Basic Annual Report Information from NFIRS:

A National Perspective

December 6, 2007

"A document that summarizes the results of operations and financial status of a company for the past year and outlines plans for the future."

"A report card."

"An annual performance review, without a raise."

- **No standard format**

- **Captures the essence of a multi-tasking, complex operation**

- **Varying Audiences**

- **Each report is unique**

- **Annual Report (*Fire in the United States*) at the National level:**
  - Presents overview of the size and scope of the U.S. fire problem and its components
  - Provides detailed information on the components
  - Seeks to mitigate the fire problem by understanding it

- **The overall USFA format may not apply, but the components of the report are useful for other Annual Reports**

- **Commonalities in analysis and presentation**

- **Fires**

- **Civilian and firefighter deaths**

- **Civilian and firefighter injuries**

- **Dollar loss (property loss + contents loss)**

Today's focus: Fires

As you prepare your Annual Report:

- **Decide focus**

- **Identify audience**

- **Determine data needs**

- **Determine appropriate analysis tools**

- **Determine appropriate data presentation**

- **Non-NFIRS related data:**
  - Outreach (public education and other)
  - Data on inspections
  - Arson and arson investigations
- **NFIRS related data:**
  - Overall run distributions; fires only (which excludes mutual aid)
  - Dollar loss (missing values)
  - Multiple entry data elements (e.g., human factors contributing to ignition, etc.)
  - Complex analytic issues (e.g., combining data from multiple elements, etc.)

- **Trend analysis – comparison of percentage change indicators**

- **Statistical significance**

- **Computation of Rates**

- **NFIRS "unknown" codes (U, UU, UUU) and missing data (blanks or null values)**

- **Data interpretation and presentation – is it more effective to present the data in a graph or table?**

- **Confined fires**

- **Mutual aid**

- **NFIRS version 5.0 vs. 4.1**

For the fire portion of a typical Annual Report:

- Types of fires
- When fires occur
- Where fires occur
- How much loss
- Cause of fire

With the audience identified and the focus of the report established:

- **Choose analysis tools**

- **Determine NFIRS data elements to use**

- **Software (e.g., Excel, SAS, SQL Server)**

- **NFIRS 5.0 Complete Reference Guide:**
  http://www.nfirs.fema.gov/documentation/reference/

- **NFIRS Training Courses:**
  http://www.usfa.dhs.gov/fireservice/nfirs/training/index.shtm

- **Fire Data Analysis Handbook, Second Edition, January 2004:**
  http://www.usfa.dhs.gov/downloads/pdf/publications/fa-266.pdf

NFIRS 5.0 Complete Reference Guide:

http://www.nfirs.fema.gov/documentation/reference/

NFIRS Training Courses:

http://www.usfa.dhs.gov/ fireservice/nfirs/training/ index.shtm

National Emergency Training Center

2007-2008
Training Catalog

Catalog of Courses for the
U.S. Fire Administration's National Fire Academy

FEMA

Fire Data Analysis Handbook, Second Edition, January 2004:

http://www.usfa.dhs.gov/downloads/pdf/publications/fa-266.pdf

- **Data element(s) appropriate for the information presented**

- **Decide which specific NFIRS codes apply**

- **If NFIRS 4.1 is used, be aware of the differences from NFIRS 5.0**

- **Exclude mutual aid incidents (i.e., where AID ≠ 3 and AID ≠ 4) to avoid double counting fires**

- **Tables**
- **Graphs**
  - Appropriate scales
  - Bar
  - Histogram
  - Line
  - Pie
- **Source**
- **Appropriate Titling**
- **Proper Labeling**

From the NFIRS basic module

- Version = 5.0

- Exclude mutual aid incidents
  (i.e., where AID ≠ 3 and AID ≠ 4)

- Incident type (INC_TYPE) 100, 111-173

**Note: When analyzing only version 5.0 data,
exclude incident type 110 (4.1 conversion only)**

Structure

Vehicle

Outside

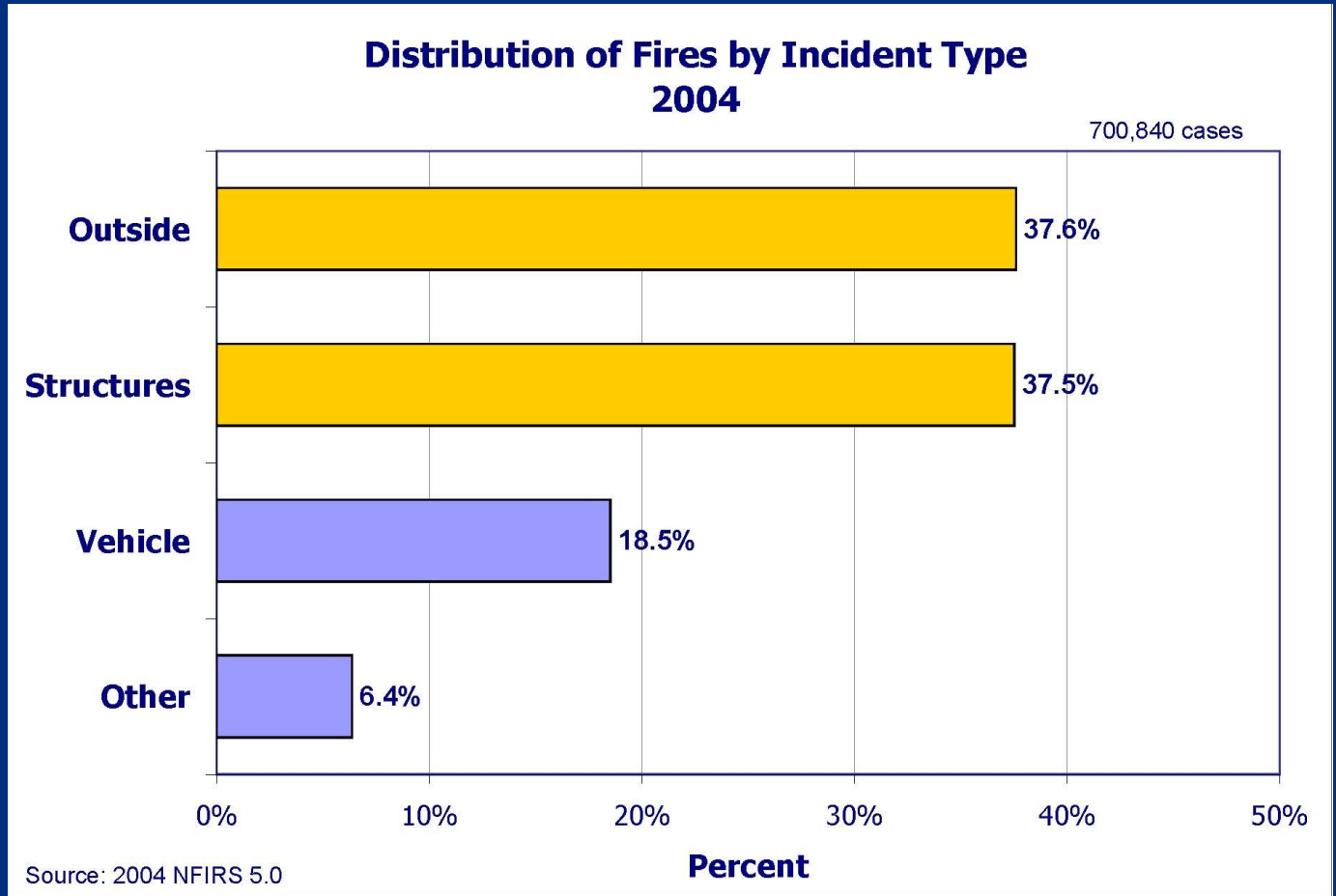**Other**

- **General incident types**
  - Structures
    - Incident type: 111-123
  - Vehicles
    - Incident type: 130-139
  - Outside
    - Incident type: 140-162, 164-173 (note, excludes 163)
  - Other
    - Incident type: 100-109, 163 (outside gas/vapor combustion/explosion)

Graphically:

