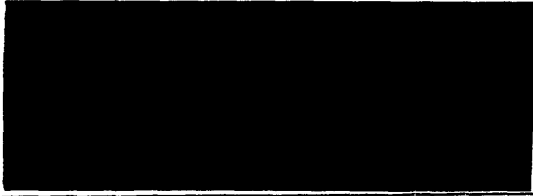


RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCÉS AND ACCESSORIES  
MANUFACTURER


Name: +



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954	A	A
1955	A	A
1956	A	A, C
1957	A, C	A, C
1958	A, C	A, C
1959	C	C
1960	C	C
1961		C
1962	C	C
1963	C	
1964		A, B
1965	A, B	A, B
1966	A, B	B
1967	B	

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or  Lining
- C - Unknown
- + - This company was last listed in January 1974 Directory

247

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS

Name: +



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		B
1967	B	

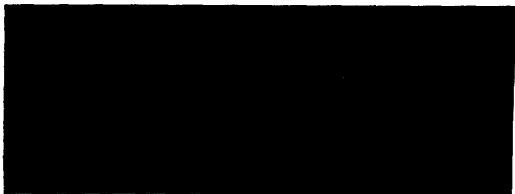
Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown
- + - This company was last listed in the January 1975 Directory.

248

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		A
1959	C	C
1960	C	C
1961	C	C
1962	C	B, C
1963	B, C	B
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Models appear to have been made by

249

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
 LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
 DEALERS OR DISTRIBUTORS

Name :

Address :



Year of Directory	Connector Classification January Issue	Code Defined Below Listing July Issue
1950		
1951		
1952		
1953		
1954		
1955	A	A
1956	A	A
1957	A	A
1958	A	A, C
1959	C	C
1960	C	C
1961	C	C
1962	C	B, C
1963	B	B
1964		
1965		
1966		
1967		

Code Definition :

- A - Brazed or Welded
  - B - Brazeless, Seamless, Swaged, Double Wall or Lining
  - C - Unknown
- Models appear to have been made by

250

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		A
1956	A	A
1957	A	A
1958	A	A
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Models appear to have been made by

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
 LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
 DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953	A	A
1954		
1955		
1956		
1957		
1958		
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
  - B - Brazeless, Seamless, Swaged, Double Wall or Lining
  - C - Unknown
- Models appear to have been made by

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		A
1956	A, C	A, C
1957	A, C	A, C
1958	A, C	A, C
1959	C	C
1960	C	C
1961	C	C
1962	C	C
1963		
1964		
1965		
1966		
1967		

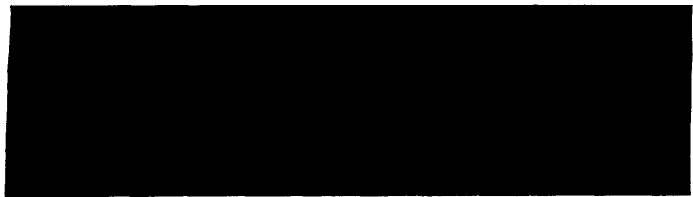
Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Models appear to have been made by

**RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS**

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955	A	A
1956	A	A
1957	A	A
1958	A	A, C
1959	C	C
1960	C	C
1961	C	C
1962	C	B, C
1963		
1964		B
1965	B	B
1966	B	
1967		

**Code Definition:**

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Models listed in the July 1962 Directory and earlier issues appear to have been made by Models listed in the July 1969 Directory and later issues appear to have been made by



RECORD OF CORRUGATED APPLIANCE CONNECTORS  
 LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
 DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		C
1957	C	C
1958	C	C
1959	C	C
1960	C	C
1961		
1962		
1963		
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Models appear to have been made by

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS

Name: + [REDACTED]  
Address: [REDACTED]

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		C
1957	C	C
1958	C	C
1959		
1960		
1961	C	C
1962	C	B, C
1963	B	B
1964	B	B
1965	B	B
1966	B	B
1967	B	

Code Definition:

- A - Brazed or Welded
  - B - Brazeless, Seamless, Swaged, Double Wall or [REDACTED] Lining
  - C - Unknown
- Models appear to have been made by [REDACTED]

+ - This company is currently a manufacturer of flexible connectors.

