

# FIRE INVESTIGATION 1A

## Fire Cause and Origin Determination



## STUDENT SUPPLEMENT



January 2011



**Approved and Adopted by the Office of the State Fire Marshal**

Recommended for adoption by the Statewide Training and Education Advisory Committee and the State Board of Fire Services

# **FIRE INVESTIGATION 1A**

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**FIRE ORIGIN AND CAUSE DETERMINATION**

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**STUDENT SUPPLEMENT**



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Mission Statement.....	i
California Fire Service Training and Education System.....	i
Acknowledgments .....	i
Course Outline .....	iii
Texts and References .....	iv
Topic 1: Orientation and Administration .....	1
Course Design.....	1
Course Requirements.....	1
Student Evaluation .....	1
Calendar of Events.....	2
Your Progress Chart .....	3
Topic 2: The Role of the Fire Investigator .....	4
Fire Loss in the United States .....	4
Why Fires Are Investigated .....	5
Fire Department Organization .....	5
Public Sector Fire Investigators.....	6
Agencies Involved With Fire Investigation, Training, and Standards.....	7
Investigator Ethics.....	9
Investigator Organizations .....	10
Professional Qualifications for Fire Investigators.....	11
Individual Activity 2-1: What Does It All Mean?.....	13
Glossary of Terms.....	16
Topic 3: The Scientific Method .....	19
Topic 4: Fire Development for the Investigator .....	20
Topic 5: Legal Aspects of Fire Investigation .....	21
Michigan v. Tyler .....	21
Michigan v. Clifford.....	22
Authority to Investigate .....	23
Inspection Warrant .....	25
Recommended Consent to Search Form.....	28
Inspection Warrant .....	29
Group Activity 5-1: Am I There Legally?.....	30
Topic 6: Expert Testimony .....	32
The Frye Opinion .....	32
Frye v. United States (1923).....	33
Depositions .....	34
Expert Testimony.....	35
Excerpt from the Investigation & Prosecution of Arson.....	36
Example of a Curriculum Vitae .....	48
Group Activity 6-1: Testifying With Body Language .....	50



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination



Topic 7: Arson Law.....	51
The Criminal Aspects of the Investigation.....	51
Criminal Act of Burning.....	51
Relevant Sections of the California Penal Code.....	51
California Penal Code Sections for Arson and Destructive Device.....	52
California Penal Code Sections for Time of Commencing Criminal Actions.....	59
Health and Safety Code Sections Related to Fire Investigation.....	59
Vehicle Code Section Related to Fire Investigation.....	60
Court Cases and General Intent.....	60
People v. Fry (1993).....	62
People v. Atkins (2001).....	67
Group Activity 7-1: What's the Code Section?.....	83
Topic 8: Fire Scene Documentation.....	85
Individual and Group Activity 8-1: Scene Sketching.....	86
Topic 9: Point of Origin Determination.....	89
Group Activity 9-1: Burn Pattern Indicators (Option 1).....	90
Group Activity 9-1: Burn Pattern Indicators (Option 2).....	91
Topic 10: Ignition.....	92
Topic 11: Accidental Ignition Sources.....	93
Topic 12: Electrical Ignition Sources.....	94
Excerpt from the Investigation & Prosecution of Arson.....	94
Topic 13: Incendiary Fire Indicators.....	101
Group Activity 13-1: What Would I Look For?.....	102
Topic 14: Incendiary Devices.....	103
Excerpts from the California Penal Code.....	103
Excerpt from the Investigation & Prosecution of Arson.....	105
Topic 15: Structure Fire Investigation.....	108
Topic 16: Vehicle Fire Investigation.....	109
Automobile Fire Investigation Checklist.....	109
Vehicle Field Notes.....	113
Topic 17: Wildland Fire Investigation.....	117
Glossary of Wildland Fire Terminology.....	118
Cigarettes as a Wildland Fire Cause.....	121
Group Activity 17-1: What Do You See?.....	134
Topic 18: Explosion Investigation.....	135



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Mission Statement



### Mission Statement

The mission of State Fire Training is to enable the California fire service to safely protect life and property through education, training, and certification.