Distribution of Fires by Incident Type 2004

700,840 cases

Incident Type	Percent
Outside	37.6%
Structures	37.5%
Vehicle	18.5%
Other	6.4%

0%   10%   20%   30%   40%   50%

Percent

Source: 2004 NFIRS 5.0
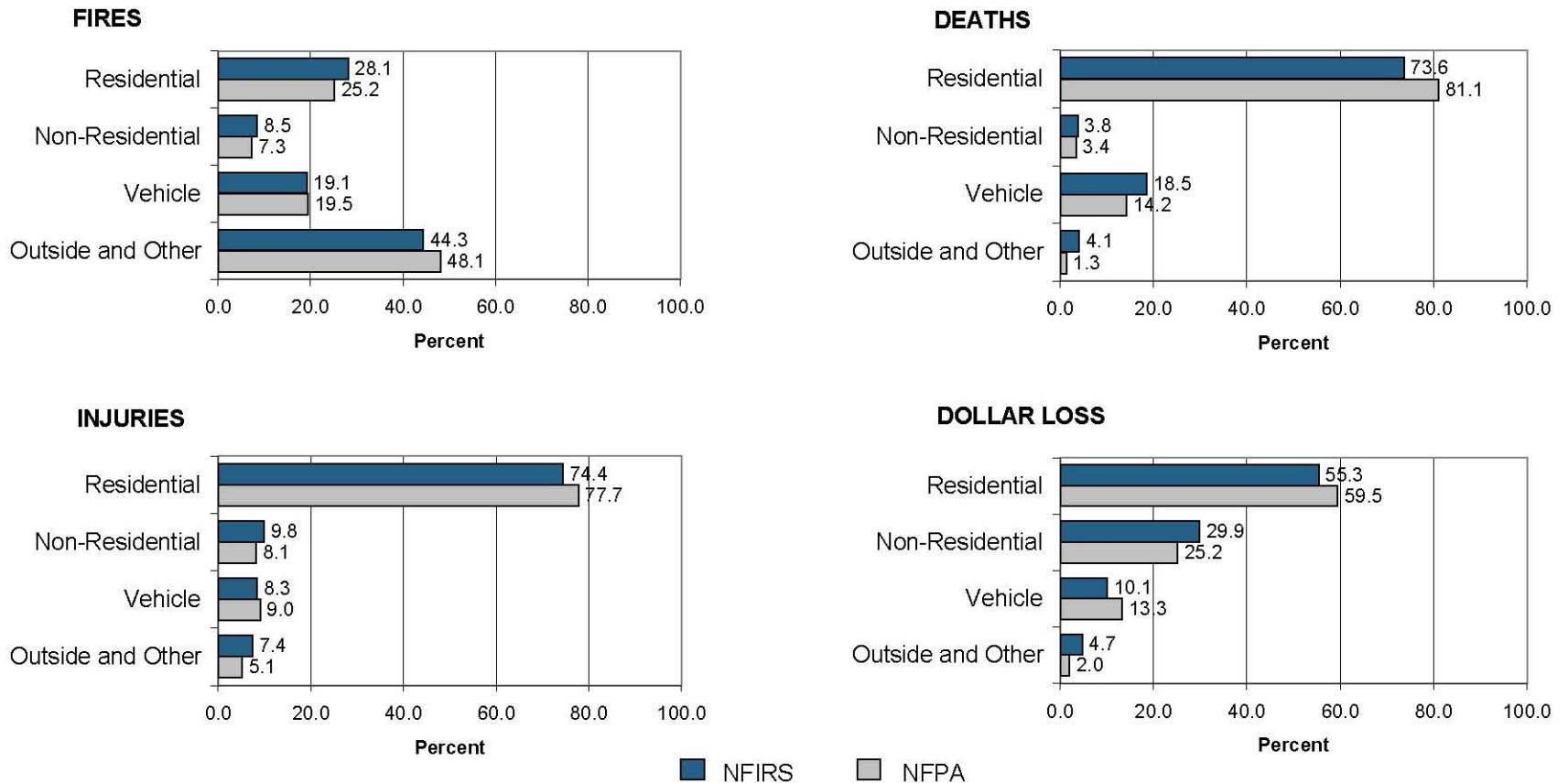
Figure 3: Comparison of NFIRS Data with NFPA Estimates by General Property Type (3-year average)

Sources: 2002-2004 NFIRS 5.0
         2002-2004 NFPA

Or, use a table:

Year	Total Fires	Structure Fires	Vehicle Fires	Other Fires
2004	2,758	1,183	591	984
2003	2,949	1,205	658	1,086
2002	2,817	1,154	716	947
2001	2,853	1,206	762	885
2000	2,505	1,160	545	800

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Total Fires and Fires by Major Incident Type 2000-2004
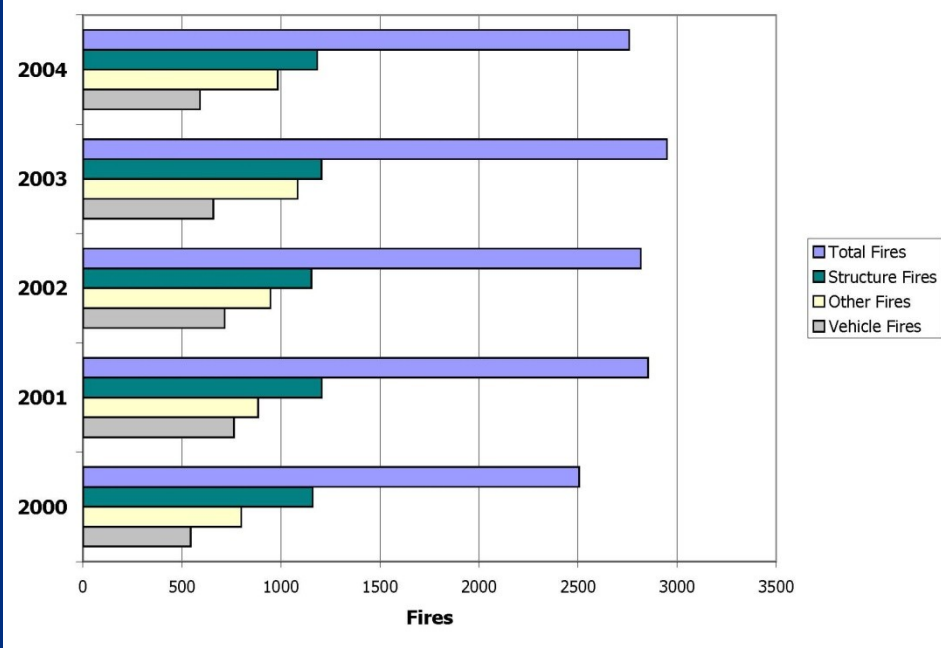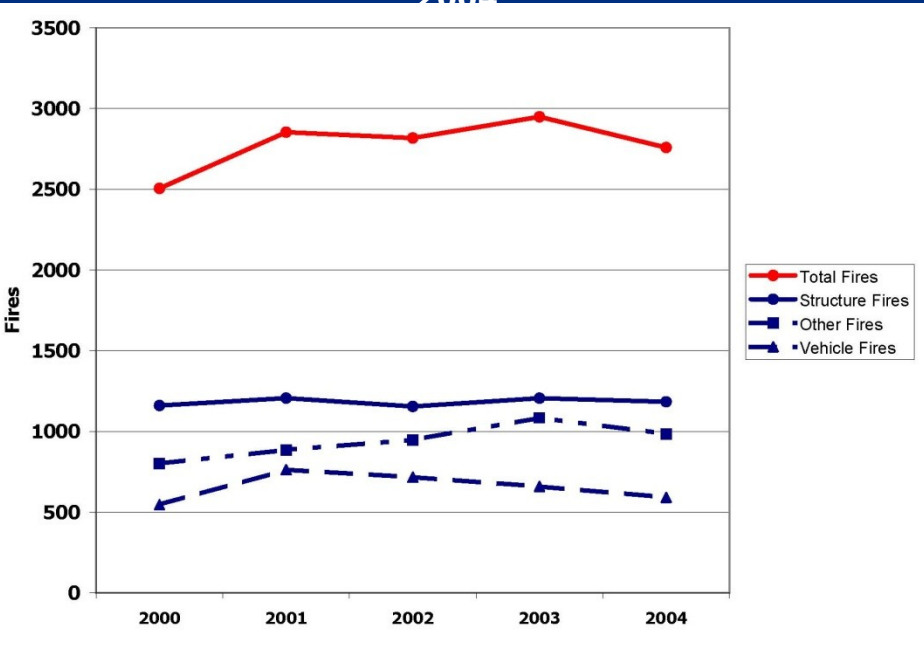
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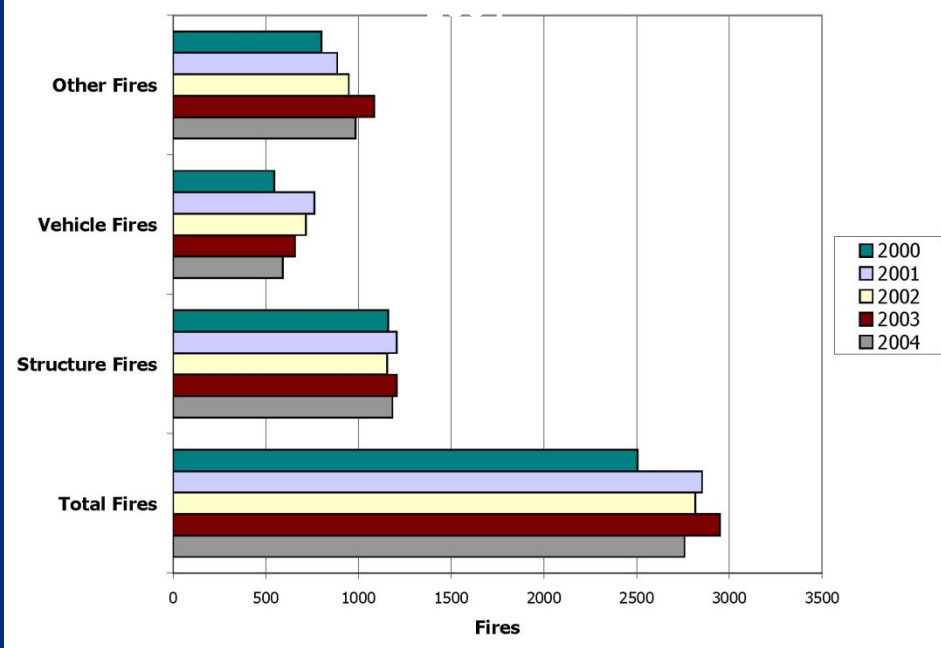
Month/Season

Day of Week

Year

Time of Day

- **From the NFIRS basic module**
  - Version = 5.0
  - Exclude mutual aid incidents
    (i.e., where AID ≠ 3 and AID ≠ 4)
  - Define fires (based on INC_TYPE)
  - Incident date (INC_DATE)
  - Alarm time (ALARM)