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
 LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
 DEALERS OR DISTRIBUTORS

Name: [REDACTED]

Address: [REDACTED]

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958	A, C	A, C
1959	C	C
1960	C	C
1961	C	C
1962	C	B, C
1963	B	B
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or [REDACTED] Lining
- C - Unknown

Models appear to have been made by [REDACTED]

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		A
1957		
1958		
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Models appear to have been made by

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955	A	A
1956	A	A
1957	A	A
1958	A	A, C
1959		
1960	A	A
1961	A	A
1962	A	A
1963	A	A
1964	A	
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Before 1959 the company was a dealer, while after 1959 the company was a manufacturer. Before 1959 all models appear to have been made by

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RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS



Name:

Address:



Year of Directory	Connector Classification - January Issue	Code Defined Below Listing July Issue
1950		
1951		
1952		
1953		
1954		
1955	A	A
1956	A	A
1957	A	A
1958	A	A
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
  - B - Brazeless, Seamless, Swaged, Double Wall or  Lining
  - C - Unknown
- Models appear to have been made by 

260

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
 LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
 DEALERS OR DISTRIBUTORS

Name: +



Address:

Year of Directory	Connector Classification - January Issue	Code Defined Below Listing July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967	B	

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or            Lining
- C - Unknown
- + - This company continues to be listed in the current Directory as a dealer of other certified items.

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RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		A, C
1959	C	C
1960	C	C
1961	C	C
1962	C	C
1963		
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Models appear to have been made by



RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959		
1960		
1961		
1962		
1963		
1964		B
1965	B	B
1966	B	B
1967	B	

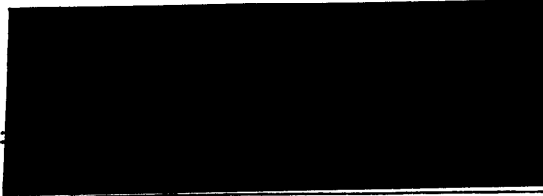
Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

This company continues to be listed in the current Directory.

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
 LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
 DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		A
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Models appear to have been made by

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
 LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
 DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		
1959	C	C
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		

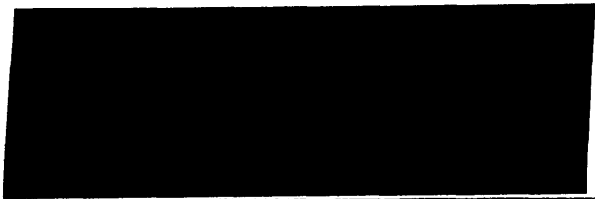
Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Models appear to have been made by

RECORD OF CORRUGATED APPLIANCE GONNECTORS  
 LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
 DEALERS OR DISTRIBUTORS

Name:



Address:

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953		
1954		
1955		
1956		
1957		
1958		C
1959	C	
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or Lining
- C - Unknown

Models appear to have been made by Cobra Metal Hose Division, DK Manufacturing Company.

RECORD OF CORRUGATED APPLIANCE CONNECTORS  
LISTING IN DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES  
DEALERS OR DISTRIBUTORS

Name: [REDACTED]

Address: [REDACTED]

Year of Directory	Connector Classification - Code Defined Below Listing	
	January Issue	July Issue
1950		
1951		
1952		
1953	C	
1954		
1955		
1956		
1957		
1958		
1959		
1960		
1961		
1962		
1963		
1964		
1965		
1966		
1967		

Code Definition:

- A - Brazed or Welded
- B - Brazeless, Seamless, Swaged, Double Wall or [REDACTED] Lining
- C - Unknown

Models appear to have been made by [REDACTED]



**American Gas  
Association Laboratories**

3501 East Pleasant Valley Road, Cleveland, Ohio 44101  
Telephone (216) 524-4380

February 27, 1981

Mr. Tim Jones  
Compliance Officer  
Corrective Actions Division  
U.S. Consumer Product Safety Commission  
5401 West Bard Avenue  
Room 230  
Washington, D.C. 20207

Dear Mr. Jones:

Further to our recent telephone conversation and to our letter of December 23, 1980 concerning corrugated appliance connector manufacturers who were in production prior to 1969, following are comments received from our Pacific Coast Branch Laboratories which pertains to companies referred to in the third paragraph of your October 17, 1980 letter:

[REDACTED]  
June 1952 - First listed flexible connector.