### California Fire Service Training and Education System

The California Fire Service Training and Education System (CFSTES) was established to provide a single statewide focus for fire service training in California. CFSTES is a composite of all the elements that contribute to the development, delivery, and administration of training for the California Fire Service. The authority for the central coordination of this effort is vested in the Training Division of the California State Fire Marshal's Office with oversight provided by the State Board of Fire Services.

The role of CFSTES is one of facilitating, coordinating, and assisting in the development and implementation of standards and certification for the California fire service. CFSTES manages the California Fire Academy System by providing standardized curriculum and tests; accredited courses leading to certification; approved standardized training programs for local and regional delivery; administering the certification system; and publishing Career Development Guides, Instructors Guides, Student Manuals, Student Supplements, and other related support materials.

This system is as successful and effective as the people involved in it are. It is a fire service system developed by the fire service, for the fire service... and we believe it is the best one in the country.

### Acknowledgments

State Fire Training coordinated the development of the material contained in this guide. Before its publication, the Statewide Training and Education Advisory Committee (STEAC) and the State Board of Fire Services (SBFS) recommended this guide for adoption by the State Fire Marshal (SFM). This guide is appropriate for fire service personnel and for personnel in related occupations that are pursuing State Fire Training certification.

<b>Ken Pimlott</b> Acting Director of CAL FIRE	
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# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

### Acknowledgments



Special acknowledgement and thanks are extended to the following members of State Fire Training for their diligent efforts and contributions that made the final publication of this document possible.

**Alicia Hamilton**  
Fire Service Training Specialist III

The material contained in this document was compiled and organized through the cooperative effort of numerous professionals within, and associated with, the California fire service.

We gratefully acknowledge the following individuals who served as principal developers for this document.

<b>Jim Allen</b> Allan Hancock College	<b>John Madden</b> San Luis Obispo Fire Department
<b>Tom Fee</b> California Conference of Arson Investigators	<b>Brad Martin</b> Fairfield Fire Department
<b>Joe Konefal, Team Leader</b> CAL FIRE/SFM Arson & Bomb Unit (Retired)	<b>Brendan O'Leary</b> San Francisco Fire Department
<b>Mark Koenig</b> CAL FIRE Law Enforcement Unit (Retired)	<b>Greg Smith</b> CAL FIRE/SFM Arson & Bomb Unit (Retired)

State Fire Training also wishes to extend a thank you to the  
California Conference of Arson Investigators  
for their support in the completion of this project.

*"We gratefully acknowledge the hard work and accomplishments of those before  
us who built the solid foundation on which this program continues to grow."*



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination



Course Outline

### Course Outline

**Course Objectives:** To provide the student with...

- a) An overview of fire investigative practices and responsibilities associated with fire origin and cause.
- b) Technical information enabling them to determine the area of fire origin.
- c) Background information that will lead them to develop an opinion of the fire causes.
- d) Technical information on the State's arson laws and legal aspects of fire scene investigation.

<b>Course Content</b> .....	<b>40:00</b>
1. Orientation and Administration.....	1:00
2. The Role of the Fire Investigator.....	1:00
3. The Scientific Method.....	1:00
4. Fire Development for the Investigator.....	2:00
5. Legal Aspects of Fire Investigation.....	3:00
6. Expert Testimony.....	1:00
7. Arson Law.....	1:00
8. Fire Scene Documentation.....	1:00
9. Point of Origin Determination.....	4:00
10. Ignition.....	2:00
11. Accidental Ignition Sources.....	3:00
12. Electrical Ignition Sources.....	2:00
13. Incendiary Fire Indicators.....	3:00
14. Incendiary Devices.....	2:00
15. Structure Fire Investigation.....	2:00
16. Vehicle Fire Investigation.....	2:00
17. Wildland Fire Investigation.....	2:30
18. Explosion Investigation.....	2:30
Formative Tests.....	3:00
Summative Test.....	1:00



