the presence and operation of detectors in NFIRS in 1982, 83% had no detectors and another 5% no working detector. That is, 88% of the deaths occurred where detectors were not available to help, even though 67% of households now have detectors.

Thus, we see that fire deaths have decreased as detectors spread, and that the fire deaths that still occur almost always do not have a working detector present. This strongly suggests that we have not "bottomed out" on the effectiveness of detectors for smoking-related fire deaths, despite the fact that they often involve people who are intoxicated. The further spread of detectors should make further in-roads into smoking-related fire deaths.

Frequency of Deaths per Fire vs. Smoke Detectors

Most smoking-related fire deaths occur one per fire. Table 5 shows the number of deaths in multiples.

Thus, in 97.7% of smoking-related fires reported to the fire service, there are no deaths. The death scenario circumstances are relatively rare. Of the 2.3% of reported smoking-related fires where a death occurs, 88.5% involve one death. The number of "third parties" who die beyond the smoker cannot be determined from existing data. (Though some people are quoting such numbers, they do not exist nationally.) We can see that the

Table 5.
Number of Deaths per Smoking-related Residential Fire
(1982 NFIRS)

<u>Number of Deaths/Fire</u>	<u>Number of Fires</u>	<u>Number of Deaths</u>
0	12,750	0
1	269	269
2	23	46
3	7	21
4	3	12
5	1	5
6	1	6
7 or more	<u>0</u>	<u>0</u>
	13,054	359

minimum number of third parties is 55 of the 359 deaths, or 15%, not the 40% sometimes quoted. However, that is the minimum, since some of the victims in some of the one-death fires may be someone other than the smoker.

Information on detectors was reported for 20 of the 35 multiple death smoking-related fires in the 1982 NFIRS. Only one out of twenty was reported to have had a detector present and operating; the other 95% had no detector. That is remarkably low considering the percent of households with detectors in 1982. It also suggests that having detectors present may eliminate much of the risk to "third parties."

Upholstered Furniture

The classic fire scenario involving smoking is a cigarette being dropped on upholstered furniture or bedding. Table 6 shows the proportions for fires and deaths.

Upholstered furniture was ignited first in connection with about two-thirds of smoking-related fire deaths for which the form of material first ignited was specified. By contrast, bedding and mattresses account for more than half of all smoking-related fires. Upholstered furniture,

mattresses, and bedding -- considered together -- account for 83% of the smoking-related fire deaths, with the largest part of the remainder of the deaths having an unknown form of material ignited. In all smoking-related fires where the form of material first ignited is identified, it is either upholstered furniture, bedding or mattresses, as shown in Table 6.

Table 6.
Upholstered Furniture and Bedding/Mattresses
in Smoking-related Residential Fires
(1982 NFIRS)

<u>Form of Material First Ignited</u>	<u>Fires</u>	<u>%</u>	<u>Fire Deaths</u>	<u>%</u>
Upholstered Furniture	3,711	45	195	66
Bedding and Mattresses	4,560	55	99	34
	8,271		294	

Thus, fire-resistant upholstered furniture and bedding/mattresses should be considered in selecting approaches to solve the smoking fire problem. Improvements in these products may have already contributed to the progress made to date.

Age

Table 7 shows the distribution of the 1982 NFIRS smoking-related fire death victims by age:

Table 7.
Age Distribution of Smoking-related Fire Deaths
(1982 NFIRS)

<u>Age Group</u>	<u>Number</u>	<u>%</u>
4 and under	14	4
5-19	22	6
20-34	44	13
35-49	30	9
50-65	70	20
66-80	52	15
81-95	24	7
Not given	95	27
	351	100

Thus, 90% were adults. Few were very old or very young, and this was supported by data in Table 9, "Condition Before Injury -- Smoking-related Fire Deaths" (page 14), where only 2% were listed as too young or too old to act. (In statements by others, the proportions of very young and very old victims have been said to be much higher than these results support.)

Nature of Injury

The vast majority of the fire death victims were reported by the fire service as having injuries from smoke alone or a combination of smoke and burns. (Of course, autopsy data would be better.) Only a small fraction were reported as having burns alone. This data from firefighters is generally consistent with the more detailed Berl-Halpin Johns Hopkins University study¹ in which the preponderance of Maryland fire death victims in 1972-1977 were found to have died from the toxic gases (especially CO) in the smoke.

Table 8.
Nature of Injury -- Smoking-related Fire Deaths
(1982 NFIRS)

	<u>Number</u>	<u>%</u>
Burns	11	3
Burns and smoke	170	48
Smoke alone	70	20
Other	10	3
Unknown	<u>90</u>	<u>26</u>
	351	100

¹ Human Fatalities from Unwanted Fires, Walter J. Berl and Byron M. Halpin, April 1979.

Condition Before Injury and Public Education

Table 9 shows that the largest category of "condition before injury" was asleep. Some of these people may well have been intoxicated. Very few are listed as awake and unimpaired.

Table 9.
Condition Before Injury -- Smoking-related Fire Deaths
(1982 NFIRS)

<u>Condition</u>	<u>Number</u>	<u>%</u>
Alcohol- or drug-impaired	42	12
Bedridden or other physical handicap	21	6
Asleep	129	37
Too young to act	5	1
Too old to act	4	1
Awake, unimpaired	18	5
Other	3	1
Unknown	<u>131</u>	<u>37</u>
	351	100

The Johns Hopkins study found that over half of the adult victims were alcohol-impaired. Some believe that this means that prevention education cannot reduce the number of victims.

However, many are not alcohol-impaired and not handicapped. Further, it is not clear that public education could not have an effect even on those intoxicated. The Germans, for one, believe that public education messages can influence fire safety behavior even of those intoxicated (not for receiving a new message, but for remembering well-implanted ones).

I do not know of any research specifically addressing the effectiveness of public education on smoking-related fires, and people certainly are aware that a burning cigarette should be handled with care. But there is extensive evidence that good public education fire safety programs can work.

Deaths vs. Cigarette Consumption

There is no apparent correlation between smoking-related fire deaths and cigarette consumption in the U.S., as seen from Figure 4. For example, the year with the largest rise in consumption (1980) was also the year with the second largest drop in the death estimate. Also, the year to year changes in consumption are much smaller percentage-wise than the year-to-year changes in the death estimates. Though the death estimates variance is high and could conceivably mask some slight correlation, there is no valid reason to believe it exists.

Over 600 billion cigarettes are smoked annually in the U.S., of which nine millionths of a percent (51,000) result in fires reported to the fire service, and three-tenths of a millionth of a percent result in a death. If we assume smokers smoked over a pack a day, the odds would be little more than one fire per million smokers. Also, the subpopulation most susceptible to having an accidental fire may be (and probably is) very different from the general population of smokers.