July 1956 - address change to [REDACTED]

October 1956 - First indication by wording in the listing that this company manufactured a two-piece connector. This wording appeared as "Appliance connector, using corrugated yellow brass tubing with a 1/2 in. long piece of 1/2 in. O.D. semi-rigid copper tubing with 1/2 in. brass or steel flare nuts at each end ..."

July 1959 - First indication by wording in the listing that manufacturer used silver braze. This wording appeared as "Appliance connector, using seamless corrugated Admiralty Brass tubing, silver brazed to 1/2 in. O.D. brass ferrule tube."

January 1962 - First indication by wording in the listing that manufacturer also made a one-piece connector. The term "one piece construction or silver brazed" was used in describing the connectors.

January 1963 - name change to [REDACTED]  
[REDACTED]

July 1963 - name change to [REDACTED]  
[REDACTED]

January 1964 - All listing shown after this date indicated connectors were manufactured as one piece type construction.

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Mr. Tim Jones  
U.S. Consumer Product Safety Commission  
Washington, D.C.  
Page 2

COMMENTS: To the best of our knowledge this company manufactured connectors with butt weld construction in the early 1950's, but cannot establish dates. Based on memory and conversation with a long-time employee of [REDACTED] some time in the mid 1950's a two-piece overlap type construction was employed and silver-brazed together.

Present name and address: [REDACTED]  
Street, Los Angeles, CA

[REDACTED]  
September 1954 - First listed flexible connector. No indication as to construction.

January 1958 - Last listing of flexible connector. Reference made in listing to brazed short section.

COMMENTS: Based on memory and a check with a local utility, we believe [REDACTED] manufactured one size flexible connector for a short period of time and also distributed connectors from an extension of certification from [REDACTED] [REDACTED] When not manufacturing a flexible connector, this company manufactured certified semi-rigid connectors; therefore, listing of flexible connectors appeared in the manufacturers section.

Present name and address: [REDACTED]  
CA

[REDACTED]  
November 1961 - First listed flexible connectors. No indication as to the construction.

January 1962 - Name changed to [REDACTED]

April 1962 - Listing showing one piece construction.

COMMENTS: This company made only the one piece type constructed flexible connectors.

Present name and address: [REDACTED]  
[REDACTED]

Bear in mind that most of the above information is based on published listings in the Directory of Certified Appliances and Accessories with limited reliance

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Mr. Tim. Jones  
U.S. Consumer Product Safety Commission  
Washington, D.C.  
Page 3

on the memories of some of the "oldtimers." Note also that [REDACTED]  
[REDACTED] at one time had [REDACTED] in the company name and  
was commonly referred to as [REDACTED] as noted in your letter.

If we can be of further assistance please feel free to call or write me.

Very truly yours,

T. S. LEITCH  
Director  
Product Certification

TSL/cm

cc: K. B. Belford  
L. J. Swift  
T. C. Wheat

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X

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## Memorandum

TO : Richard A. Gross, Executive Director  
THROUGH: Bert G. Simson, Director, OPM *Bert G. Simson*  
THROUGH: Douglas L. Noble, Program Manager for Emerging Hazards, OPM  
FROM : John F. Liskey, Program Manager, New Project Identification Program, Office of Program Management *John Liskey*

DATE: MAY 1 1981

SUBJECT: Transmittal of Discussion Paper on Gas-Fire Appliances

Per your request, the New Project Identification Program Team has developed the attached discussion paper on safety issues associated with the use of gas-fire appliances by consumers. This paper is organized so as to provide: (1) a summary of injuries associated with various gas-fired appliances, (2) an overview of the gas-fired appliances industries, and (3) an outline of various activities under way within CPSC and other organizations which relate to the safety of gas-fired appliances.