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Texts and References



### Texts and References

- Arson Fires in California, CSFM, NFIRS Program, [www.osfm.fire.ca.gov/cairs/cairs.php](http://www.osfm.fire.ca.gov/cairs/cairs.php)
- California Code of Civil Procedure, Sections 1822.50-1822.57
- California Evidence Code, 2009 Edition, Sections 720–723 and 800-805
- California Fire Code, Sections 104, 104.10 and 104.10.1
- California Health and Safety Code, Sections 13000-13002, 13007, 13100, and 13107
- California Penal Code, Sections 15-17, 26, 450-457.1, 654, 800-801, 1523–1542, 11413, 12301-12303.3, 12308-12312
- California Public Resources Code, Sections 714 and 714(d)
- California Vehicle Code, Section 23111
- Essential Finding - A Study of Serial Arsonists, Federal Bureau of Investigation (FBI), National Center for Analysis of Violent Crime (NCAVC), 1994
- Fire Investigation Handbook, National Insurance Crime Bureau, 1995
- Fire Loss In The United States, NFPA Research Paper, 2008 Edition (Revised 2010)
- Fireline Handbook – Appendix B, NWCG, 2006 Edition
- Forensic Fire Scene Reconstruction, Icove and DeHaan, Second Edition
- <http://definitions.uslegal.com>
- Ignition Handbook, Vytennis Babrauskus PhD, Fire Science Publishers, 2003 Edition
- Investigation & Prosecution of Arson, California District Attorney's Association
- Investigation of Motor Vehicle Fires, Lee S. Cole, 1992
- Investigation of Wildfires, Richard T. Ford, 1995 Edition
- Kirk's Fire Investigation, John DeHaan, Pearson Prentice Hall, 2006, Sixth Edition
- NFPA 921: Guide for Fire and Explosion Investigations, 2008 Edition
- NFPA 1033: Standard for Professional Qualifications for Fire Investigator, 2009 Edition
- Principles of Fire Behavior, James G. Quintiere, 1997 Edition
- State Fire Training Procedures Manual, SFT, Current Edition
- Title 18: USL, Part 1, Crimes, Chapter 40, Section 844
- Vehicle Fire Investigation, California Conference of Arson Investigators, 1994, Workbook and VHS
- Wildfire Origin and Cause Determination Handbook, NWCG, 2005 Edition



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 1: Orientation and Administration



## Topic 1: Orientation and Administration

### Course Design

Fire Investigation 1A satisfies portions of the NFPA 1021 command standards for Fire Officer I, II, and III as well as the NFPA 1033 Standard for Professional Qualifications for Fire Investigator. The course is one of the educational requirements for State Fire Training's certified Fire Officer and Fire Investigator.

### Course Requirements

Fire Investigation 1A: Fire Origin and Cause Determination, is a 40-hour course. Each topic within the course covers a different aspect this level of fire investigation.

### Attendance

State Fire Training requires every student to attend the entire class. If there is a problem with meeting this requirement, you should consider enrolling at another date when you can commit the time required.

### Prerequisites

There are no course prerequisites for attending Fire Investigation 1A.

### Required Textbooks

Two manuals are required for this course. NFPA 921: Guide to Fire & Explosion Investigations, 2008 Edition provides the student with a systematic procedure and methodology to effectively conduct a fire and/or explosion investigation. Fire and explosion investigators developed this guide and underwent extensive peer review. Fire Investigation 1A Student Supplement published by SFT contains information that is necessary for a complete understanding of the topic but is not found in the NFPA 921: Guide to Fire & Explosion Investigations.

### Student Evaluation

#### Activities

All activities must be successfully completed.

#### Formative Tests

All formative tests must be successfully completed with a minimum score of 80%.

After each test, a review will be conducted and then the tests returned to the instructor.

You may **not** keep a copy of the formative test.



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 1: Orientation and Administration



### Summative test

- Minimum 50-item test.
- The format can be completion, short-answer, and/or multiple choice.
- You must pass the summative test with a minimum score of 80% to pass the class and receive a course completion certificate.