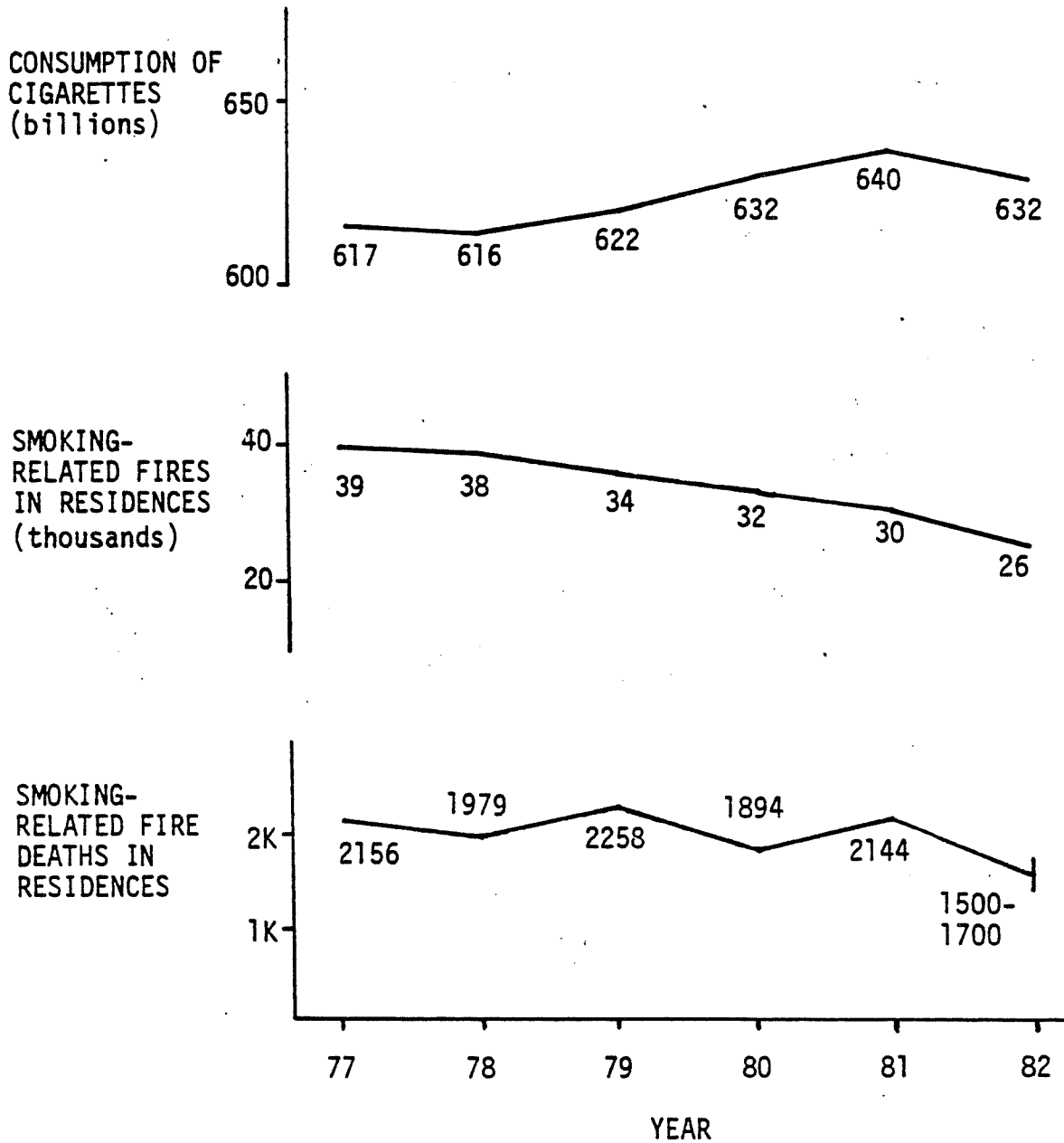
Methodology for Death Estimates

National statistics on smoking-related fire deaths have been available in a consistent manner for only six years, since the National Fire Incident Reporting System started.

The NFIRS has grown each year, as more states and fire departments join the system. The 1982 NFIRS data is the most comprehensive "sample" to date, with 180,000 residential fires out of the total 667,000 residential fires estimated by NFPA, and 2,072 out of 6,000-6,800 deaths. In other words, between 1 in 3 and 1 in 4 fires and fire deaths are in the data base. In previous years, it was close to 1 in 5.

Nevertheless, the statistics on smoking-related fire deaths are all based on the 379 fire deaths in the NFIRS data base that are attributed to smoking. The assumption is made by most analysts that the fires of "unknown" reported cause are distributed like the knowns. Unknowns comprise about a quarter of the fire deaths in NFIRS. So the 379 is scaled upward by a factor of 4/3.

Figure 4. Cigarette Consumption and Smoking-related Fires and Deaths



Then the data is scaled up to national estimates using the ratio of the total fire deaths estimated by the U.S. Fire Administration or NFPA to the number in NFIRS, another factor of 4 or 5. The USFA estimates and NFPA estimates have differed sharply over the years, and the shape of the fire death trend curves have not been the same. The USFA in 1981 estimated 900 more deaths than did NFPA. The NFPA estimate is based on a statistical analysis of a non-random sample of 2,000-3,000 fire departments that elect to respond to their survey. The USFA estimate is based on death certificate information from the National Center for Health Statistics, with adjustments for certain types of fire deaths missed.

No one knows the precise number of fire deaths, let alone smoking-related deaths. But the trends are beginning to emerge and the dimensions of the problem are taking enough shape to give us our best ever look at the problem.

Summary

There are many loose ends in our statistical view of fires, including those fires caused by careless smoking. We are sure the smoking-related problem is significant, but it is declining markedly. There are many links in the chain of events leading to a smoking-related fire that can be attacked. I subscribe to the philosophy that was articulated by the past directors of the Center for Fire Research at the National Bureau of Standards, which was that no one element of a prevention program is likely to be perfectly implementable or to work perfectly, and that several lines of defense are needed (Lyons and Clarke). The cigarette itself certainly should be examined, but there are a number of other ways to attack the problem if a satisfactory change in the product is not possible.

Smoke detectors seem to have played a significant role in the downward trend of smoking-related fire deaths. The spread of detectors should be further encouraged and smoke detector maintenance emphasized. The influence of drinking on fire victims has clouded the picture as to the potential for public education, but many victims are not impaired and some people believe public education may even help reduce the alcohol-related

deaths. Upholstered furniture and bedding are overwhelmingly the things that smolder or catch fire first and should continue to be the focus of research and what has already been learned should be applied in the manufacture of these products to increase fire resistancy -- especially upholstered furniture.

CITIZENS COMMITTEE FOR FIRE PROTECTION

A Non-profit Corporation Working in the Public Interest

Statement Before the IAFC
Ad Hoc Committee on Fire Safe Cigarettes,
November 16, 1983

I appreciate the opportunity to appear before this Committee. The Citizens Committee for Fire Protection is an independent, non-profit organization dedicated to reducing the toll of death and destruction caused by fire. Our own inquiries lead us to conclude that the tobacco industry can make safer cigarettes, and that such cigarettes will go a long way toward lowering this Nation's excessive fire death rate. In fact, it is the single fastest and most effective action now available to us to lower fire deaths.

Cigarette Technology and the "Self-Extinguishing Cigarette"

I would like to start by urging that this Committee broaden its line of inquiry in one critical way. The questions you have posed all refer to "self-extinguishing" cigarettes. This is too narrow a focus, and excludes a very promising approach. The National Bureau of Standards laboratory tests found that some commercial cigarette brands, although they burned completely, did not ignite the underlying upholstery fabrics.¹ These cigarettes are not "self-extinguishing," but their universal use would prevent many fires.

In line with this research finding, none of the currently-pending federal or state bills that we know about is limited to

self-extinguishing cigarettes. They all provide that cigarettes would have to either self-extinguish or burn all the way down without igniting an underlying fabric.

Accordingly, we ask that you also consider the issue in these broader terms, and be sure to discuss each approach separately in your final report.

I would also like to point out to you that the tobacco industry has concentrated in its public statements on criticizing only self-extinguishing cigarettes.² By-and-large, they have ignored the other approach. Many of the arguments and concerns they raise about self-extinguishing cigarettes do not apply to the other approach.

Fire-Safe Cigarettes Need Not Result in Increased Health Risks.