- **Month:** Characters 1-2 of the incident date field

- **Day:** Characters 3-4 of the incident date field

- **Year:** Characters 5-8 of the incident date field

- **Time:** Characters 9-12 of the alarm time field

Fire Incident Reporting, by Month
1/1/2004 - 12/31/2004

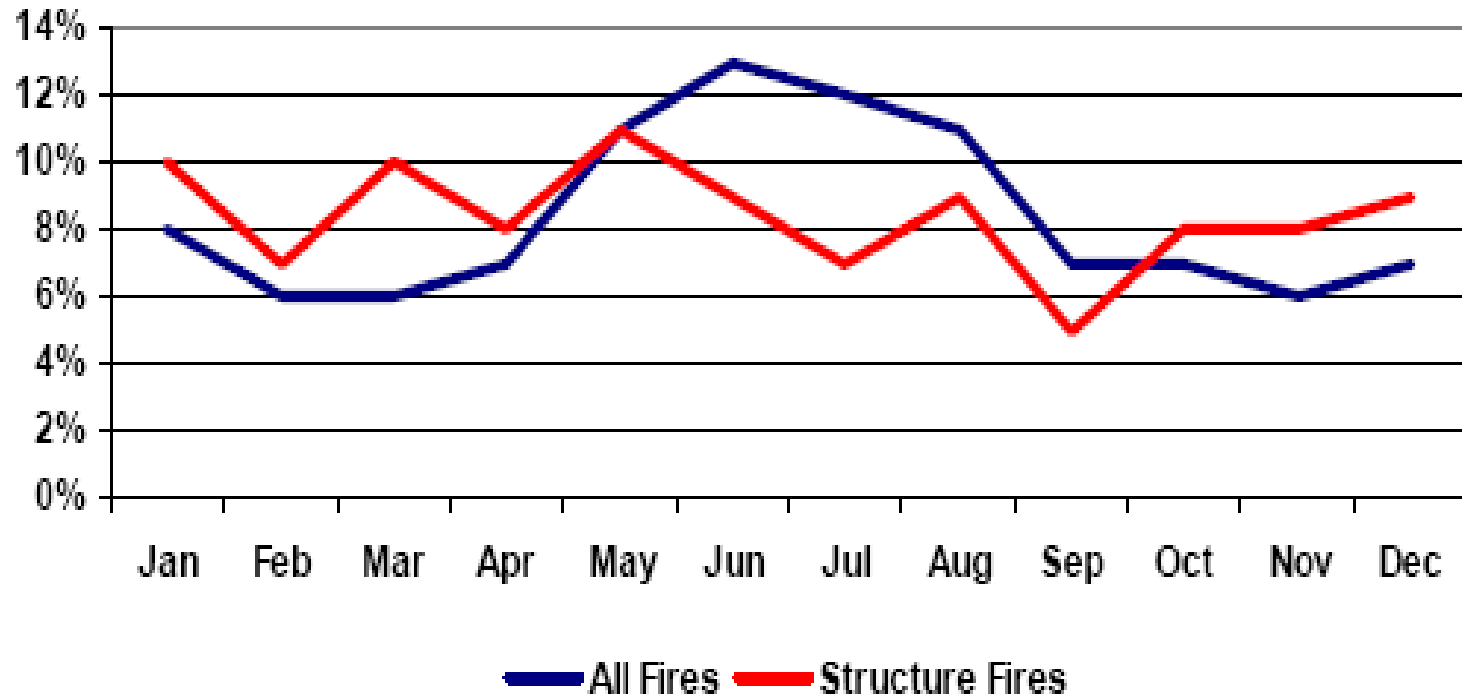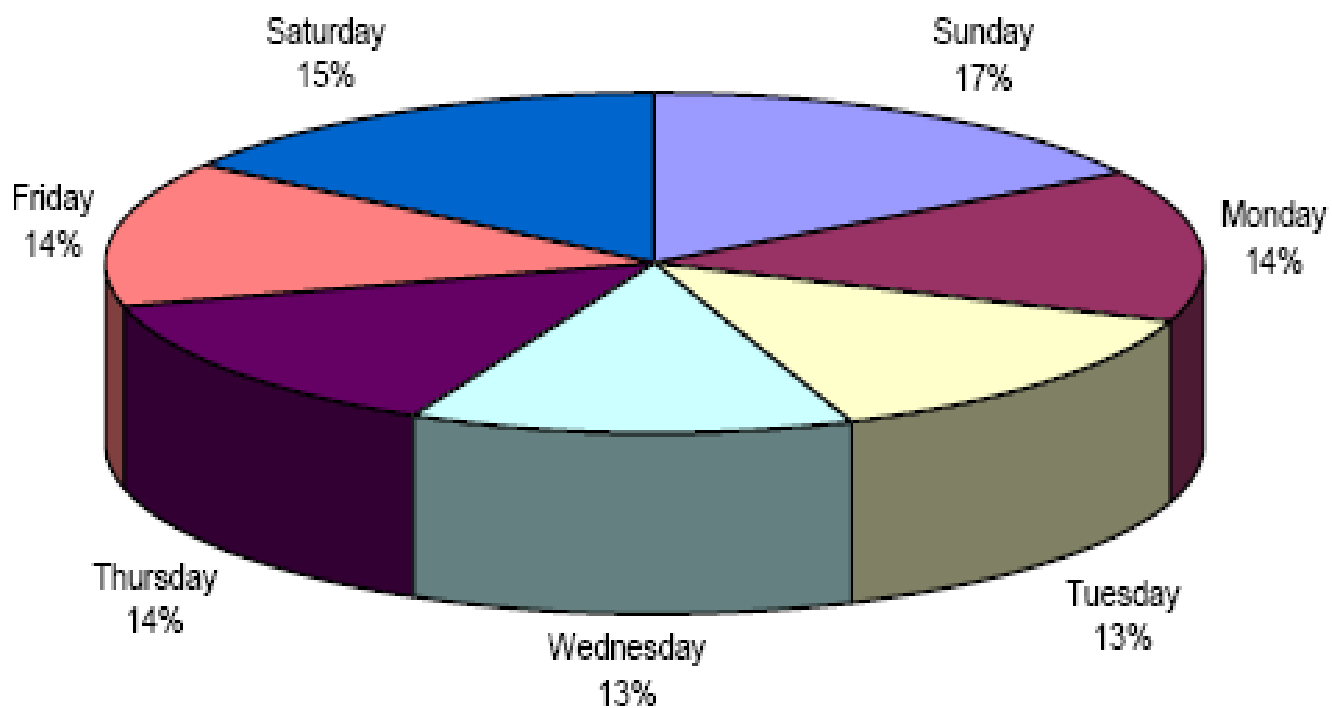| Month	Incidents
December	310
November	334
October	295
September	275
August	290
July	311
June	333
May	364
April	379
March	393
February	368
January	366
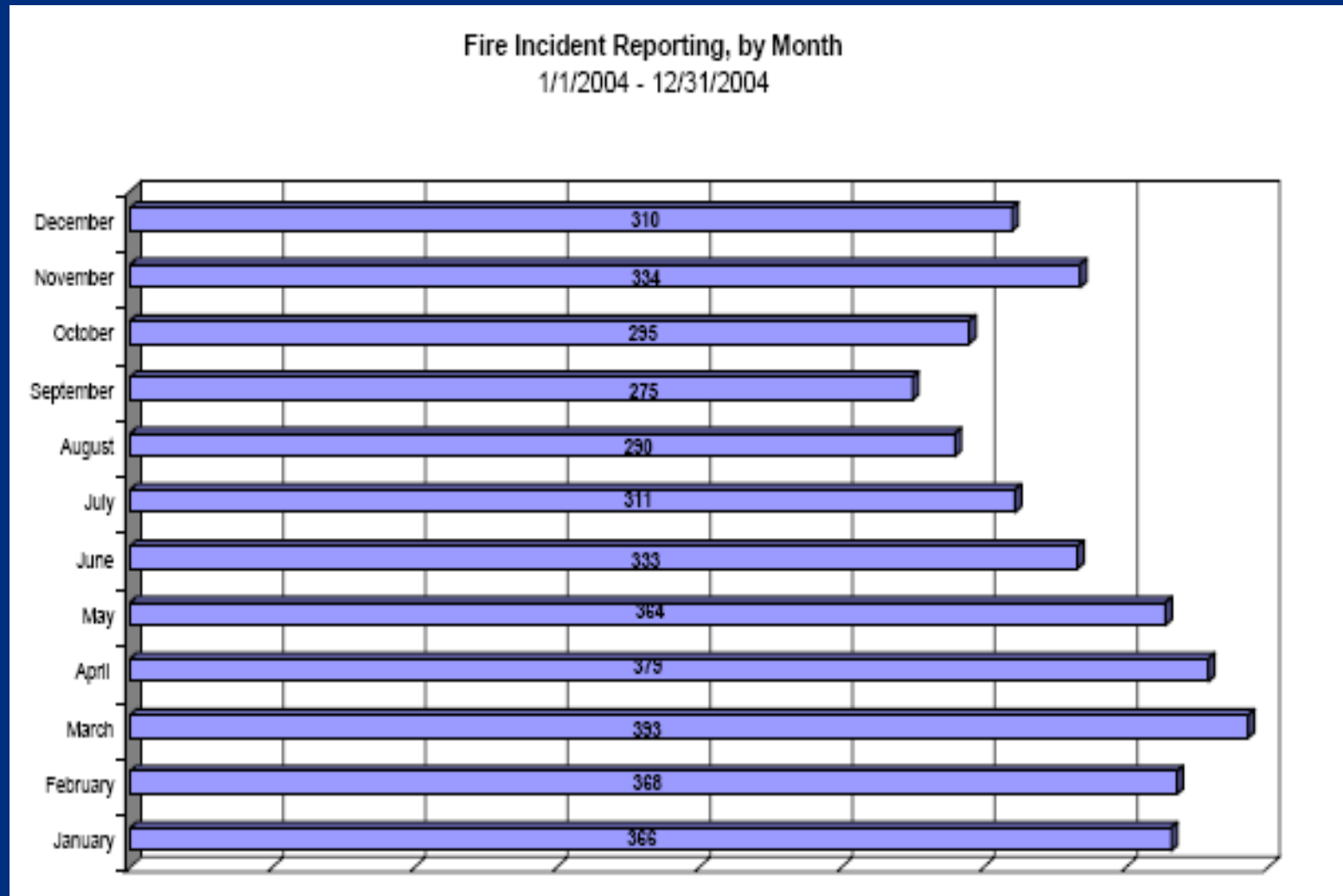
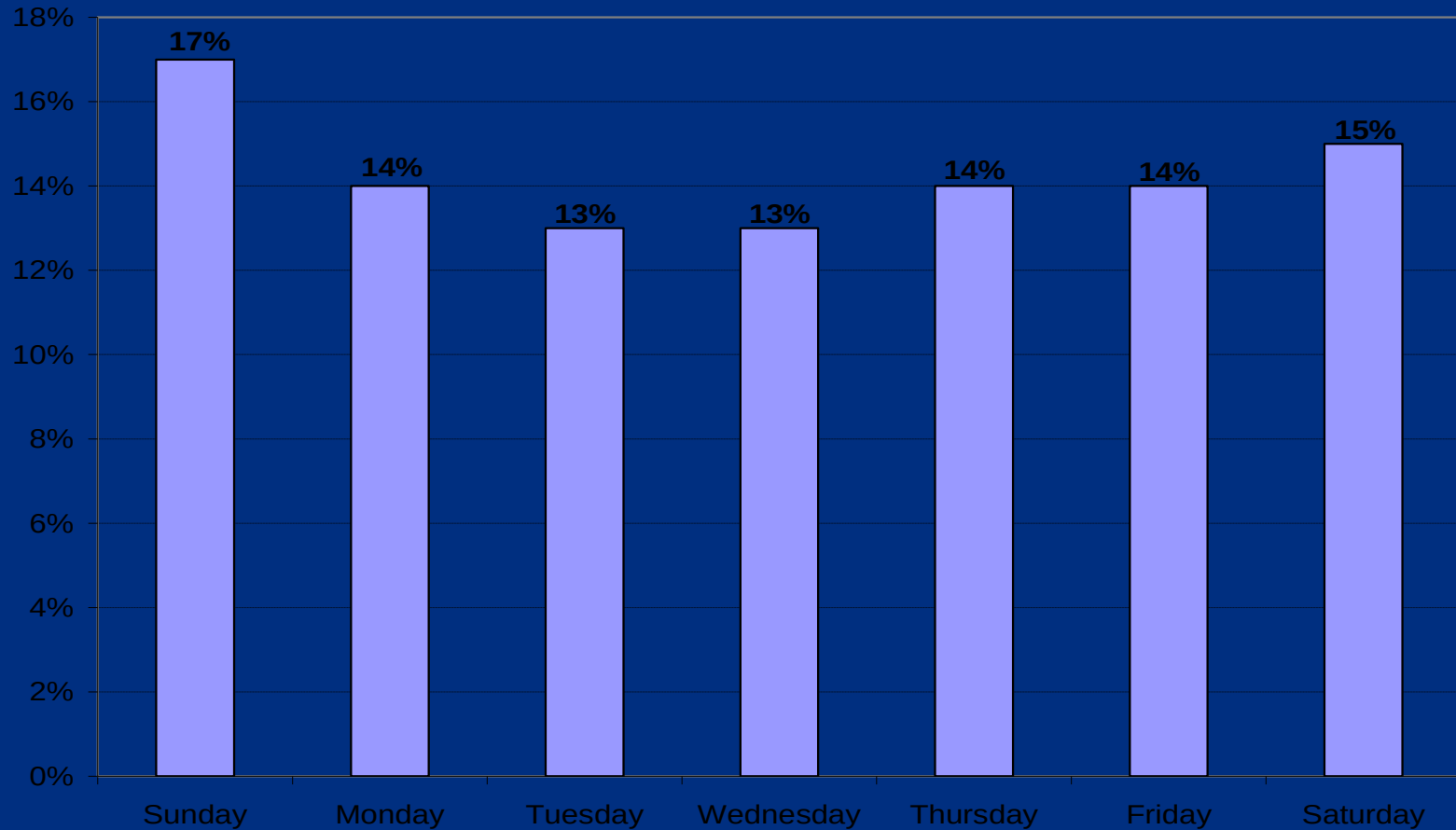Residential Structure Fires by Month