### Calendar of Events

DAY	TOPIC	TITLE	TIME	ACTIVITY	EVALUATION
Day 1	1	Orientation and Administration	1:00		
	2	The Role of the Fire Investigator	1:00	2-1	
	3	Scientific Method	1:00		
	4	Fire Development for the Investigator	3:00		
	5	Legal Aspects of Fire Investigation	2:00	5-1	
<b>Day 1 Total</b>			<b>8:00</b>		
Day 2			1:00		<b>Formative Test 1</b>
	6	Expert Testimony	1:00	6-1	
	7	Arson Law	1:00	7-1	
	8	Fire Scene Documentation	1:00	8-1	
	9	Point of Origin Determination	4:00	9-1	
<b>Day 2 Total</b>			<b>8:00</b>		
Day 3			1:00		<b>Formative Test 2</b>
	10	Ignition	2:00		
	11	Accidental Ignition Sources	3:00		
	12	Electrical Ignition Sources	2:00		
<b>Day 3 Total</b>			<b>8:00</b>		
Day 4			1:00		<b>Formative Test 3</b>
	13	Incendiary Fire Indicators	3:00	13-1	
	14	Incendiary Devices	2:00		
	15	Structure Fire Investigation	2:00		
<b>Day 4 Total</b>			<b>8:00</b>		
Day 5	16	Vehicle Fire Investigation	2:00		
	17	Wildland Fire Investigation	2:30	17-1	
	18	Explosion Investigation	2:30		
			1:00		<b>Summative Test</b>
<b>Day 5 Total</b>			<b>8:00</b>		
<b>Course Total</b>			<b>40:00</b>		



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 1: Orientation and Administration



### Your Progress Chart

ACTIVITY TITLE	DUE DATE	PASS/FAIL	DATE
Individual Activity 2-1: What Does It All Mean?	Day 1: In Class	[ ] P [ ] F	___/___
Group Activity 5-1: Are You There Legally?	Day 1: In Class	[ ] P [ ] F	___/___
Group Activity 6-1: Testifying With Body Language	Day 2: In Class	[ ] P [ ] F	___/___
Group Activity 7-1: What's the Code Section?	Day 2: In Class	[ ] P [ ] F	___/___
Individual and Group Activity 8-1: Scene Sketching	Day 2: In Class	[ ] P [ ] F	___/___
Group Activity 9-1: Burn Pattern Indicators	Day 2: In Class	[ ] P [ ] F	___/___
Group Activity 13-1: What Would I Look For?	Day 3: In Class	[ ] P [ ] F	___/___
Group Activity 17-1: What Do You See?	Day 4: In Class	[ ] P [ ] F	___/___
Formative Test 1	Day 2: In Class	[ ] P [ ] F	___/___
Formative Test 2	Day 3: In Class	[ ] P [ ] F	___/___
Formative Test 3	Day 4: In Class	[ ] P [ ] F	___/___
Summative Test	Day 5: In Class	[ ] P [ ] F	___/___

## Topic 2: The Role of the Fire Investigator

Student information for this topic can also be found in [NFPA 921: Guide to Fire & Explosion Investigations](#), 2008 Edition, Chapter 1: Administration, Page 921-7, Sections 1.1-1.3.5 and Chapter 3: Definitions, Pages 921-11 through 921-16, Sections 3.1-3.3.180.

### Fire Loss in the United States

The damage to property due to fires in the United States is quite staggering. Loss of life and injuries from fires are alarming.

The National Fire Protection Association (NFPA) reported that in 2008, U.S. fire departments responded to an estimated 1,451,500 fires. These fires resulted in 3,320 civilian fire fatalities, 16,705 civilian fire injuries and an estimated \$15,478,000,000 in direct property loss. (The direct property loss includes the California wildfires 2008 with an estimated property loss of \$1,400,000,000.)

There was a civilian fire death every 158 minutes and a civilian fire injury every 31 minutes in 2008. Home fires caused 2,755, or 83%, of the civilian fire deaths. Fires accounted for six percent of the 25,252,500 total calls.

### **Intentionally Set Fires**

- An estimated 30,500 intentionally set structure fires occurred in 2008, a decrease of 6.2%.
- Intentionally set fires in structures resulted in 315 civilian deaths, an increase of 6.8%.
- Intentionally set structure fires also resulted in \$866,000,000 in property loss, an increase of 18.2%.
- 17,500 intentionally set vehicle fires occurred, no change from a year ago, and caused \$139,000,000 in property damage, a decrease of 4.1% from a year ago.