The cigarettes that burn completely without causing upholstery fires may actually lower the smoker's tar and nicotine exposure. The National Bureau of Standards' researchers were uncertain why these cigarettes did not cause fires. However, they suggest that two factors were lower packing density of tobacco (which causes the cigarette to burn cooler) and narrower diameter (which results in less contact between the cigarette and the fabric, and therefore less efficient heat transfer). Both of these design features produce lower tar and nicotine levels. In fact, one of the cigarettes successfully tested by the NBS was Carlton, supposedly the lowest tar and nicotine cigarette on the market.

I also call your attention here to the growing body of medical research that questions whether low tar and nicotine cigarettes

really produce any significant health benefit.³ This research apparently shows that smokers of low tar and nicotine cigarettes are taking the same amounts of nicotine into their blood stream as they would if they smoked high tar and nicotine cigarettes.

I am not qualified to discuss or evaluate this research. I have suggested before that this committee hear directly from the authors of these studies, and I reiterate that suggestion now. If their work withstands scrutiny, it suggests that we have far more leeway in changing the cigarette than we may have thought previously.

In an appendix to this testimony, I have covered the other technical questions about which the Committee asked, questions such as the feasibility of alternative solutions to the cigarette fire problem, and whether fire-safe cigarettes will require greater use of matches and lighters. However, I would like to turn now directly to the last question on your issue paper, "What should the IAFC position be?" Since I am apparently the only lawyer in the group, I believe it would be helpful if I could review with you the provisions of the various bills pending before Congress, compare them with one another, and describe the areas we think you should look for as Congress considers and modifies these bills.

Review and Comparison of Pending Federal Legislation

Two major pieces of safe-cigarette legislation are currently pending in Congress. The first is HR 1880, introduced in the House by Congressman Moakley of Massachusetts. It would give the CPSC two years to develop a standard for fire-safe cigarettes, and authority to implement that standard if it is feasible and can be done without imposing unacceptable health and economic burdens. S. 1935, introduced by Senator Heinz of Pennsylvania, provides simply for a two-year study, to include development of a standard and consideration of health and economic consequences.

There are five areas that we think are important in considering whether these bills, and various proposals floated by the tobacco industry, will be useful and effective: Pre-emption of state efforts; the composition of the study committee; the mandate given to the study group or agency; its authority to compel production of important information from the cigarette companies; and the extent to which such information will be regarded as secret.

Pre-emption: The first issue is whether federal research and regulatory efforts will displace or pre-empt state efforts to require fire-safe cigarettes. There are many areas in the law where, once the federal government acts, or decides that no action is appropriate, the states are prohibited from imposing their own standards. Those of you who are dealing with shipment of hazardous materials through your jurisdictions are no doubt already familiar with this concept.

The Heinz bill, which provides only for a study of the feasibility of fire-safe cigarettes, contains no pre-emption clause.

States would be free to continue their regulatory work during the federal study.

The Moakley bill places the project in the hands of the Consumer Product Safety Commission. There is no pre-emption of state efforts during the two-year effort to prepare a rule. Under the Commission's current operating statute, though, once the rule is in place state standards are pre-empted unless the CPSC rules otherwise.

We certainly do not favor any pre-emption of state efforts until a federal standard is in place. We believe one of the great strengths of the American system is that we have, in the 50 states, 50 different laboratories to try out various approaches to new and difficult social problems. Those of you who are local officials are well aware that the federal government has no monopoly on wisdom.

In any event, we also believe that the current activity on fire-safe cigarettes at the state level is a major force motivating the federal action. We would like to see this continue. From this perspective, either the Heinz or the Moakley bill is acceptable.

One of the most unfortunate combinations would be a permanent pre-emption of state efforts with no guarantee of a federal standard. There is talk among some tobacco people of a bill to establish a two-year federal study, accompanied by a pre-emption of state efforts that would last forever. We trust the IAFC would join us in condemning any such bill.

Composition: A second issue is the composition of the study group. The Moakley bill places the entire project within the CPSC, although it's strongly implied that they are to work closely with the National Bureau of Standards in setting the basic standard and with the National Institute of Health in considering the potential health effects.

The Heinz bill establishes a Task Force composed of six federal officials and one tobacco industry representative. The federal officials would come from the National Institute of Health, the Department of Health and Human Services, the Surgeon General's Office, the CPSC, the Federal Trade Commission and the NBS. Under the Task Force would be a 15-member Technical Advisory Group. Four members would come from the tobacco industry and one from the American Burn Association. The other 10 members are not specified.

Either of these seems acceptable, although we would like to see greater consumer input on the Heinz bill's Technical Advisory Group, and you would no doubt like to see greater fire-service representation.

We have to watch very carefully the composition of these study groups. We can expect that any tobacco industry representatives will vote as a group. It would be very unfortunate if the study group were dominated by tobacco representatives and a few of their hand-picked friends from the fire service. Such a study group would be suspect from the very beginning, and in two years we would be right back where we started from.

Mandate: A third important issue is the mandate given to the study group or agency. Here, the Moakley bill is clearly superior. It directs the CPSC to research and establish a standard, if that can be done in two years and without producing unacceptable health and economic consequences. The Heinz bill provides for a simple study; what is to be done with the results, we won't know for several years.

We favor the Moakley bill here for obvious reasons. It is very difficult to gather together all the forces to take on a powerful lobby like the cigarette industry. Under the Heinz bill, we have to gather them once this year to authorize a study; again two years from now to authorize CPSC or some other agency to act on the study's results; and possibly a third time to pass on the standard the agency devises.

The Moakley bill would take care of all those steps at once, but give the CPSC clear guidelines about whether it should impose a standard. For the fire service, which does not have a history of strong lobbying, the Moakley bill seems preferable.

Authority to obtain information: Another important area is the authority of the study group or agency to require that the tobacco industry give it the information it needs. The Moakley bill places the study in the hands of the CPSC, which already has subpoena power to obtain information it needs.

The Task Force established by the Heinz bill has no such power. It can insist on information from other federal agencies, but it has no specified power to compel the tobacco companies to deliver important information.

Again, we favor the Moakley bill. The tobacco industry is obviously resisting this effort at regulation, and in the crunch, they are not likely to give up crucial information voluntarily. They could easily claim that the needed information is some sort of trade secret that they do not wish to reveal in front of their competitors. There is no judge or impartial arbiter to review such claims, so the tobacco industry can make them indiscriminately and no one would ever be the wiser.

This is already a problem. We've heard tobacco industry representatives say on several occasions before legislative committees that they've spent vast sums of money researching fire-safe cigarettes, and have yet to discover how to make one. Legislators have asked for copies of these studies, but none are ever forthcoming. In fact, so far as we know, Dr. Spears' paper is the only research work on fire-safe cigarettes that the cigarettes industry has ever published. We often wonder if it's the only such research they've ever done.

The investigating agency here must be given the power to require the production of essential information from the tobacco industry. Only then can it get the information it needs from all parties, and have the full benefit of tobacco industry research, if such research has been done.

Trade secrets: The final area to consider is that of trade secrets. The two bills are largely similar in this respect. Under the Heinz bill, the Task Force determines which information is to be considered secret. That information is then exempt from required

public release under the Freedom of Information Act, and unauthorized release could result in criminal penalties. But the Task Force may use the information in its final report to Congress.

CPSC generally has the same power already. If anything, its statute is slightly more restrictive, since it also must make findings about accuracy and fairness before it can release any product-specific information.

We suggest you be very careful here of bills that are too sweeping in their trade secret provisions. Be especially careful of any bill that would grant trade secret status, across the board, to any and all information the tobacco industry may submit. A provision like that would make the entire basis for the study into a secret affair. No one would be able to analyze or criticize the results of the study, because no one would know what it was based on. The study would be worthless as a scientific and policy-making document, and we would all be back where we started.