From your review of the information presented in this discussion paper, you will be better prepared to make recommendations to the Commissioners for possible action in the future. Options for further action include: (1) a recommendation to establish one or more projects leading to the development of a mandatory product safety standard, (2) a recommendation to authorize staff involvement in activities of one or more of the existing voluntary standards committees, and (3) recommending a course of action which includes a combination of both mandatory as well as voluntary standards development activities.

We will be glad to meet with you at your convenience and discuss these options further, as well as the information provided in the attached paper.

Attachment

*Rich, I suggest we put this first on an EHT agenda and then follow up with a discussion with AED's.*

*JFJ 4/30/81*

DISCUSSION PAPER:  
GAS-FIRED APPLIANCES

New Project Identification  
Program Team  
April 22, 1981

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DISCUSSION PAPER:  
GAS-FIRED APPLIANCES

Introduction

In February, 1981, the Executive Director of CPSC directed the New Project Identification Program Team to develop a discussion paper on gas-fired appliances. The purpose of this paper is to summarize the injuries associated with various gas-fired appliances, provide an overview of the gas-fired appliance industries, and outline various activities within CPSC and other organizations which relate to gas-fired appliances. For purposes of this paper, the definition of gas-fired appliances includes the following products, component parts, and accessories:

- ° Butane-fueled Products
  - Grills and Stoves
  - Portable Heaters
- ° Butane Gas Tanks and Fittings
- ° Gas Connectors, Controls, and Valves
- ° Gas Clothes Dryers
- ° Gas Air Conditioners
- ° Gas Furnaces and Boilers
- ° Gas Water Heaters
- ° Gas Ovens
- ° Gas pipes, pipe fittings, and distribution systems
- ° Gas Ranges (with ovens)
- ° Gas Space Heaters
- ° Propane Gas Tanks and Fittings
- ° Propane-fueled Products
  - Grills and Stoves
  - Portable Heaters

Summary of Injuries (Tab A)

According to data gathered by CPSC and the U.S. Fire Administration, gas-fueled appliances appear to be a major contributor to burns, fires and carbon monoxide fatalities. Of the products reviewed, heating and cooking equipment were associated with the highest frequency of injury. The major hazards were fires and burns from product failures and flashbacks, carbon monoxide poisoning from product malfunction, and inadvertent misuse or improper installation.

The U.S. Fire Administration's data from 15 states for 1979 indicates that fires involving wood- or coal-fueled heating equipment had a higher frequency of occurrence (8,000-9,000) than heating equipment using gas fuel (3,000-4,000)--increasing by over 15 percent over the previous year.

However, gas-fueled products were involved in almost 450 reported casualties in 1979 (an increase of two percent from the previous year) while wood- or coal-fueled products were cited in less than 300 casualties (a seven percent decrease from 1978).\*

Of the products examined within the gas-fueled appliances category, fixed surface cooking equipment has the largest number of deaths associated with it, followed by water heaters, space heaters, fixed heating units, and central furnaces.

In addition to the fire hazard associated with gas-fueled appliances, carbon monoxide poisoning is also of great concern. It is estimated that there were about 350 carbon monoxide deaths of this type in 1977. Almost one-half of these deaths involved gas space heaters.

A review of In-Depth Investigations (IDI's) for 1979 has revealed the following major hazard patterns for those products defined as gas-fired appliances:

- ° Central Furnaces - (1) Malfunction of furnace or one of its components resulting in carbon monoxide poisoning, fire or a gas leak; (2) Manual ignition of the furnace or its pilot light resulting in a flashback burn when accumulated gas suddenly ignites; (3) Defeating of the furnace's venting mechanism resulting in carbon monoxide poisoning.
- ° Water Heaters - (1) Ignition of nearby combustibles, usually flammable vapors by water heater; (2) Malfunction of water heater resulting in a fire; (3) Manual pilot light ignition resulting in a flashback burn when accumulated gas suddenly ignites.
- ° Gas or LP Heaters - Component malfunction, improper installation or maintenance of venting system resulting in carbon monoxide poisoning.
- ° Gas Ranges with Ovens - (1) Lighting the oven, stove top or a pilot light for the range resulting in flashback; (2) Contact burn occurring when the victim inadvertently touched a hot surface of the range. (A number of these victims were children.)
- ° Fixed Oven Unit - Flashback while lighting the oven and contact burn.
- ° Butane/Propane Grills and Stoves - Component malfunction (e.g. gas valve, regulator) resulting in a fire.
- ° Gas pipes, Fittings, and Distribution Systems - Leaks in gas line connectors--both flexible and rigid--resulting in explosions.