Fire Incident Reporting, by Day of the Week
1/1/2004 - 12/31/2004

Fire Incident Reporting by Day of the Week
2004

Source: 2004 (etc...)

Fire Incident Reporting by Day of the Week 2004
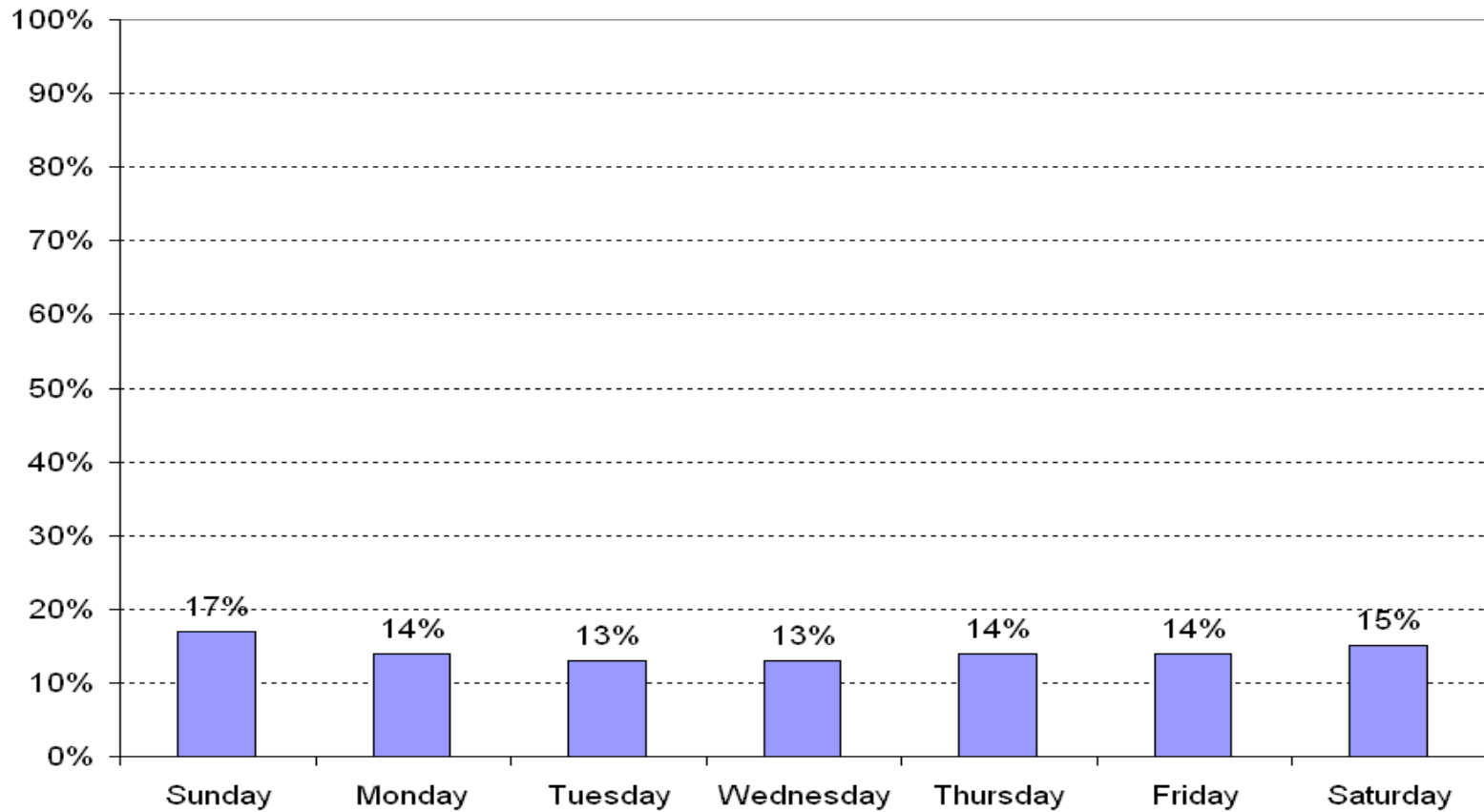
Source: 2004 (etc...)
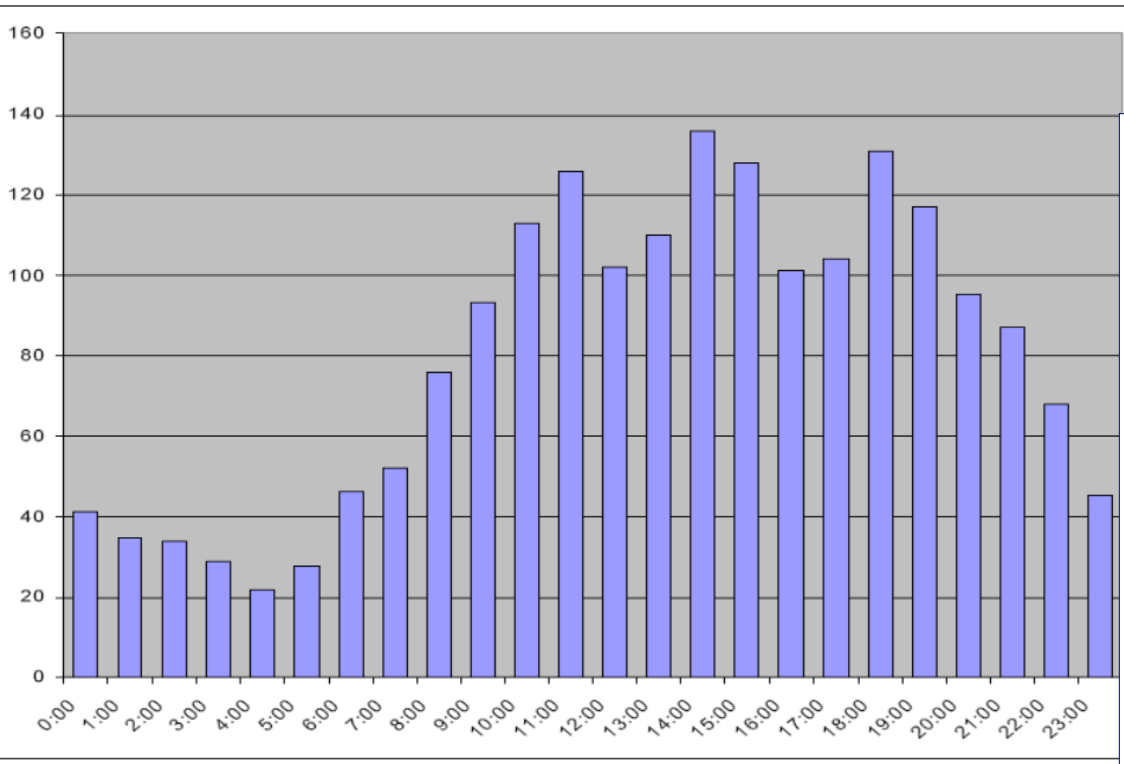
A.M.		P.M.	
12 AM - 00:59	41	12 PM - 12:59	102
01:00 - 01:59	35	13:00 - 13:59	110
02:00 - 02:59	34	14:00 - 14:59	136
03:00 - 03:59	29	15:00 - 15:59	128
04:00 - 04:59	22	16:00 - 16:59	101
5:00 - 05:59	28	17:00 - 17:59	104
6:00 - 06:59	46	18:00 - 18:59	131
07:00 - 07:59	52	19:00 - 19:59	117
08:00 - 08:59	76	20:00 - 20:59	95
09:00 - 09:59	93	21:00 - 21:59	87
10:00 - 10:59	113	22:00 - 22:59	68
11:00 - 11:59	126	23:00 - 23:59	45