For all of these reasons, we favor the Moakley bill, I think if you will take a close look at it, you'll see that it already takes into account the concerns you've expressed, and represents a well-tempered compromise. CPSC would have a reasonable but limited time to look into this matter, and cannot go ahead unless the standard is feasible and the economic and health consequences are acceptable. But if these conditions are met, the Moakley bill allows the Commission to proceed without further delay. And that is as it should be in addressing this very worst aspect of America's fire problem.

Appendix to
Statement Before the IAFC
Ad Hoc Committee on Fire-Safe Cigarettes,
November 16, 1983
Answers to Questions 1, 2, 8 & 9

Safer Cigarettes Will Not Cause an Increased Fire Problem from Use of Matches and Lighters. The IAFC summary of issues raises concern that self-extinguishing cigarettes may result in more frequent use of matches and lighters, and therefore some increase in fire hazard. For several reasons, we do not think there will be such an increase in hazard.

To begin with, there is the very promising category of cigarettes that burn completely without igniting upholstery fabrics. Because these cigarettes do not self-extinguish, there is no reason to think they will result in more frequent use of matches and lighters.

Second, even self-extinguishing cigarettes are not likely to result in particularly greater use of matches and lighters. People will not relight these cigarettes. The tobacco industry has frequently pointed out that relighted cigarettes taste bad, and that people will not want to continue smoking one once it has gone out.

Third, even if changes in cigarette design do result in more frequent use of matches and lighters, the overall result should be a major decrease in fire fatalities. The match-caused fires simply will not be fatal as often as the cigarette-caused fires.

Cigarette fires often occur in circumstances especially dangerous to life. U.S. Fire Administration statistics for 1981 show that while cigarettes caused 8.9% of all residential fires, they caused 35.2% of residential fire deaths.⁴ This disproportionate number of deaths occurs because cigarettes frequently produce a low, smoldering fire that does not become apparent for some time. Thus, a cigarette dropped at 11 p.m. may not cause a visible fire until after everyone in the household is in bed. Thus, while there might be some added danger from the increased use of matches and lighters, the fires they cause are likely to be immediately obvious, and the consequences far less fatal.

Use of the Term "Fire-Safe Cigarettes" Will Not Cause Smokers to Take Increased Risks. The outline of issues for this committee raises the question whether use of the designation "fire-safe cigarette" will give smokers a false sense of security and lead them to take new risks. We think this is extremely improbable.

If legislation passes requiring all cigarettes to be fire-safe, no one after that will talk about fire-safe cigarettes, as such, because it will not be a basis for distinguishing between one brand and another. It won't be advertised or listed on the package as "fire-safe."

In fact, we suspect that the industry will try its best to preserve existing brands and brand names, since they've got a considerable investment in building customer loyalty. They will make sure that changes are minimal, and as a result, few people will even know that they're smoking a "fire-safe" cigarette.

We call your attention to the many other fields where building or product designs have been altered to improve fire safety. There is no indication that people are taking greater risks with their children's sleepwear, or that they're more willing to do dangerous things because they live in a building with plaster walls.

If products are functional, most people simply accept them as they are. They generally do not know or care that safety or some other public purpose has affected the design. Cigarettes will be no exception.

Data on Cigarette Fire Losses

All of the available data show that cigarettes are, by far, the leading cause of residential fire deaths. We rely primarily on U.S. Fire Administration data. Their most recent National Estimates, for 1981, attribute the following losses to smoking materials:⁵

63,518 residential fires, or 8.9% of all residential fires;

2,144 residential fire deaths, or 35.2% of the total;

3,819 residential fire injuries, or 19.0% of the total;

\$305 million in residential property losses, or 10.3% of the total.

We call your attention also to a recent study by the Johns Hopkins University School of Hygiene and Public Health, entitled "Fatal House Fires in an Urban Population." This study found that 39% of the victims of fatal cigarette fires were people other than the smoker. ⁶

Within the category of "Smoking Materials," the U.S. Fire Administration does not give any further breakdown among cigarettes, cigars, pipes, matches, etc. Nevertheless, there is every indication that cigarettes are responsible for the vast majority of these losses.

To begin with, cigarettes are far more common than cigars or pipes. The American public consumes over 600 billion cigarettes each year. Furthermore, as any cigar or pipe smoker can tell you, their devices are already self-extinguishing, sometimes to an irritating degree.

As between cigarettes and the matches or lighters used to light them, the evidence again points to the cigarette as the cause of most fires. The attached chart shows fire deaths from various causes versus time of occurrence. Notice that smoking fire deaths peak in the early morning hours. This points to a smoldering mechanism, something that requires some time before it becomes apparent -- in other words, the cigarette, not the match.

In fact, we've never seen the data on cigarette fire involvement seriously challenged. Tobacco industry spokesmen sometimes deride the data by suggesting that fire investigators blame

smoking when they can't find any other cause. But the data showing that cigarettes play a large role are confirmed by another Johns Hopkins University study. In this one, researchers from the Applied Physics Laboratory studied all fires in Maryland from 1971 to 1977, where someone died within six hours of the fire.⁷ Forty-seven percent of these fatal fires were caused by smoking materials. Their data is especially credible because trained researchers actually examined the scene of each fire. They did not rely on local officials, whose expertise might vary, especially in small communities.

The important point to draw from all this data is simply that cigarettes play such a large role in causing fire fatalities that we cannot hope to get the overall fire problem under control unless we can control the cigarette-caused portion of it. And to accomplish this, mandating safer cigarettes is, by far the best strategy.

Alternative Approaches to the Cigarette Fire Problem are not as Promising.

The IAFC issue paper suggests several alternative approaches to the cigarette fire problem: public education, a more fire-resistant living environment, smoke detectors and residential sprinklers. All of these have serious drawbacks when compared to safer cigarettes.

Education: We are not optimistic about education as a means to solve the cigarette fire problem. It has been the primary

approach used up until now, and the problem is still very much with us.

The target audience for this education may be largely impervious to the message. The 1971-77 Johns Hopkins Study of Maryland fire deaths found that many of the victims of cigarette fires had enough alcohol in their blood to be legally intoxicated. If these people are habitual heavy drinkers, they may be beyond the reach of education programs. And even if they were only occasional drinkers who were drunk at the time of the fire, there is obviously a question of whether they could, at that moment, apply the lessons of any past education.

Furthermore, there is a 1972 study by the Insurance Institute for Highway Safety that calls into sharp question the ability of public education to affect safety-related habits generally.⁸ The Institute went to a city with two separate cable TV networks. On one, they broadcast a series of hard-hitting advertisements promoting seat-belt usage; on the other, no such ads. They stationed observers around the town to note whether motorists wore their belts and to record their license numbers. These numbers were then traced to individual homes, to see which of the two cable channels that home received.

After nine months of this experiment, there was no statistically significant difference in seatbelt usage between those who saw the TV ads and those who did not. Admittedly, this result may not be directly transferrable into residential fire safety education. But it has ominous implications that the advocates of greater safety education have never fully explored.

A fire-resistive environment: 25 years away. The IAFC issue paper also raised the question of a more fire-resistant living environment. The Citizens Committee is following very closely the efforts of the Consumer Product Safety Commission to improve the fire safety of upholstered furniture, and especially to improve its resistance to cigarette ignitions.

Although there are some promising results to this work, there are several serious drawbacks. First, we must consider that upholstered furniture is a major consumer purchase, and remains in use for perhaps 15 to 20 years. Thus, even if we began today making only fire-resistant furniture, it would be 20 years before we replaced the unsafe furniture currently in American homes. The poor and the elderly, who suffer a disproportionate number of fire deaths, would probably be the last to get rid of the old furniture.