### **Arson Fires in California**

According to the California State Fire Marshal's office and the California Department of Forestry and Fire Protection (CAL FIRE), the following chart was developed to reflect the statistical data of arson fires in California. This information is based on all reported fires from fire agencies within the state of California.

It should be noted that the data can change and the information contained herein should only to be used as a learning point of the current available data.



### Arson Fires in California Reported to the Office of the State Fire Marshal 2008

2008	Incident Count	Property Loss	Contents Loss	Fire Service Injuries	Fire Service Deaths	Civilian Injuries	Civilian Deaths
Arson Fires	8,903	\$ 194,194,554	\$ 125,551,011	8	0	39	8
All Fires	86,520	\$ 2,595,175,039	\$ 1,183,179,590	264	0	503	115
Percentage of Fires Related to Arson	10%	7%	11%	3%	0%	8%	7%

## Why Fires Are Investigated

With fires creating such a problem, they are investigated for several reasons. One primary reason is that public sector agencies are authorized to determine the cause. If the fire cause can be identified and its reoccurrence under similar circumstances prevented, then future fires can be averted and possible injuries avoided.

Fires are also investigated to determine if the circumstances involving the fire complied with any applicable fire code. If conditions warrant, the fire situation could be evaluated for the effectiveness of existing fire codes and determine if they need to be upgraded or changed. The cause of a fire could be related to a product malfunction or defect. The identification of that problem could lead to corrective action that can prevent future fires.

Fires are investigated to determine if they are the result of a criminal act and if that is the case, then the resulting investigation may lead to the arrest and conviction of the perpetrator. In the civil area, fires are investigated to determine if there are any subrogation issues.

## Fire Department Organization

Traditionally, fire departments have addressed the fire situation through suppression, prevention, and investigation. The bulk of resources have usually been assigned to the operations concerned with extinguishment. Fire prevention personnel are involved with building plan review, issuance of permits and code enforcement.

Fire investigation responsibilities might be carried out on a part-time basis by either suppression or prevention personnel. In some instances, a line officer could be assigned to an incident to conduct the investigation or a prevention inspector might be on call to perform the same service. In many jurisdictions, the investigation of the fire is initially conducted by the senior officer or the incident commander. They may delegate that activity to subordinate personnel that have had specialized training. Depending on the

direction that the investigation is taking, some local agencies will then request a full-time investigator that specializes in the fire scene examination.

It is common to see a response matrix that requires the presence of a certified or full-time fire investigator when pre-identified events occur. These events may be a fire where a death or serious injury has occurred. An explosion or the presence of evidence associated with an incendiary fire could also trigger the response of a fire investigator. Some departments will summon an investigator to a fire scene where the estimated dollar loss is above a certain threshold.

## **Public Sector Fire Investigators**

### **Federal**

Public sector fire investigators work for federal, state, or local agencies. The authority for federal investigators assigned to the Department of Justice, Bureau of Alcohol, Tobacco, Firearms, and Explosives to conduct the investigation derives from the U.S. Code, Title 18, Part I, Chapter 40. Other federal employees such as those who work for the U.S. Forest Service, Bureau of Land Management, or the National Park Service also conduct fire investigations as authorized by the U.S. Code.



ATF Response Vehicle

### **State Investigators**

Employees that work for the CAL FIRE are empowered to conduct fire investigations as authorized by Public Resource Code Section 714(d). Health and Safety Code Section 13107 also authorizes these employees to investigate fires and explosions on state property and to assist local agencies.



Investigator's Vehicle for CAL FIRE, Office of State Fire Marshal

### Local Agency Investigators

The 2010 California Fire Code of Regulations, Title 24, Part 9, Chapter 1, Section 104.10 authorizes the fire code official, the fire department, or other responsible authority to investigate any fire, explosion, or other hazardous condition. Furthermore, Section 104.10.1 authorizes police or other enforcement agencies to render necessary assistance in the investigation of fires when requested to do so. Because the investigators are legally investigating the incident, they are authorized to collect any evidence necessary to support the hypothesis (deductive reasoning) as to the cause of the fire, explosion, or hazardous incident. The investigator must follow all policies and procedures in place with regard to evidentiary procedures.