TOTAL RUNS CALCULATED: 1919

Residential Structure Fires by Time of Day

All Fires — Structure Fires

Fire Incident Reporting, by Hour of the Day
1/1/2004 - 12/31/2004
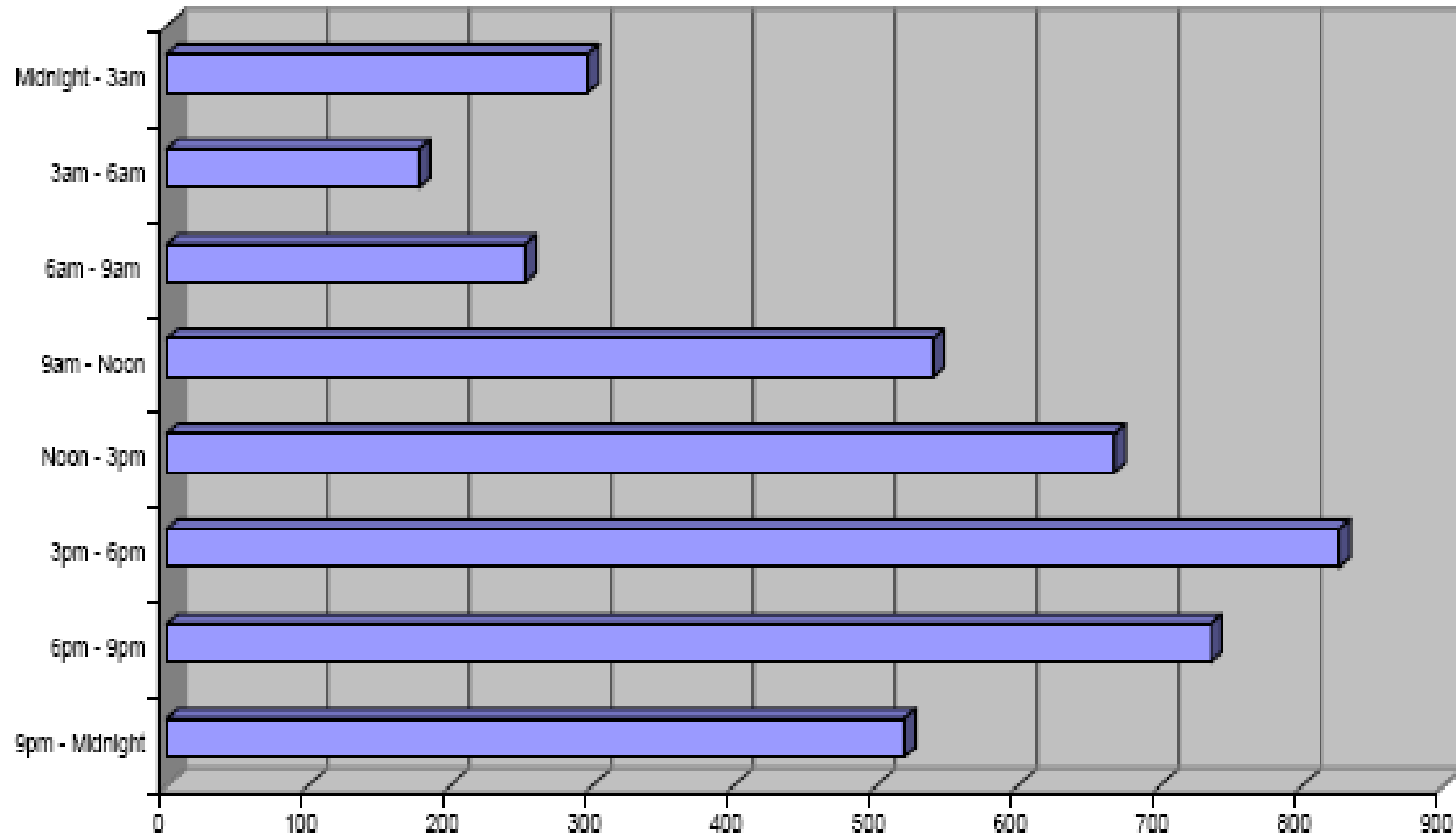
Property Use

Area of Fire Origin

Geographic Location

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- **From the NFIRS basic module**
  - Version = 5.0
  - Exclude mutual aid incidents
    (i.e., where AID ≠ 3 and AID ≠ 4)
  - Define fires (based on INC_TYPE)
  - Property use (PROP_USE)
  - State (STATE)

- **From the NFIRS header module**
  - County (FD_FIP_CTY)

- **From the NFIRS fire module**
  - Area of fire origin (AREA_ORIG)

- **Assembly**
  - PROP_USE: 100-199

- **Educational**
  - PROP_USE: 200-299

- **Health Care, Detention and Correction**
  - PROP_USE: 300-399

- **Residential**
  - PROP_USE: 400-499

- **Mercantile, Business**
  - PROP_USE: 500-599

- **Industry**
  - PROP_USE: 600-699

- **Manufacturing**
  - PROP_USE: 700

- **Storage**
  - PROP_USE: 800-899

- **Outside or Special Property**
  - PROP_USE: 900-999

- **Property Use, Other**
  - PROP_USE: 000

- **None**
  - PROP_USE: NNN

- **Undetermined**
  - PROP_USE: UUU

- **Null or Missing Values**
  - PROP_USE: blank

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PERCENTAGE OF STRUCTURE FIRES
BY PROPERTY TYPE

Property Type	Percentage
Residential	72%
Storage	11%
Public/Comm.	7%
Indust./Manufact.	4%
Educ./Instit.	3%
Special/Other	2%
Unclassified	1%
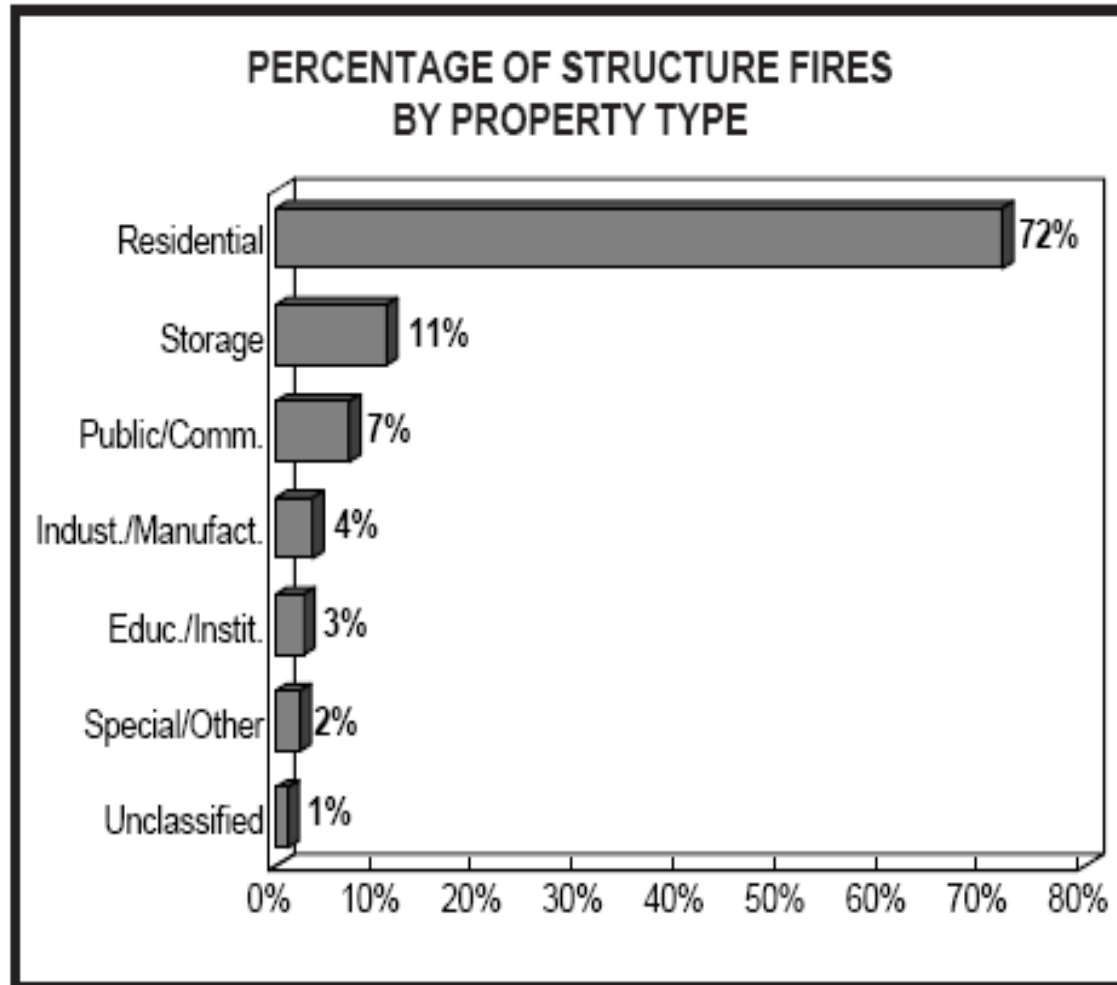
Structure Fires by Property Type
2001 - 2005