Contrast this with cigarettes. Most cigarettes remain in the stream of commerce for a few months at most, and are completely consumed within a few days of purchase. If we could start making only fire-safe cigarettes, the change-over would be complete within a few months.

There is also a question of economic burden. The furniture industry in America is characterized by a large number of small manufacturers. Mandatory changes in product design and manufacturing processes to improve product safety impose a relatively large burden on such small companies.

The cigarette industry, on the other hand, is made up primarily of a very few large companies. They could much more easily absorb the costs associated with changing their products.

Smoke detectors: Smoke detectors also have severe limitations for dealing with cigarette fires. Obviously, they're a very important development and every home should have at least one. But for the slow, smoldering fire often produced by a cigarette on upholstered furniture, the warning may not come in time. Consumers Union found in its 1980 tests of smoke detectors that the average response time of photoelectric detectors to a slow fire was 26 minutes, while for ionization detectors it was 48 minutes.⁹

Furthermore, the data on alcohol involvement in cigarette fire deaths suggest that many potential victims, even if they are alerted by a smoke detector, will be disoriented and may not respond properly.

In any event, it is important to realize that when the detector goes off, the fire is already underway. At that point, there are always a host of dangers and uncertainties. Early warning, important as it is, will never be as good as preventing the ignition.

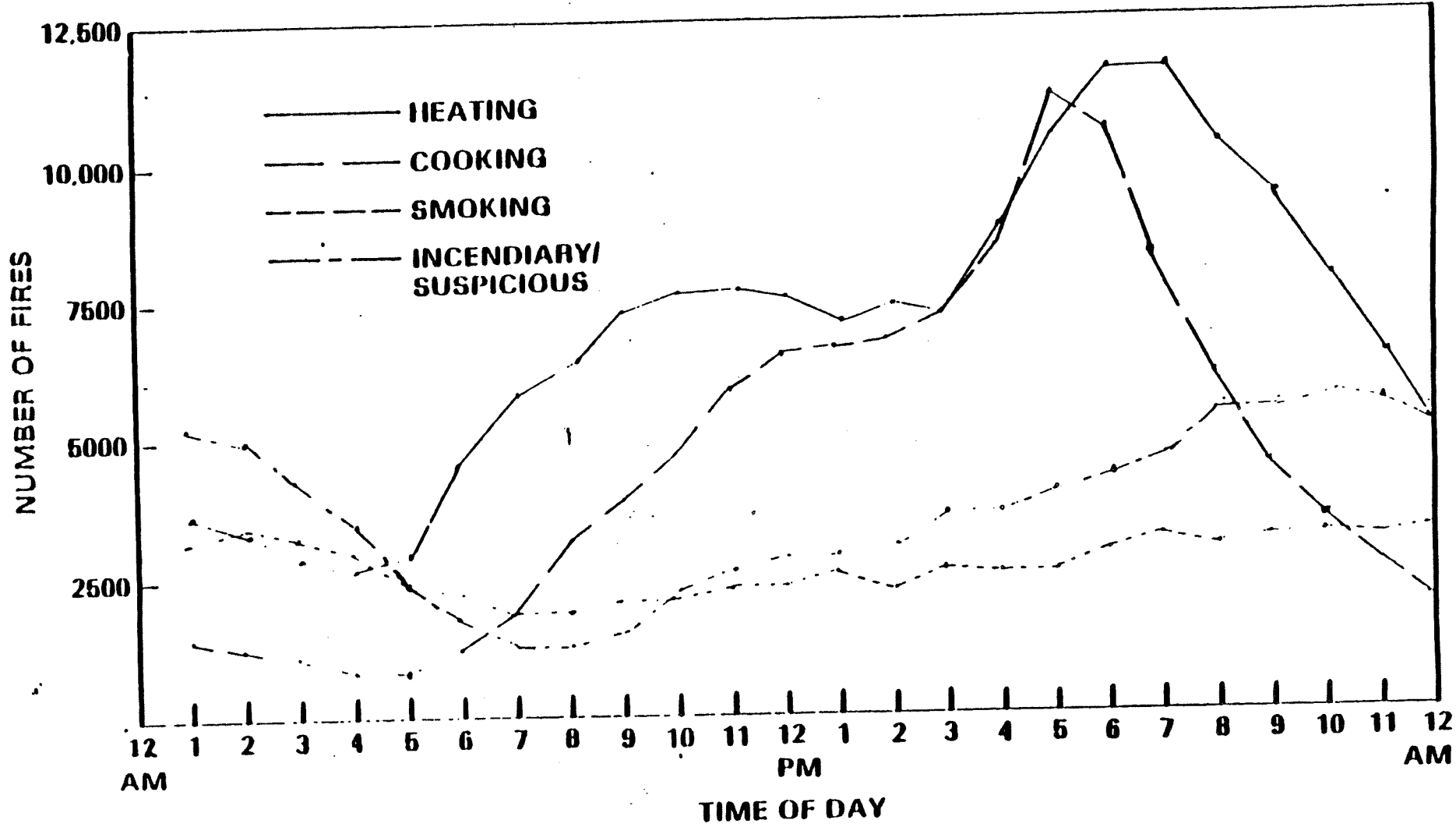
Sprinklers: Sprinklers also will not solve the problem of cigarette fire fatalities. A significant number of cigarette fires produce lethal concentrations of smoke and gases in the smoldering phase, before they ever erupt into flames. In other words, these fires will kill the occupants before the sprinkler activates.

Furthermore, it seems unrealistic to think that most homes will ever have sprinklers in the living quarters. If they do, it is still decades away. And again, the poor, the most frequent victims of fire, will be the last to have sprinklered homes.

References

1. Krasny, et al, "Development of a Candidate Test Method for Measuring the Propensity of Cigarettes to Cause Smoldering Ignition of Upholstered Furniture and Mattresses," National Bureau of Standards, Center for Fire Research, October 1981.
2. Spears, "'Self-Extinguishing' Cigarettes: A Technical Analysis Including a Review of Relevant Patents."
3. Benowitz, et al, "Smokers of Low-Yield Cigarettes Do Not Consume Less Nicotine," New England Journal of Medicine, Vol. 309, No. 3, p. 139 (July 21, 1983).
4. U.S. Fire Administration, "Fire in the United States," Fourth Edition.
5. "Fire in the United States," Fourth Edition.
6. Mierley and Baker, "Fatal House Fires in an Urban Population," Journal of the American Medical Association, Vol 249, No. 11, p. 1466 (March 18, 1983).
7. Birky et al, "Fire Fatality Study," Fire and Materials, Vol. 3, p. 211 (1979).
8. Robertson et al, "A Controlled Study of the Effect of Television Messages on Safety Belt Use," American Journal of Public Health, Vol 64, No. 11, p. 1071 (Nov. 1974).
9. "Smoke Detectors," Consumer Reports, Aug. 1980, p. 475.

FIGURE 20: ²¹1980 RESIDENTIAL FIRES
BY TIME OF DAY



SOURCE: N



FIRE DEPARTMENT

250 LIVINGSTON STREET BROOKLYN, N.Y. 11201-5884

JOHN J. HART
Chief of Department

November 21, 1983

Chief William Stamm
Milwaukee Fire Department
711 West Wells Street
Milwaukee, Wisconsin 53233

COMMITTEE MEMBER

Dear Bill:

I am writing to give you my thoughts on the IAFC special committee meeting on self-extinguishing cigarettes. First, let me congratulate you on putting together such a distinguished and knowledgeable group of panelists, and also for the calibre of the witnesses you brought in to testify. To my mind I thought it was highly successful and I also felt that we have been given sufficient information to recommend a position that the IAFC should adopt.

Before I suggest my recommendations, I would like to give you some of the conclusions I drew.