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\*For this comparison, "risk" is the likelihood of injury given the event of a fire. Not taken into consideration is the much higher use of gas-fired heating devices in the population.

- ° Butane/Propane Tanks, Pipes, Fittings, and Distribution Systems - (Incidents reviewed could not be logically fitted into major hazard groups.)

- ° Gas Clothes Dryers - (1) Malfunction caused fire, smoke or explosion; (2) Flashback while attempting to ignite the pilot light.

#### Overview of Gas-Fired Appliance Industries (Tab B)

Within the gas-fired appliance industries, a number of larger corporations effectively control the market for several appliances. For example, four companies accounted for 67% of all shipments of gas ranges in 1980, three firms for 77% of water heater shipments, and one firm alone accounted for 40% of all gas clothes dryer shipments in 1980. It is common in these industries for major manufacturers to produce articles for sale under another brand name. One appliance manufacturer, for instance, does not market any product under its own brand, but produces strictly for other producers and marketers. For this reason, an accounting of all manufacturers producing gas-fired appliances is difficult. Component parts and accessories for appliances such as gas tanks and fittings, gas pipe, pipe fittings and distribution systems, connectors and valves, and controls are not generally produced within the scope of the gas-fired appliance industries. These items are manufactured in the "Fabricated Metal Products" industry. At this time, available data is not adequate to determine what portion of items are designated for household use.

Shipments of most of the appliances previously defined have fallen off from 1979 to 1980; however, shipments of "unit heaters" have shown a slight increase from 1979 to 1980, as consumers purchased alternative heating sources. The fall in shipments is attributed to softened consumer demand for these appliances during a recessionary period. This softened demand can best be described as a deferment of purchases of major appliances--at some point, replacement of these articles will be necessary. The replacement is determined, in large part, by the useful life of the product. At Tab B are charts showing industry shipments of selected gas-fired appliances and a five-year statistical forecast of shipments for selected gas-fired appliances.

Home heating is the major household use for gas. The American Gas Association has estimated that in 1979 about 55% of home heating was fueled by gas; an estimated 43.5 million homes were gas heated in 1979. For almost all gas-fired appliances, sales are projected to increase significantly over the next five years. Outdoor gas grills are projected as the products with the greatest growth pattern--increasing by some 63% from 1981-86.

#### CPSC Activities Relating to Gas-Fired Appliances

##### Section 15 Cases

Since 1974, the Commission has handled 63 Section 15 cases relating to gas-fired appliances. More than one-half of these cases were associated with

three categories of gas-fired appliances/accessories: (1) Gas Connectors, Valves, Controls, (2) Gas Furnaces and Boilers, and (3) Gas Ranges and/or Ovens. The product defect and/or hazard involved in these categories included:

- ° Defective screws holding the gas valve together which could result in slow gas leakage;
- ° Shearing or weakening of gas connectors causing possible gas leaks;
- ° Pilot lighter tube fracturing which could cause sudden ignition and flaring of accumulated gas from the unlit furnace with possible ignition of materials outside the furnace;
- ° Modification of flue damper device which nullifies the furnace safety limit switch which may result in overheating of furnace;
- ° Construction defect involving lower limit switch in furnace which could result in a fire;
- ° Gas valve installed in oven may fail to close due to dirt build-up on valve seat which may result in gas leakage into oven;
- ° Possibly defective broiler burner system in gas oven which may cause burns to user due to delayed ignition;
- ° Inoperative pilot safety valve in gas combination controls used on water heaters or furnaces could result in potential fire or explosion of accumulated gas.