	2001	2002	2003	2004	2005	% Increase (Decrease) 2004-2005
Residential	3,912	4,698	4,858	4,973	5,043	1%
Educational/ Institutional	183	245	216	202	195	(3%)
Public Assembly/ Commercial	409	454	433	443	512	16%
Industrial/ Manufacturing	271	253	261	257	256	(<1%)
Storage	771	799	847	822	769	(6%)
Special/Other	170	220	234	199	167	(16%)
Unclassified	84	91	102	80	84	5%
TOTAL	**5,800**	**6,760**	**6,951**	**6,976**	**7,026**	**1%**

- **Means of Egress**
  - AREA_ORIG: 01-09
- **Assembly or Sales Areas**
  - AREA_ORIG: 10-17
- **Function Areas**
  - AREA_ORIG: 20-28
- **Technical Processing Areas**
  - AREA_ORIG: 30-38
- **Storage Areas**
  - AREA_ORIG: 40-47
- **Service Areas**
  - AREA_ORIG: 50-58

- **Service or Equipment Areas**
  - AREA_ORIG: 60-68
- **Structural Areas**
  - AREA_ORIG: 70-78
- **Transportation, Vehicle Areas**
  - AREA_ORIG: 80-86
- **Outside Areas**
  - AREA_ORIG: 90-98
- **Area of Fire Origin, Other**
  - AREA_ORIG: 00
- **Undetermined**
  - AREA_ORIG: UU

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Top Five Area of Fire Origin

Sleeping Room Under 5 Persons 8%

Bathroom 5%

Living Room 9%

Laundry Area 6%

Cooking Area, Kitchen 13%
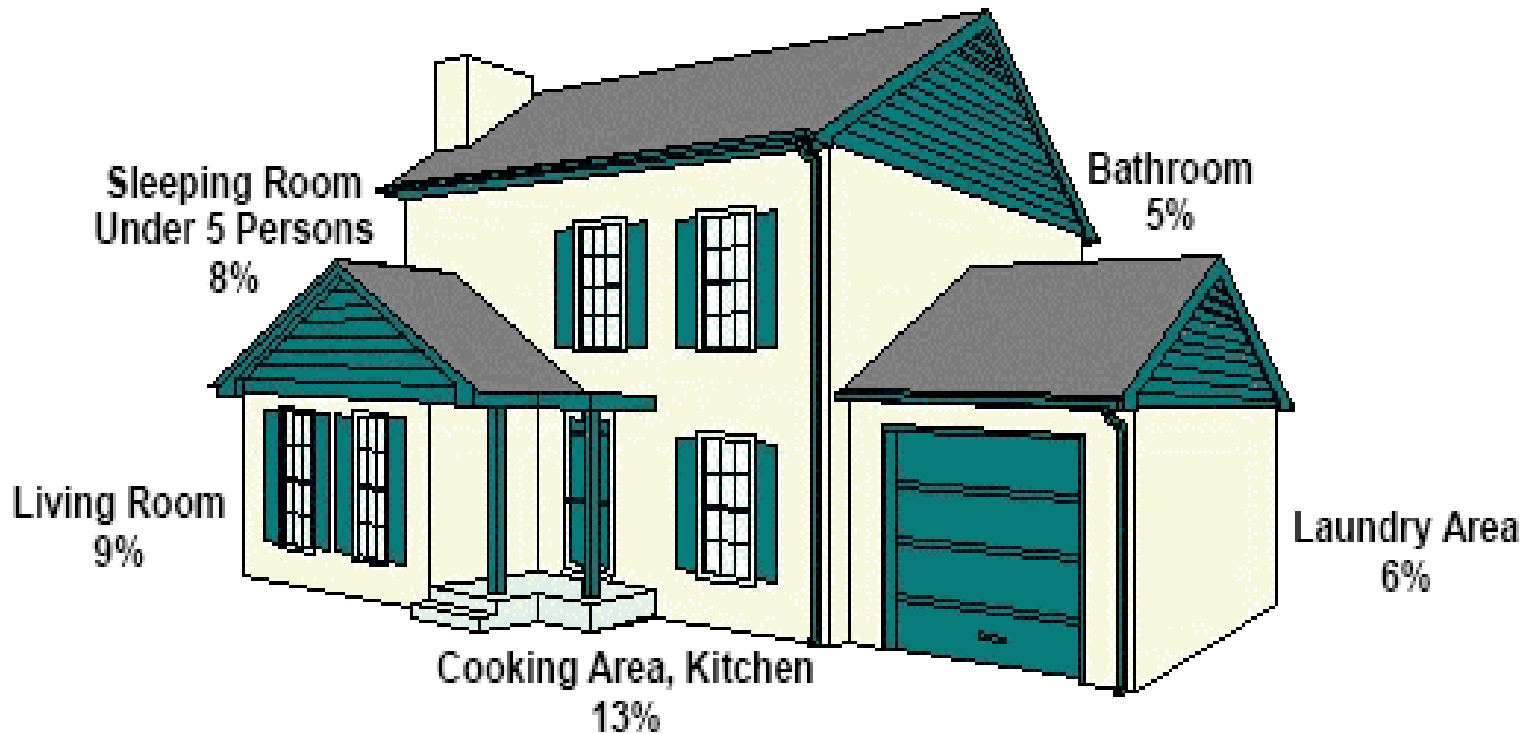
STORE AND OFFICE PROPERTY

(Retail Shopping, Business Offices, Service Stations)
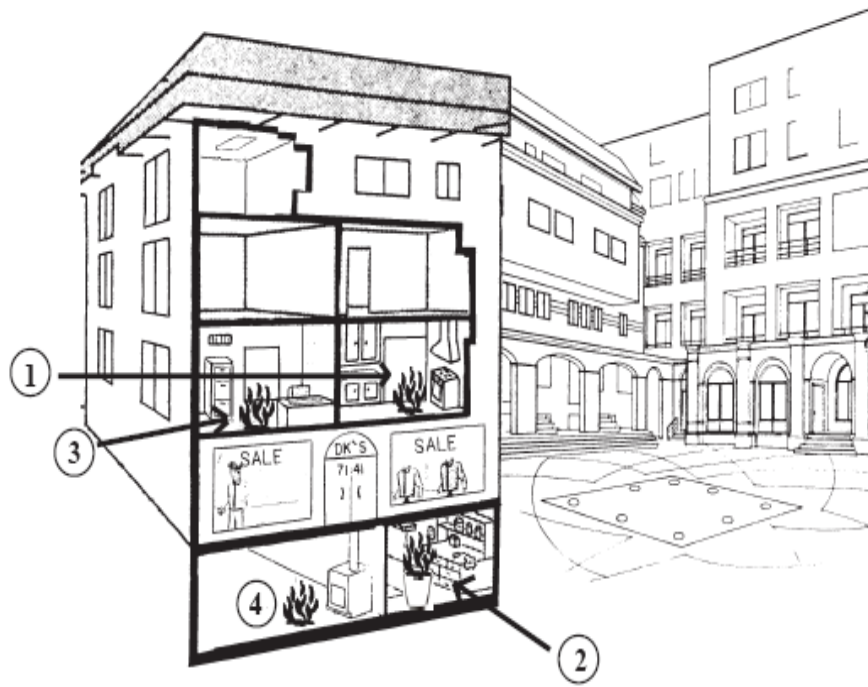
AREA OF FIRE ORIGIN

1. Kitchen/Cooking Area 14%
2. Trash Chute/Container 9%
3. Office 6%
4. Heating Room/Area 5%

Other Areas of Fire Origin 66%

Example: Where Fires Occur Geographic Location (Spatial Analyses)

Fire Deaths Per Million Population
- Greater than 25
- 14 - 24.9
- 10 - 13.9
- Less than 10