- a. There is a great variety of opinions as to what constitutes a self-extinguishing cigarette in terms of standards.
- b. The testing done to date by the National Bureau of Standards was insufficient to determine a standard and was not broad enough to be a practical substitute for the actual burn situation.
- c. There is not currently a cigarette on the market that can be classified as self-extinguishing. The two example brands cited, "More" and "Sherman" cannot reasonably be classified as cigarettes as used by the American public. They are both, long, thin, brown, strong and harsh, more akin to small cigars than cigarettes.
- d. There was no testimony offered that would indicate that a technology is available that could create a self-extinguishing cigarette without altering what is commonly perceived as a cigarette. The two example brands, both "More" and "Sherman" were constructed of pipe tobacco rather than cigarette tobacco and had a substantially higher tar and nicotine content.

(Cont'd...)

SMOKE DETECTORS SAVE LIVES

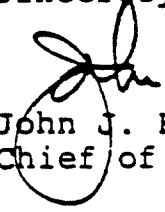
- e. Any method of gaining a reduction in the burning propensity of a cigarette that would result in a higher tar and nicotine content would be foolhardy, in light of the evidence, linking smoking to cancer. Since our sense of morality must lead us to the preservation of life, the saving of two lives by fire at the expense of 10 dying by cancer cannot in my mind be justified.
- f. The proposed legislation HR 1880 does not include any consideration of the health impact of any proposed fire safe cigarette and should not be supported.

In light of these thoughts I would recommend the following to the IAFC.

- 1. Support HR 1880 or any other legislation that included,
 - a. The requirement to conduct tests that would establish a standard for self-extinguishing cigarettes that pertained across a wide range of substrates and across a range of probable fire scenarios.
 - b. Provide that once a standard is established, all products measured to that standard must also show that they do not create a health hazard in another area.
 - c. While the CPSC retain jurisdiction over the project, the legislation include a panel to determine feasibility of any standards before they are established.
 - d. The panel consists of a broad spectrum of interested parties, i.e. industry representatives, medical specialists, consumer advocates, fire chiefs, etc.

Good luck in putting everyone's thoughts together.

Sincerely,


John J. Hart
Chief of Department

JJH:mv



Center for
Firesafety
Studies

December 2, 1983

William Stamm, Chief
Milwaukee Fire Department
711 West Wells Street
Milwaukee, Wisconsin 53223

Dear Bill:

As we agreed at the committee meeting, I have attempted to summarize my thoughts on the issues associated with so-called self-extinguishing or reduced ignition hazard cigarettes and the proposed federal legislation in the area of cigarette safety.

Let me begin with the issue of technical feasibility. I believe that it may be possible to design a cigarette with reduced ignition potential...perhaps through control of burning rate and ember diameter. Whether or not this can actually be accomplished has not been demonstrated by research specifically directed to that objective, to the best of my knowledge. However, the fact that some cigarettes appear to have lower ignition potential than others for certain fabrics does point to the need to have the possibility explored in detail if it is possible that lives could be saved. Incidentally, I believe that self-extinguishment in the time necessary would most likely result in changes to the chemistry of the smoke produced. This leads to the next issue... the health hazard.

Whether or not individual people believe that smoking causes lung cancer, I don't know of anyone who will say that it's good for you. For many people, the statistics and medical data appear to be convincing with respect to lung cancer and a variety of cardiovascular disorders. If, in the attempt reduce fire deaths and injuries an increase could be created in deaths and disease from smoking related causes, that fact and the possible magnitude of the effect must be known, or at least, carefully examined.

The total effect of fire losses must also be considered. In addition to deaths, the costs in burn care and physical and mental rehabilitation have to be included.

In order to put the risks and benefits of the pending legislation in perspective, I believe that a risk analysis should be part of any study of the technical issues.

Before summarizing my summary, I would like to mention two other issues... regulatory action at the state level and the regulatory aspects of the federal legislation. In order to allow time for the technical issues to be studied and resolved (if possible), I believe that state level legislation should be

delayed until the end of the study provided that the federal legislation requires a decision to be made regarding federal regulation within a reasonable time after conclusion of the study. I believe that the CPSC is the most appropriate agency to deal with the regulatory decision. Should the federal government decide not to regulate, states would then have the technical facts to study and would be free to pursue their own legislative directions.

Since there are several bills and proposed changes being considered at the moment, I will list those items that should be included in a cigarette safety bill that the IAFC could support.

1. The bill should require a study of both the technical feasibility and the risk-benefit of regulation.
2. The bill should require a regulatory decision at the completion of the study. CPSC should be the lead agency.
3. State legislation should be delayed only until a decision has been made at the federal level.
4. An advisory board should be established that is composed of technical people representing at least CPSC, NBS, FEMA (IAFC?), and NFPA. Technical representatives from industry and medical experts in the field of cigarette-related diseases and burn injuries should also be included.
5. The research should be done by or coordinated through the Center for Fire Research at NBS.

Those are my thoughts as I have developed them since our meeting in New York. Over all, I felt that neither "side" made a convincing argument for their position. I do feel that NBS is on the right track regarding the test method. The effects of the cravice and the final criteria for performance still need to be addressed.

I must say Bill, that I enjoyed having the opportunity to meet you and that I think the meeting went well. I am sorry that I was not able to stay longer so that we could have had more time for discussion. I hope that my comments are helpful and I look forward to seeing a draft of what pull together from our various comments. If you have any questions on any of the above, let me know.

Very truly yours,



Professor Richard L.P. Custer
Associate Director

RLPC:11b



DEC 5 1983

OFFICE

Naylor Dana Institute for Disease Prevention American Health Foundation



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November 21, 1983

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EDWARD B. KLARBERG, Esq.
Executive Vice President
General Counsel

Mr. William Stamm, Chief
Fire Department
City of Milwaukee
711 West Wells Street
Milwaukee, WI 53233

Dear Chief Stamm:

Please let me thank you on behalf of myself and my associate, Klaus Brunnemann for inviting us to participate in the ad hoc committee meeting on "Fire Safe Cigarettes". We learned a lot and are in full support of your leadership in clarifying the issue of the self-extinguishing cigarette.

Please find attached our ideas on the development of "Fire Safe Cigarettes".

With best wishes,

Dietrich Hoffmann
Dietrich Hoffmann, Ph.D.
Associate Director

DH/cch
Encl.

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OFFICE OF THE CHIEF

"FIRE SAFE CIGARETTES"

Based on our experience, our knowledge of the technical literature, and discussions at the meeting of the ad hoc committee on "Fire Safe Cigarettes" of the International Association of Fire Chiefs, New York, November 16, 1983, we offer the following suggestions.

I. In principle, the pending bill H.R. #1880 on "Fire Safe Cigarettes" introduced by Congressman J. Moakley offers a satisfactory basis for initiating studies on self-extinguishing cigarettes. However, it appears that the task is very complex and one could not hope to arrive at scientifically sound conclusions after only 2 years of research, since major efforts have to be directed towards evaluations of the toxicological properties of the self-extinguishing cigarettes. It would be unwise to disregard the potential for increased toxicity of the smoke that might result from cigarettes which are modified to self-extinguish.

II. We would envision a step-by-step development of the program along the following guidelines.

1. Testing method.

Establish standardized methodology to determine the potential of ignited cigarettes to inflame upholstered furniture made

of various fiber materials. The method of John Krasney, U.S. National Bureau of Standards, is a good beginning, but does not include testing smouldering cigarettes in furniture crevices. Consideration should be given to the use of thermocouples with a recording device which would register the radiant heat emitted from the burning cone of a cigarette into the various fibers. The measuring device used for this purpose should give reliable readings at various degrees of humidity of the ambient air (20-70% R.H.).