A complete list of the 63 cases is contained in Tab C. The list includes ID Number/Company Name, Product, Defect/Hazard, and Corrective Action.

#### Information and Education Programs

The Directorate for Communications has conducted extensive information and education programs addressing the hazards associated with certain gas-fired appliances. A major program, the Flammable Products and Ignition Sources Program, was conducted for five years to alert consumers to the risk of injury associated with certain flammable product types and to try to effect attitudinal and behavioral changes in relation to selection, use and maintenance of these products. Two product categories addressed by the program were gas space heaters/ovens and ranges/stoves. The Commission distributed over 800,000 copies of several publications and another 150,000 copies were reprinted and distributed by various groups. Major hazards addressed in the publications included gas leakage and explosions, burns from surface contact, and fires from flame contact.

A list of publications currently being distributed by the Directorate for Communications that address the hazards associated with gas-fired appliances is contained in Tab D.

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### Technical Research/Hazard Programs Activities

Since mid-1974, the Commission has contracted for research to investigate various problems with certain gas-fired appliances. In July, 1974, the Calspan Corporation was contracted to determine the existence, applicability, adequacy, and effectiveness of safety standards covering the design, construction, installation, operation and maintenance of furnaces, ranges, dryers, and hot water heaters. The information obtained from the contract, completed in 1976, has formed the nucleus of current Commission staff knowledge of flame-fired equipment.

In 1977 and 1978, the Commission funded a contract investigation of energy saving devices and standards for such devices. Devices studied were vent dampers, flue gas heat extractors, alternative ignition devices, residential clothes dryer exhaust diverters, water heater insulation kits, extended draft hoods, and commercial clothes dryer exhaust recirculators. The reports that resulted from the work on energy saving devices were widely circulated within the industries and are used as reference materials even today. Other Commission-funded research includes the following:

- ° In 1978, the National Bureau of Standards (NBS) completed research to explore the levels of carbon monoxide emitted by unvented gas-fueled space heaters under conditions that may be experienced in the field and to determine the effectiveness of an oxygen depletion sensor (ODS). This work was initiated to address comments received on the Commission's proposed ban on unvented gas-fired space heaters. The commentators claimed that a ban was unnecessary because an ODS could be used to eliminate or reduce the hazard.

- ° The NBS, in 1978, completed work on a project to determine the effectiveness of a proposed room temperature limiting device (TLD) for use with unvented gas-fired space heaters. The results of this study showed that the ODS would be more effective than the TLD in preventing the development of severe carbon monoxide levels in the home.

- ° In 1980, the Calspan Advanced Technology Center completed a study to determine the feasibility of additional safety systems for home heating systems to eliminate the carbon monoxide hazard. The study identified a device known as a "spill switch" for installation on draft hoods where heated flue products could be detected as they enter the surroundings of the appliance.

- ° In 1980, the NBS was asked to conduct a study to determine the feasibility of developing a low cost residential carbon monoxide detector. The study concluded that such a device was not feasible at that time but that, due to the rapid development of relevant technology, such a detector may become possible within a few years.

In addition to funded research, the Engineering Sciences staff has conducted a fairly large number of in-house examinations of individual gas-fired appliances and accessories in connection with its support function for Section 15 activities. A more detailed explanation of CPSC funded research and in-house technical activities is contained in Tab E.



In several hazard programs, the Commission has established projects dealing with specific gas-fired appliances. The Fire and Thermal Burn Hazard Program developed a regulation for Unvented Gas Space Heaters to address carbon monoxide poisoning. The regulation requires these heaters to be equipped with a sensor to shut off the heater when the oxygen level becomes depleted, indicating that the heater is producing high levels of carbon monoxide.

Other Fire and Thermal Burn Hazard Program projects, through various voluntary standards organizations, address ranges and ovens, hot surfaces, and energy conservation devices. The Household Structural Products Program has a voluntary standards project on water heaters (including gas) to address scalding hazards from excessively hot water.

A description of various research activities is contained in Tab E.