### Private Sector Investigator

Private sector investigators can be independent contractors, employees of the independent contractor, or can work for an insurance company. They might be retained to perform services for insurance companies, law firms, product manufacturers, utility companies, public adjustors or might be retained by the victim of the fire to represent the owner or occupant's interest. Private investigators may also be retained by companies that specialize in the analysis of failures of products and appliances. In California, the private sector investigator can become a certified fire investigator (CFI) by complying with the certification requirements of either the California Conference of Arson Investigators (CCAI) or the International Association of Arson Investigators (IAAI).



Some private sector investigators are individuals that had previously served in the public sector and received their certification from the State Fire Marshal while working for a public agency.

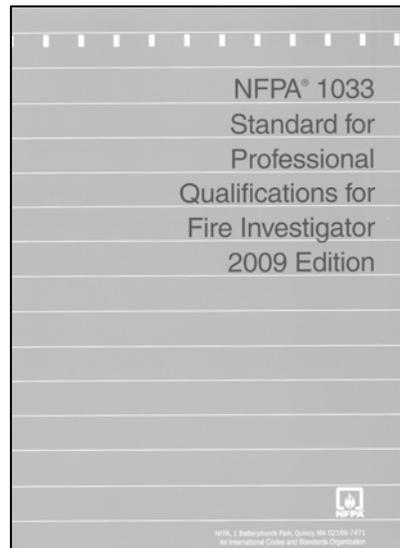
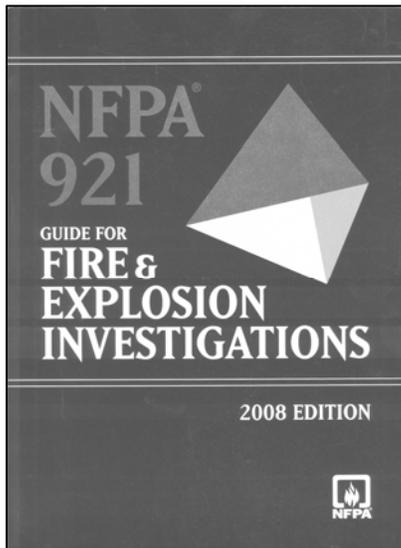
### Agencies Involved With Fire Investigation, Training, and Standards

#### **National Fire Protection Association (NFPA)**

The NFPA has developed a guide for fire investigation. NFPA 921 Guide for Fire and Explosion Investigations, 2008 Edition was prepared by the Technical Committee on Fire Investigations. That edition was approved as an American National Standard on December 31, 2007.

The NFPA has also prepared a standard for Fire Investigator qualifications. NFPA 1033 Standard for Professional Qualifications for Fire Investigator, 2009 Edition was prepared by

the Technical Committee on Professional Qualifications and approved as an American National Standard on July 18, 2009.



### **National Fire Academy**

The National Fire Academy located at Emmitsburg, Maryland is operated under authority of the United States Fire Administration. Courses of study include basic fire/arson investigation and classes for supervisors.

### **State Fire Training**

At a state level, State Fire Training under the direction of the State Fire Marshal coordinates development of curricula and sets standards for certification as a Fire Investigator.

### **National Institute of Standards and Technology (NIST)**

Founded in 1901, NIST is a nonregulatory federal agency within the U.S. Department of Commerce. NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

The Fire Research Division develops, verifies, and utilizes measurements and predictive methods to quantify the behavior of fire and means to reduce the impact of fire on people, property, and the environment. This work involves integration of laboratory measurements, verified methods of prediction, and large-scale fire experiments to demonstrate the use and value of the research products

### Investigator Ethics

Investigators have been traditionally considered as truth finders. Their approach to evaluating the fire scene is one of gathering information and developing a hypothesis as to what had occurred. They should not have any preconceived conclusion prior to the evaluation of all the facts and physical evidence.

The California Conference of Arson Investigators has developed a code of ethics that is quite appropriate for the conduct of people working in this field.