2. Determination of tar, nicotine and carbon monoxide.

Upon development of standard measuring devices for the inflaming potential and subsequent approval of these devices by the U.S. Bureau of Standards, the development of experimental cigarettes should begin with those modifications that appear to have the most promising potential for a fire-safe cigarette. Treatment of the cigarette paper and changes in the diameter of the cigarette are two important considerations in this regard.

Toxic agents such as silicates should not be utilized for paper treatment, nor as additives to tobacco. Candidate cigarettes holding promise to qualify as "self-extinguishing" should generate no more than 10 mg of tar, 1 mg of nicotine, and 10-12 mg of carbon monoxide in their mainstream smoke when measured under FTC-standard smoking conditions.

3. Smoke analyses.

If a candidate cigarette fulfills these criteria, mainstream smoke yields must also fall within acceptable ranges for the following compounds:

- a) Gas Phase: formaldehyde, acrolein, acetaldehyde, benzene, toluene, hydrogen cyanide, ammonia, nitrogen oxides, carbon monoxide, carbon dioxide, acetonitrile, and volatile N-nitrosamines
- b) Total Smoke: pH
- c) Particulate Phase: in addition to "tar" and nicotine, volatile phenols, catechol, aromatic amines, quinoline, benz(a)anthracene, benzo(a)pyrene (and possibly other carcinogenic aromatic hydrocarbons), and the tobacco-specific N-nitrosamines

The mainstream smoke yields of the aforementioned compounds should not significantly exceed corresponding emissions from untreated cigarettes with identical tobacco or blend.

4. Bioassays.

If all qualitative and quantitative analytical parameters of the smoke of the candidate self-extinguishing cigarette are satisfactory, bioassays have to be completed for evaluation of toxic, mutagenic, carcinogenic, and cocarcinogenic potential of

the smoke of the modified cigarette. These evaluations would include the Ames test for mutagenicity, assays for carcinogenicity and cocarcinogenicity of tobacco smoke particulates on mouse skin and inhalation of whole smoke with Syrian golden hamsters.

5. Clinical assays.

The candidate self-extinguishing cigarette emerging from the screening process described above with negative toxicity data must be submitted to clinical assays with at least 10 volunteers who are long-term (>10 yrs) cigarette smokers. These volunteers would be asked to smoke the control cigarette for 2 weeks and then switch to the candidate cigarette for the next 2 weeks. At the beginning and at the end of the assay for each cigarette, volunteers' blood pressure will be measured and blood samples will be taken. Carboxyhemoglobin, nicotine, cotinine, and thiocyanate will be measured in the blood samples. The readings and assay data obtained should not reflect greater uptake of smoke components than those seen with the control cigarette (untreated, unmodified). The candidate self-extinguishing cigarette can be considered a viable product only when all aspects, the pyroquality, tar and nicotine yields, analytical smoke profiles, bioassays, and clinical assays are satisfactory.

We realize that the taste characteristics, i.e. the smoke flavor of an experimental cigarette, must be consumer acceptable.

We have not discussed this aspect since it falls into the realm of the cigarette manufacturers' evaluation.

Technical details and references needed for the above discussed outline can be supplied by us. For the development of "Fire Safe Cigarettes" it will be necessary to assemble a Technical Committee. In our judgment, this technical advisory group should be made up of representatives from the International Association of Fire Chiefs, tobacco scientists and fire experts from the industry, academic institutions, U.S. government, and physicians with expertise in respiratory physiology.

Respectfully submitted,

Dietrich Hoffmann

Dietrich Hoffmann

Associate Director

Klaus D. Brunnemann

Klaus D. Brunnemann

Head, Section of Bio-
Organic Chemistry



December 2, 1983

Chief William Stamm
Milwaukee Fire Department
711 W. Wells St.
Milwaukee, WI 53233

Dear Chief:

Listed below are my recommendations to the IAPC special committee meeting on the self-extinguishing cigarette:

1. I would endorse research to establish a standard methodology to measure the self-extinguishing characteristics of cigarettes. This test should cover a wide range of substrates.
2. Once a cigarette is developed which has acceptable self-extinguishing properties, its products of combustion must be quantitatively identified. If these substances differ in any significant degree from those which have been identified in cigarette smoke, the appropriate animal toxicology studies must be done before any consideration for legislation to market the cigarette is endorsed.
3. I advocate that all phases of the research be under the supervision of a panel of experts chosen from multiple disciplines, i.e. medical toxicology, fire specialists, tobacco industry scientists, and consumer advocates.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Dick".

Richard D. Stewart, M.D.
Corporate Medical Director

RDS:de

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DEC 6 1983

MILWA
OFFICE

UNITED STATES
CONSUMER PRODUCT SAFETY COMMISSION

NOV 25 1983

The Chairman

Chief William Stamm
Fire Department
City of Milwaukee
711 West Wells St.
Milwaukee, WI 53233

Dear Chief Stamm:

Thank you for your letter of October 27, 1983. You indicated in your letter that the International Association of Fire Chiefs has formed an ad hoc committee on fire safe cigarettes to determine the pros and cons of "self-extinguishing" cigarettes. The Association is to be commended for undertaking work in this area.

As requested, the Commission staff has prepared responses to the series of questions included with your letter. These are attached. I hope these will be of some assistance to your committee.

If we can be of any further assistance, please let me know.

Sincerely,



Nancy Harvey Steorts
Chairman

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DEC 1 1983

MILWAUKEE FIRE DEPT.
OFFICE OF THE CHIEF

IAFC AD HOC COMMITTEE ON FIRE SAFE CIGARETTES

New York City - November 16, 1983

Points to be Cleared Up

Data

Question 1. What is the magnitude and nature of the part of the fire problem involving cigarettes and other smoking materials? (This includes number of fires deaths, injuries, dollar loss; typical fire scenarios; reliability of the available data; trends over the last five years; 1982 update.)

Answer:

CPSC estimates of the number of fires, deaths, and injuries associated with smoking materials is presented in the attached table. These data cover the five years between 1978 and 1982. In this table, estimates of the total number of residential fires, deaths, and injuries were obtained from the National Fire Protection Association (NFPA). The proportion of these fires related to smoking materials was obtained from data supplied by the U.S. Fire Administration (USFA). Cigarette ignitions constitute more than 95% of the smoking materials related fires.

The products most frequently ignited by smoking materials are upholstered furniture and mattresses/bedding. Typically smoking materials, primarily cigarettes, are involved in the ignition sequence when someone falls asleep smoking or else improperly discards the smoking material before leaving the area. Such fires often smolder for hours, and may be especially insidious for family members who are asleep or unaware of the fire until it has reached an advanced state. These are often multiple casualty fires; it is frequently not just the smoker himself who becomes the victim. Alcohol is often a factor in these incidents. When upholstered furniture is involved, ignition generally occurs in the crevice or welt areas around or between the cushions. The location of ignition and the precise ignition sequence are not clearly known for fires involving mattresses and/or bedding. The Commission is currently involved in a priority project to investigate the hazard scenario associated with these fires.

Alternative Approaches

Question 2. What are the alternative approaches to reducing smoking-related fires and fire losses? (This includes alterations to the cigarette; behavioral education; improving fire resistivity of the environment; use of detectors and sprinklers; and other ideas.)

Answer:

A variety of approaches can be visualized to reduce the frequency of fires caused by smoking materials. The most direct method would be to modify the ignition source, the cigarette, to reduce its propensity to ignite other materials. On the other hand, the fuel source, usually furniture or bedding, could be modified to reduce its susceptibility to cigarette ignition.

Less direct approaches to reducing fire losses include a) fire detection (smoke detectors) to provide occupants with early warning of fires to improve escape potential, b) fire suppression (sprinklers, fire extinguishers) to put out fires before significant casualties occur, and c) consumer education to alter consumer behavior patterns to avoid potentially hazardous situations.