Data Source: National Center for Health Statistics and U.S. Census Bureau
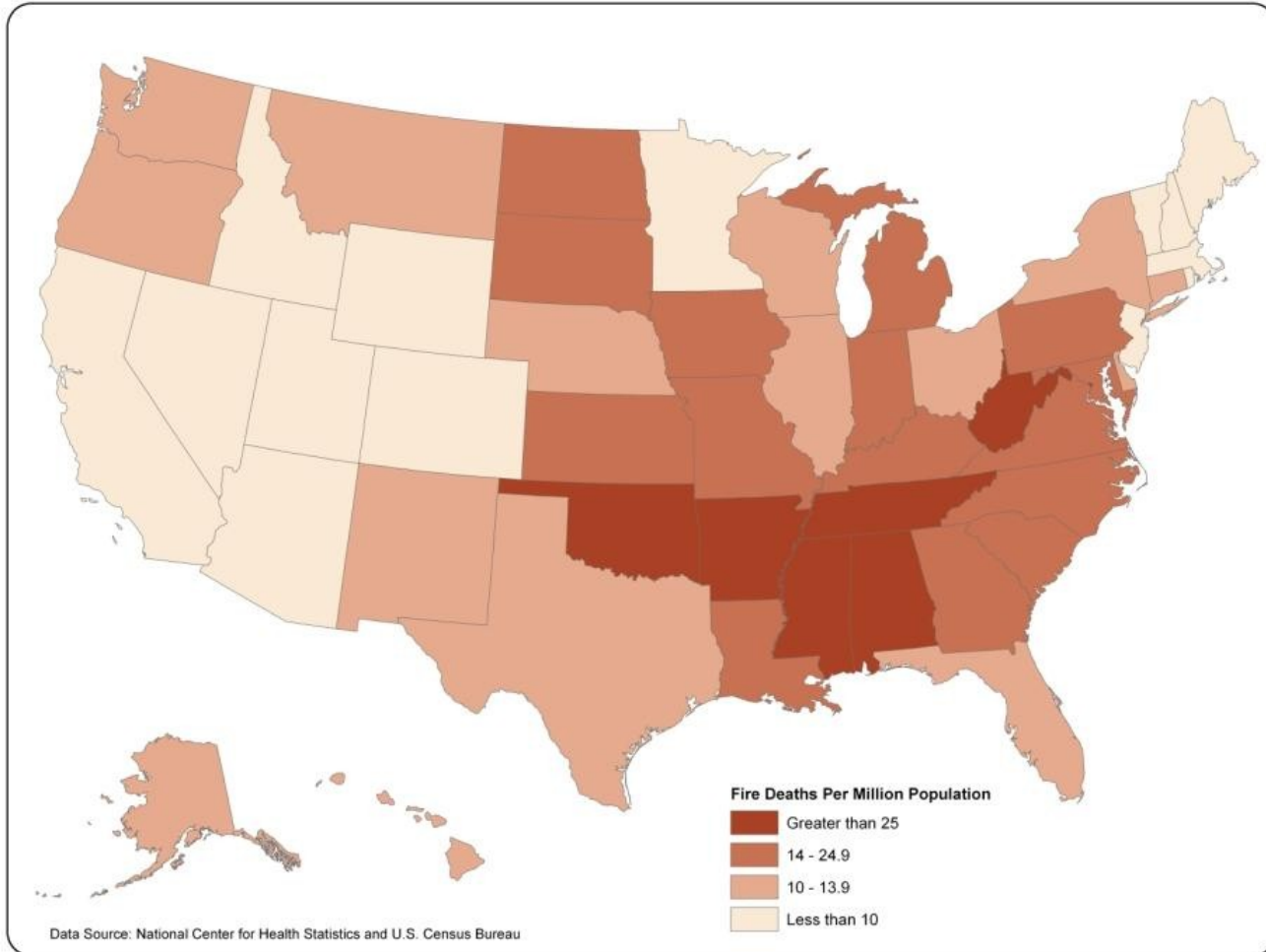
Deaths

Injuries

Contents Loss

Property Loss

Fire Spread

- **From the NFIRS basic module**
  - Version = 5.0
  - Exclude mutual aid incidents
    (i.e., where AID ≠ 3 and AID ≠ 4)
  - Define fires (based on INC_TYPE)
  - Deaths (OTH_DEATH)
  - Injuries (OTH_INJ)
  - Total dollar loss = Contents loss (CONT_LOSS) + Property loss (PROP_LOSS)

- **From the NFIRS structure fire module**
  - Fire Spread (FIRE_SPRD)

- **Confined fires, by definition, are confined to the object of origin (FIRE_SPRD=1)**
  - Confined Fires = INC_TYPE 113 to 118

- **Abbreviated reporting may limit the number of confined fires with fire spread entries**

- **Confined fires with no (or NULL) fire spread entries then need to be counted in with FIRE_SPRD=1**

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Table 2. Dollar Loss per Clothes Dryer Fire by Fire Spread
[Residential Buildings, 3-year Average (2002-2004)]

Measure	Flame Spread Confined to:				
	Confined to object of origin	Confined to room of origin	Confined to floor of origin	Confined to building of origin	Beyond building of origin
Clothes Dryer Loss per fire	$2,420	$4,742	$28,971	$63,822	$65,665
Percent of Fires	61.8%	26.5%	3.8%	7.4%	.5%

Source: NFIRS 5.0 data only; Loss per fire is computed for only those fires where loss information was provided.

- **At USFA, fire cause for structures is determined by information gathered from several data fields from different NFIRS modules.**

- **Cause is mutually exclusive – one and only one cause is assigned to each incident**

- **The cause hierarchy is designed for structure fires, but currently is applied to all fires.**

- **Separate cause hierarchies are under development for vehicles and outside other fires.**

What does this mean for you?

- **Option: Implement USFA cause methodology**

- **Option: Cause-related fields from the NFIRS fire module**
  - Cause of ignition (CAUSE_IGN)
  - Equipment involved in ignition (EQUIP_INV)
  - Factors contributing to ignition (FACT_IGN_1, FACT_IGN_2)
  - Human factors contributing to ignition (HUM_FACT1, ... , HUM_FACT8)
  - Heat source (HEAT_SOURC)

None of these NFIRS variables individually defines fire cause

- **Cause is a complex chain of events**

- **Hierarchy of definitions**
  - Assign fire to highest category – if it does not fit in the top category, then consider the second; if not that one, then the third, etc.

- **Three level process**
  - Priority cause – Initial hierarchy, 34 categories
  - Cause – 34 priority groupings condensed into 16 major groups.
  - General Cause – 16 causes condensed into 7 general causes

- **Primary Variables Used**
  - Cause of ignition (CAUSE_IGN)
  - Equipment involved in ignition (EQUIP_INV)
  - Factors contributing to ignition (FACT_IGN_1, FACT_IGN_2)
  - Heat source (HEAT_SOURC)
  - Human factors contributing to ignition (HUM_FACT1, … , HUM_FACT8)
  - Area of Origin (AREA_ORIG)

- **Secondary Variables**
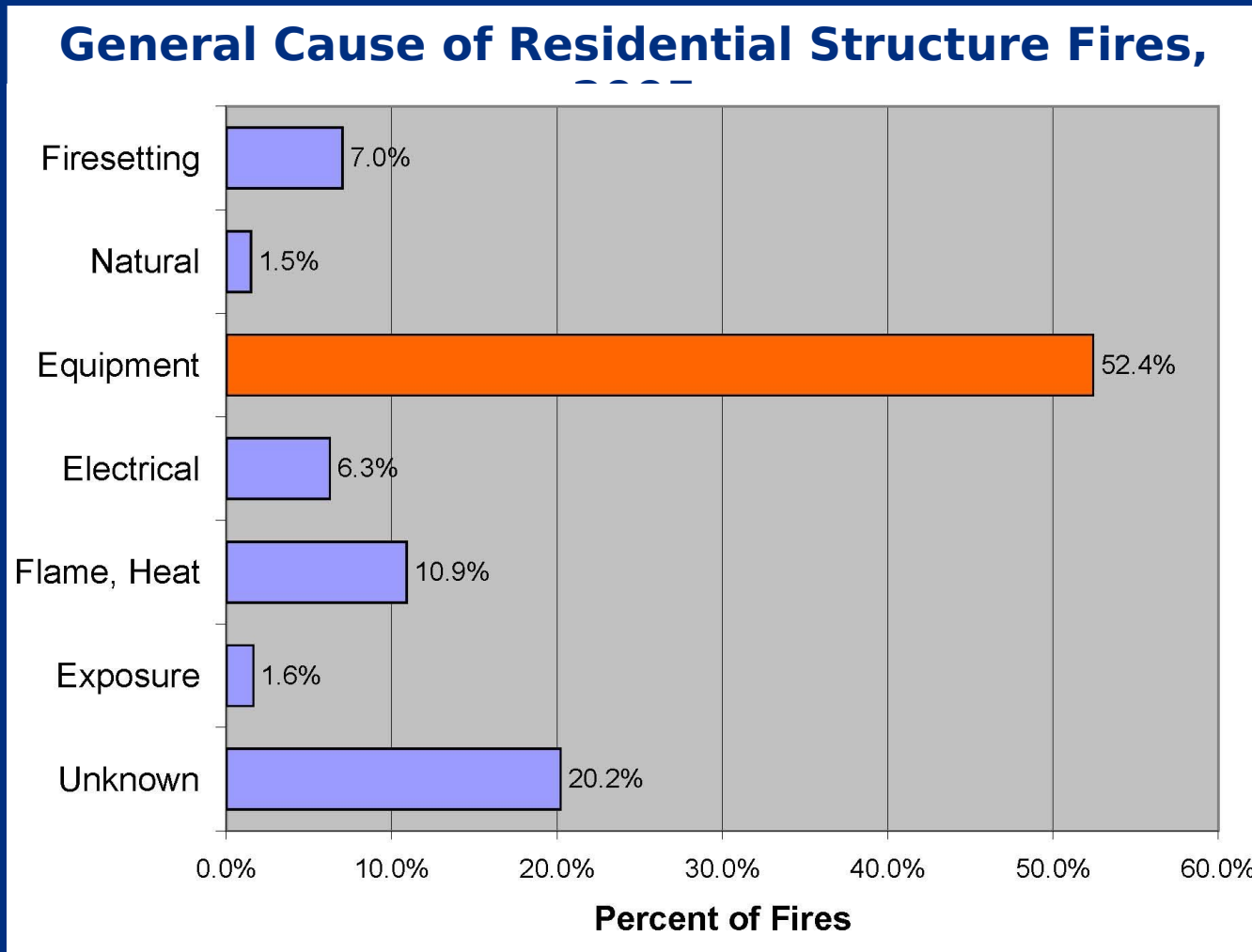 - Age, Equipment power source (EQ_POWER), Mobile property involved (MOB_INVOL)

