

**REPORT OF THE INTERNATIONAL ASSOCIATION
OF FIRE CHIEFS**

**THE AD HOC COMMITTEE ON FIRE-SAFE
CIGARETTES**

2021394287

Chairman - William Stamm, Chief, Milwaukee Fire Department

John J. Hart, Chief, New York City 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. Custer, Associate Director, Center
for Fire Safety Studies, Worcester Polytechnic Institute*

2021394288

RECHARGE TO COMMITTEE

Krasny
INVESTIGATE " SELF-EXTINGUISHING CIGARETTE CONCEPT"

THE EXPRESSION " SELF-EXTINGUISHING CIGARETTE" HAS BEEN USED BY MOST ADVOCATES AND OPPONENTS OF CIGARETTE SAFETY BILLS.

FOR MANY UPHOLSTERED AND MATTRESS SUBSTRATES, SELF-EXTINGUISHMENT IS NOT NECESSARY: CIGARETTES CAN BURN THEIR WHOLE LENGTH AND NOT IGNITE THE SUBSTRATES. ←

SUGGEST CHANGE TO " LOW IGNITION PROPENSITY CIGARETTE"

DEFINE LOW IGNITION PROPENSITY CIGARETTES AS THOSE WHICH :

IGNITE THE LOWEST POSSIBLE PERCENTAGE OF EXISTING SUBSTRATES, AND, IF THEY IGNITE, HAVE THE LONGEST POSSIBLE IGNITION TIME. (THE LONGER THE IGNITION TIME, THE LOWER THE PROBABILITY OF IGNITION). ←

NOT INSISTING ON SELF-EXTINGUISHMENT WOULD MAKE TECHNOLOGY LESS RESTRICTIVE, AND MAKE IT EASIER TO MAINTAIN LOW TAR, NICOTINE, AND CO LEVELS. ←

2021394289

RANKING OF MATERIALS IN ORDER OF DECREASING CIGARETTE IGNITION RESISTANCE:

FABRICS

FILLING

BEST

WOOL, HEAVY VINYL,
 NYLON, OLEFIN, POLYESTER

HEAVY

LIGHT

COTTON, RAYON

LIGHT

HEAVY

VONARR, HEAT DISSIPATING MATERIALS

POLYESTER BATTING

SR POLYURETHANE FOAM, SR COTTON BATTING

UNTREATED POLYURETHANE FOAM

UNTREATED COTTON BATTING

OTHER FACTORS AFFECTING CIGARETTE IGNITION RESISTANCE : WELT CORD, FLAT VS.
 : CREVICE AREA

* THERE IS CONSIDERABLE OVERLAP BETWEEN GROUPS OF MATERIALS.

2021394290

TECHNICAL EXPERTS

Dr. John F. Krasny, Center for Fire Research, National Bureau of Standards.

Dr. Alexander W. Spears, Executive Vice President, Operations and Research, Lorillard.

Philip S. Schaenman, President, TriData Corporation, and Former Associate Administrator of the U.S. Fire Administration.

Arthur C. Delibert, President, Citizens Committee for Fire Safety.

2021394291

Smoking-related Residential Fires

<i>Form of Material</i>	<i>Fires</i>	<i>Pct</i>	<i>Deaths</i>	<i>Pct</i>
<i>Furniture</i>	3,711	45	195	66
<i>Bedding</i>	4,560	55	99	34
	<hr/>		<hr/>	
	8,271		294	

2024394292

Philip S. Scheerman

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	<u>4,560</u>	55	<u>99</u>	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.

Table 7 shows the distribution of the 1982 NFIRS smoking-related fire deaths with 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	<u>95</u>	<u>27</u>
	351	100

2021394293

Condition Before Injury and Public Education

Table 9 shows that the largest category of "condition before injury" is 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 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. There is extensive evidence that good public education fire safety programs can work.

2021394294

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 one 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 joined 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.

Hoffmann, Drummann

"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

2021394296

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 (20-90% R.H.).

2. Determination of tar, nicotine and carbon monoxide.

Upon development of standard measuring devices for the flaming 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.

- 1 A Weight Loss Technique for Determining Rate of Static Burn
- 2 Natural Smoulder in Cigarettes
- 3 The Mechanism of Smouldering in Cigarettes
- 4 Investigation of Some Physico-Chemical Aspects of Cigarette Smoke
- 5 The Distribution of Gases within the Combustion Coal of a Cigarette
- 6 Temperature Distribution Inside a Burning Cigarette
- 7 Investigations on the Effect of Chemical Modifiers on Tobacco and Tobacco Smoke
- 8 Thermal Decomposition of Tobacco
- 9 Factors Affecting Static Burning Rate
- 10 Flame-Retardant Additives as Possible Cancer Hazards
- 11 NBS Back-Up Report for the Proposed Standard for the Flammability of Upholstered Furniture
- 12 Furniture Flammability: Fabric Opportunities¹
- 13 Role of Inorganic Additives in the Smoldering Combustion of Cotton Cellulose
- 14 Development of a Candidate Test Method for the Measurement of the Propensity of Cigarettes to Cause Smoldering Ignition of Upholstered Furniture and Mattresses
- 15 Cigarette Ignition Studies by United States Testing Company, Inc. (California Division)
- 16 Smoldering Characteristics of Fabrics Used as Upholstered Furniture Coverings
- 17 Flame Retarded Cotton Fabric and Filling Materials
- 18 Regulatory Clouds Flee from UFAC (Upholstered Furniture Action Council) Skies
- 19 Statement by Susan B. King, Chairman, Consumer Product Safety Commission
- 20 Smoldering Characteristics of Cotton Upholstery Fabrics
- 21 Report No. 1 - Toward Less Hazardous Cigarettes
- 22 Report No. 4 - Toward Less Hazardous Cigarettes
- 23 Role of Oxygen Chemisorption in Low-Temperature Ignition of Cellulose
- 24 Smoldering and Ignition of Cotton Fibres and Dust
- 25 Cigarettes and Upholstered Furniture
- 26 UFAC - Voluntary Action Program Chair Tests
- 27 A FEMA View of the 1981 US Fire Problem
- 28 A Survey of Several Factors Influencing Smoldering Combustion in Flexible and Rigid Polymer Foams
- 29 Smoldering in Cotton Upholstery Fabrics and Fabric/Cushioning Assemblies

2021394300