The Commission strongly believes that all of these approaches should be pursued. The Commission, in fact, is now actively engaged in such actions. However, you are probably aware that the Commission is prohibited by law from regulating cigarettes. Therefore, the Commission's primary approach to reducing deaths and injuries from smoking related fires has been to improve the cigarette ignition resistance of those consumer items most likely to be ignited by cigarettes, that is, mattresses and upholstered furniture.

A federal standard requiring all mattresses to resist cigarette ignition was promulgated in 1972. A recent check by the Commission and by the State of California indicates a high level of compliance with the mattress flammability standard. There still are, however, approximately 1000 deaths per year resulting from bedding fires. This includes fires started by cigarettes and open flames. The Commission has a program in progress to determine the causes of such fires, and thereby, actions needed to reduce the number of fires and deaths. The results of this program are expected to be available in the second half of 1984.

In the upholstered furniture area, the Commission is working with industry's Upholstered Furniture Action Council (UFAC) to develop upholstered furniture more resistant to cigarette ignition. Improvements in the cigarette ignition of upholstered furniture have been achieved. A Commission check in 1980 indicated that approximately 50% of the furniture constructed to the UFAC requirements resisted ignition. Since that time additional modifications have been found which can be expected to further increase the cigarette ignition resistance. These modifications were incorporated into the UFAC voluntary program in July 1983. The Commission has a program underway to obtain and test residential furniture

constructed in accordance with the latest UFAC requirements. The results of this program are expected to be available mid 1984.

In addition to the work on mattresses and upholstered furniture, the Commission has a priority outreach program on smoke detectors with the objective of a smoke detector in every home by the end of 1983.

Cigarette Technology and Self-extinguishing Issues

Question 3. What are "self-extinguishing" cigarettes?
(This includes the issues of their time to extinguish in order to be called self-extinguishing; their reliability of going out within a certain time; the ways in which a cigarette can be made self-extinguishing; and whether removing additives will lead to self-extinguishment.)

Answer: The Commission has not carried out any work on cigarettes, but would refer the committee to the National Bureau of Standards (NBS) for a knowledgeable answer to this question. We would note that there appears to be some tendency in the popular press to use the term "self-extinguishing" to cover not only a cigarette which will go out when not puffed, but also any other modification of the cigarette which might assist in reducing fires started by cigarettes.

Question 4. Are any existing brands of cigarettes "self-extinguishing"? (Proponents of self-extinguishing say yes; what evidence is there? What do NBS, the tobacco industry, and others say?)

Answer: The Commission has not carried out any work in this area, but again would refer the committee to NBS.

Question 5. What is the relationship, if any, between extinguishment time and the propensity to start ignition? What evidence is there that an earlier extinguishment time will materially reduce the number of fires and fire deaths and injuries? What fraction of deaths might be prevented? (This includes the theory of smoldering ignition; data from the field; test data, if any; upholstered furniture and bedding prevalent among current fire victims, especially in households of the poor and elderly.)

Answer: The Commission has not carried out programs to determine the specific relationship between extinguishment time and the propensity to start ignition. Past work with mattresses and upholstered furniture indicated that the time to ignition by a burning cigarette can vary over a relatively wide range depending on such factors as the materials used in the mattress or furniture items and the location of the burning cigarette. We have observed that, in general, cigarettes that burn longer are more likely to

start fires. We have no information to estimate what fraction of the deaths might be prevented. Please refer to NBS for additional information.

Question 6. By what criteria can a cigarette be tested to determine its relative fire safety? Is there a reliable test to do so? (This includes considering how to test in light of the wide variety of upholstered furniture and bedding.)

Answer: The Commission has not carried out any work in this area. NBS may have some input to this question.

Side Effects

Question 7. Will tar and nicotine levels be raised by making cigarettes self-extinguishing? By how much? Will that have potential health impacts? What is the risk, if any? How does it compare to potential gains in fire safety?

Answer: The Commission has not carried out any work in this area, and therefore cannot comment.

Question 8. What unwanted fire-related behavior, if any, might be caused by requiring smokers to relight self-extinguishing cigarettes? Will there be any negative impacts on others stemming from the smoker's need to relight more frequently? (Considerations here include increased use of matches and lighters, increased spread of matches and lighters for smokers' convenience, access by children, decrease in manual dexterity of the elderly.)

Answer: The Commission has not carried out any work in this area.

Question 9. What unwanted fire safety behavior or attitudes might be caused by calling cigarettes "fire safe." (Is there any precedent? Is there likely to be any change in people's attitudes toward fire? Will smokers be more careful or careless?)

Answer: The Commission has not carried out any work in this area.

Adequacy of Information

Question 10. Is the current technical information adequate enough to make a reasonably confident decision regarding the net benefits of self-extinguishing? If not, what other research is needed?

Answer: Only limited information is available on the time of ignition (time at which self-sustained combustion starts) of upholstered furniture from cigarettes. Such information

for a wide range of materials and constructions would be needed to establish the potential benefits from self-extinguishing cigarettes. Other approaches, such as the development of a cooler burning cigarette, may be a better approach.

IAFC Position

Question 11. What should the IAFC position be?
(This should include its stance relative to national legislation.)

Answer: The Commission supports the purpose of proposed legislation such as the "Cigarette Safety Act," to establish a technologically practicable and economically feasible performance standard for cigarettes to reduce the hazards which they present as an ignition source. IAFC may wish to consider a similar position.

FIRES AND FIRE CASUALTIES RELATED TO SMOKING MATERIALS
(1978-1982)

IGNITION SOURCE AND ITEMS IGNITED	YEAR					% change 1978-82
	1978	1979	1980	1981	1982	
<u>FIRES</u>						
TOTAL RESIDENTIAL	757,500	721,500	757,500	733,000	676,500	-10.7%
SMOKING MATERIALS	94,600 (100%)	84,800 (100%)	79,400 (100%)	70,700 (100%)	56,400 (100%)	-40.4%
UPHOLSTERED FURN.	27.4%	26.8%	28.2%	29.1%	28.4%	
MATTRESSES/BEDDING	33.2%	33.9%	35.2%	35.2%	34.9%	
OTHER	39.4%	39.4%	36.6%	35.7%	36.6%	
<u>DEATHS</u>						
TOTAL RESIDENTIAL	6,800	5,800	5,500	5,600	5,000*	-26.5%
SMOKING MATERIALS	2,430 (100%)	2,370 (100%)	1,980 (100%)	2,130 (100%)	1,730* (100%)	-28.8%
UPHOLSTERED FURN.	50.8%	48.0%	54.5%	52.9%	54.2%	
MATTRESSES/BEDDING	35.7%	27.6%	27.6%	28.9%	27.5%	
OTHER	13.6%	24.4%	17.9%	18.1%	18.3%	
<u>INJURIES</u>						
TOTAL RESIDENTIAL	56,100	52,100	53,000	52,400	41,800*	-25.5%
SMOKING MATERIALS	10,750 (100%)	9,820 (100%)	9,420 (100%)	9,510 (100%)	6,200* (100%)	-42.3%
UPHOLSTERED FURN.	37.7%	39.7%	40.5%	42.2%	40.4%	
MATTRESSES/BEDDING	36.0%	38.2%	35.9%	36.2%	34.8%	
OTHER	26.2%	22.1%	23.6%	21.6%	24.7%	

* Data now under analysis, and estimates are subject to change.

Source: NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
U.S. FIRE ADMINISTRATION (USFA)
U.S. CONSUMER PRODUCT SAFETY COMMISSION - EPIDEMIOLOGY