- **Cause Category Methodology Matrix:**
  http://www.nfirs.fema.gov/jsps/nfirsdownload.jsp?url=
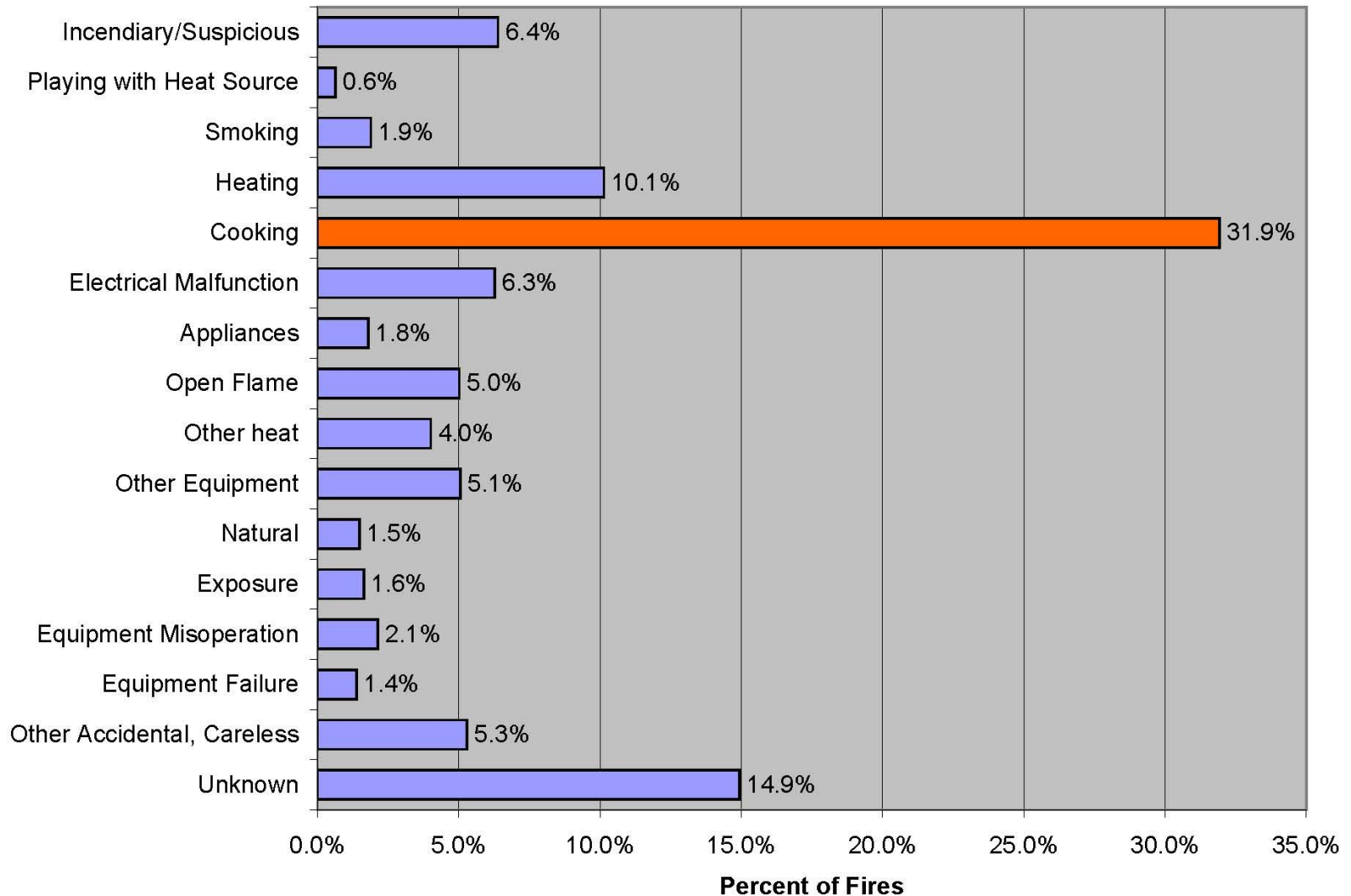 /_download/50causematrix01012004.xls

Code	Priority Cause Description	Code	Cause Description	Code	General Cause Description
04	Incendiary	01	Incendiary/Suspicious	01	Firesetting
04	Suspicious				
05	Children Playing	02	Playing with Heat Source		
05	Children Playing				
05	Children Playing				
36	Other Playing				
06	Natural	11	Natural	02	Natural
06	Natural 2				
11	Heating	04	Heating	03	Equipment
12	Cooking	05	Cooking		
13	Air Conditioning	07	Appliances		
15	Appliances				
16	Special Equip.	10	Other Equipment		
16	Special Equip.				
17	Processing Equip.				
19	Service Equip.				
20	Vehicle, Engine				
25	Unclassified fuel powered equip.				
25	Unclassified equip. w/ other or unknown fuel source				
22	Equipment Operation Deficiency	14	Equipment Misoperation		
23	Equipment Failure, Malfunction	15	Equipment Failure		
14	Electrical Dist.	06	Electrical Malfunction	04	Electrical
26	Unclassified elec malfunction				
07	Fireworks	09	Other heat	05	Flame, Heat
08	Explosives				
09	Smoking	03	Smoking		
18	Torches	08	Open Flame		
27	Matches, Candles				
28	Open fire				
31	Ember, rekindle				
29	Other open flame, spark	09	Other heat		
30	Friction, hot material				
32	Other hot object				
03	Exposure	12	Exposure	06	Exposure
33	Exposure 2				
24	Other Unintentional	16	Other Accidental, Careless	07	Unknown
21	Heat Source or Product Misuse				
34	Unknown 1	13	Unknown		
35	Unknown 2				
37	Trash, rubbish				

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General Cause of Residential Structure Fires, 2005

Cause	Percent of Fires
Firesetting	7.0%
Natural	1.5%
Equipment	52.4%
Electrical	6.3%
Flame, Heat	10.9%
Exposure	1.6%
Unknown	20.2%

Percent of Fires

Cause of Residential Structure Fires, 2005

Cause	Percent of Fires
Incendiary/Suspicious	6.4%
Playing with Heat Source	0.6%
Smoking	1.9%
Heating	10.1%
Cooking	31.9%
Electrical Malfunction	6.3%
Appliances	1.8%
Open Flame	5.0%
Other heat	4.0%
Other Equipment	5.1%
Natural	1.5%
Exposure	1.6%
Equipment Misoperation	2.1%
Equipment Failure	1.4%
Other Accidental, Careless	5.3%
Unknown	14.9%

Percent of Fires

HEATING FIRES IN RESIDENTIAL PROPERTIES ONLY

Equipment	No. of Fire Incidents	% of Total	Dollar Loss	% of Total
Fireplace/Chimney	240	62%	$1,472,550	47%
Fixed Heating Units	65	17%	762,925	24%
Central Heating Units	61	16%	169,200	5%
Water Heaters	12	3%	208,000	7%
Portable Heaters	9	2%	464,000	15%
Other	3	1%	40,080	1%
Total	**390**	**100%**	**$3,116,755**	**100%**

Figure 4: Leading Equipment Involved in Ignition of Residential Building Heating Fires
(residential buildings, 3-year average (2002-2004) NFIRS 5.0 data)
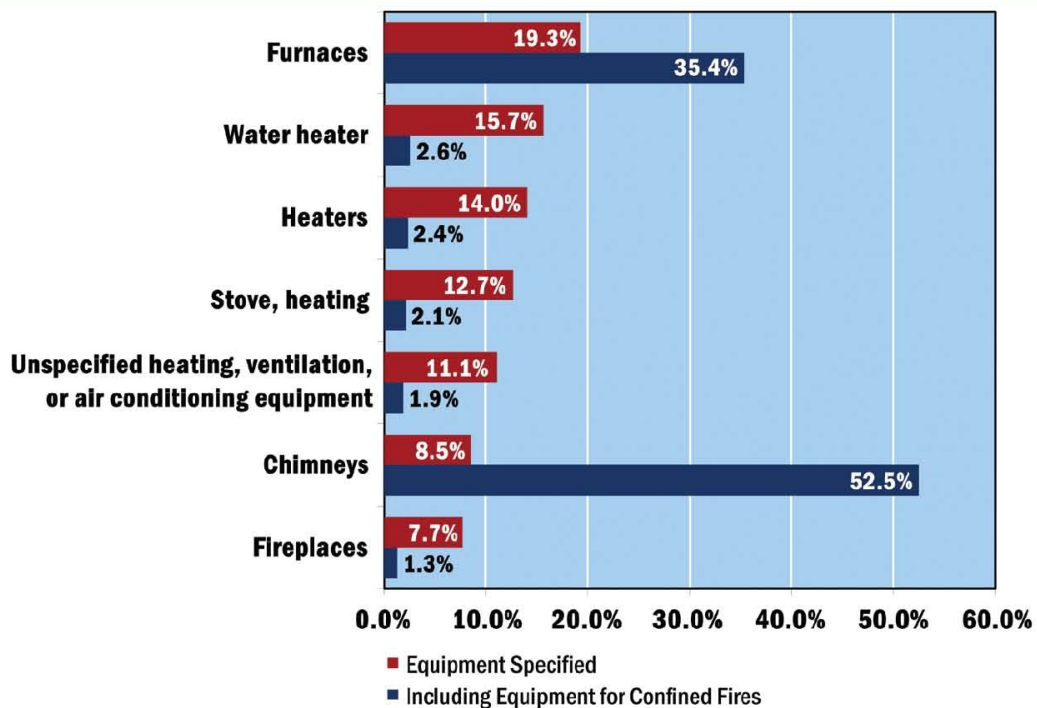
Note: Adjustments were made for heating stoves: NFIRS 5.0 data on item first ignited (cooking materials) suggested the equipment involved in ignition was a cooking stove. These 558 incidents were excluded from this analysis.

Source: 2002-2004 NFIRS 5.0 data

- **Unreported data**

- **Data reported as "unknown" or "undetermined"**

- **Adjusting for unknown data – adjusted percentages computed using only those incidents for which data were provided**

- **Decide focus**

- **Identify audience**

- **Determine data needs**

- **Determine appropriate analysis tools**

- **Determine appropriate data presentation**

- **Write clearly, keep focused**

Patricia Frazier, Director

Center for Data Analysis and Special Studies
TriData, a Division of System Planning Corporation
(703) 351-8300
pfrazier@sysplan.com
www.sysplan.com

Gayle Kelch, Statistician

National Fire Data Center
U.S. Fire Administration
Federal Emergency Management Agency
Department of Homeland Security
(301) 447-1154
gayle.kelch@dhs.gov
www.usfa.fema.gov