#### Overview of Standards, Codes, and Regulations Relating to Gas-Fired Appliances

The most important organization involved in regulating the manufacture and installation of gas-fired appliances is the American National Standards Institute (ANSI)--a voluntary standards writing organization. Through the ANSI Z21 Committee on Performance and Installation of Gas Burning Appliances and Related Accessories, standards are developed for appliances and accessories such as automatic ignition devices, vent dampers, and flexible connectors. The Committee is composed of 17 subcommittees, and forty-seven standards covering appliances and accessories have been developed. Major organizations which are concerned with gas-fired appliances and are members of the ANSI Z21 Committee include:

- American Gas Association (AGA)
- American Public Gas Association (APGA)
- Association of Home Appliance Manufacturers (AHAM)
- Gas Appliance Manufacturers Association (GAMA)
- National Fire Protection Association (NFPA)
- National LP-Gas Association (NLPGA)

In addition to ANSI, other organizations such as the AGA (whose members are public utilities), American Society of Mechanical Engineers, and NFPA are involved in writing codes or standards. Among the work of these organizations is a combined effort known as the "National Fuel Gas Code (ANSI Z223.1 and NFPA No. 54)." This code sets standards for the installation of gas piping and gas equipment.

The AGA certifies appliances as complying with ANSI standards in much the same way that Underwriters Laboratories lists products conforming to its own standards. Manufacturers make use of this AGA certification service in part because in many places there are state or local requirements that all gas appliances sold must be certified by the AGA. The AGA's Directory of Certified Appliances and Accessories lists many thousands of models of appliances and accessories.

GAMA is a national trade association with member firms that manufacture over 90 percent of all residential commercial and industrial gas appliances made in the U.S., as well as equipment used in the production, transmission,

and distribution of fuel gases. Although GAMA does not write standards, its members participate in the standard development activities of other organizations. GAMA states that, through the technical committees of its 13 product divisions, it assists in the identification of areas where performance and safety standard revisions may become desirable to keep pace with improved technology.

A list of ANSI Z21 standards and a more indepth description of voluntary standards activities is contained at Tab E.

#### Summary/Discussion

Gas-fired appliances, as a general category, can be labeled as a major source of burns, fires and carbon monoxide fatalities. The major hazards associated with these appliances are fire and burns from product failures and flashbacks, and carbon monoxide poisoning from product malfunction, inadvertent misuse or improper installation.

In order to determine what specific approach to gas-fired appliance hazards should be pursued, a much more indepth study of the hazards, standards and industries should be made. Additionally, policy decisions such as staff resources required and injury reduction potential need to be considered.

ATTACHMENTS

- Tab A - Memorandum from William Barr, Division of Program Analysis, (HIEA), March 27, 1981
- Tab B - Memorandum from T. R. Karels, Division of Economic Program Analysis, (HICS), April 2, 1981
- Tab C - Memorandum from Sandra Shimasaki, Division of Corrective Action (CACA), March 24, 1981.
- Tab D - Memorandum from Norm Rosen, Division of Consumer Education (CED), March 25, 1981
- Tab E - Memorandum from Robert Northedge, Division of Electrical and Structural Engineering (ESES), April 9, 1981

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UNITED STATES GOVERNMENT

# Memorandum

U.S. CONSUMER PRODUCT  
SAFETY COMMISSION

DATE: March 27, 1981

TO : John Liskey, Program Manager New Project Identification, OPM

FROM : William D. Barr, Manager, Project SEARCH, HIEA

SUBJECT: Gas-Fueled Appliances Position Paper

Attached is a cursory review of the hazards associated with gas-fueled appliances and relevant documents previously prepared by Epidemiology. In accordance with our previous conversation, the product categories reviewed have been slightly changed to reflect those products which are the major contributors to the gas-fired appliance problem.

As summarized in the report, gas-fueled appliances appear to be a major contributor to burns, fires and carbon monoxide fatalities. Of the products examined, heating and cooking equipment were associated with the highest frequency of injury. The major hazards were fires and burns from product failures and flashbacks, and carbon monoxide poisoning from product malfunction, inadvertent misuse or improper installation.

Attachment

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