### **CCAI Code of Ethics**

*I will, as an arson investigator, regard myself as a member of an important and honorable profession.*

*I will conduct both my personal and professional life so as to inspire the confidence of the public.*

*I will not use my position of trust in the California Conference of Arson Investigators for personal advantage or profit.*

*I will regard my fellow investigators with the same standards as I hold for myself. I will never betray a confidence, nor otherwise jeopardize their investigation.*

*I will regard it my duty to know my work thoroughly. I will make it my further duty to avail myself of every opportunity to learn more about my profession.*

*I will avoid alliances with those whose goals are inconsistent with an honest and unbiased investigation.*

*I will make no claim to professional qualifications which I do not possess.*

*I will share all publicity equally with my fellow investigators, whether such publicity is favorable or unfavorable.*

*I will be loyal to my superiors, to my subordinates, and to the organizations I represent.*

*I will always bear in mind that I am a truth seeker; not a case maker, that it is more important to protect the innocent than to convict the guilty.*

*I will at all times remember the importance of honesty within my profession.*

The issue of being unbiased and remaining neutral as information and data is gathered cannot be over emphasized.

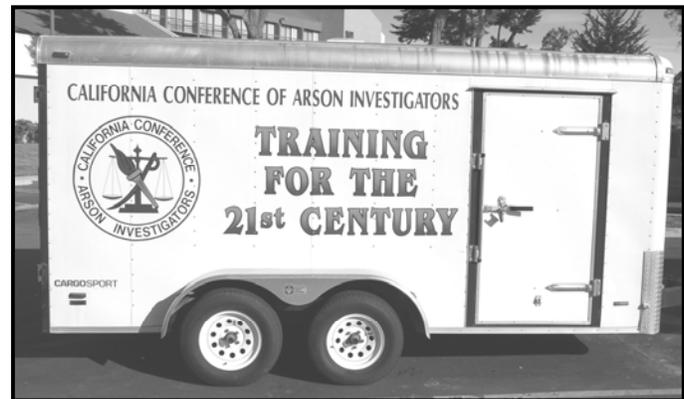
"From the standpoint of public safety and economic considerations, it is important that investigative methods for accurately determining the causes of fires be understood and applied to the fullest extent possible. While there should be a presumption that a fire is accidental until clearly proven to be incendiary, it is vital

that the investigator not prejudge any fire as to cause. If an investigator decides that a fire is arson before collecting any data, then only data supporting that premise are likely to be recognized and collected. As Sherlock Holmes points out, 'It is a capital mistake to theorize before one has data. One begins to twist facts to suit theories instead of theories to suit facts.' The same caution is necessary for those who decide that all fires are accidental, no matter what their true cause may be."

*Kirk's Fire Investigation, John D. DeHaan, Sixth Edition, Page 5.*

### Investigator Organizations

The fire investigator should maintain proficiency and remain current with investigation methodology, fire protection technology, and code requirements. Investigators should attend seminars and workshops. They should be familiar with the latest technologies as presented in professional journals and publications. During the voir dire examination to qualify as an expert witness, they might be questioned about their membership in professional organizations. Both the CCAI and IAAI are recognized professional organizations and produce informational publications. The CCAI is actively involved in curriculum development and sponsors semi-annual training seminars as well as regional round table meetings that address current events.



The CCAI and IAAI are recognized professional organizations and produce informational publications. The CCAI is actively involved in curriculum development and sponsors semi-annual training seminars as well as regional round table meetings that address current events.

### The Task Force Approach

During the 1970s, the problem of arson reached epidemic proportions throughout the country. Congress commissioned a study that was entitled "America Burning." Several shortcomings regarding how public agencies were handling the problem as well as deficiencies with training were identified.

Police departments and other law enforcement agencies believed that they did not have the expertise to handle a fire scene, so they identified arson as a fire department problem. Fire departments thought arson was a crime and thus it fell under the jurisdiction of the police. Due to this divergence of views, arson was neither properly identified nor investigated by

either of the two primary agencies. Many arson fires were never identified at the initial scene nor were the proper follow-up investigation ever conducted.

Progressive public agencies recognized that both the fire department and police department had a stake in the arson problem. As a result, the early approach to the problem was to form an "Arson Squad" that was a cooperative venture between fire departments and law enforcement agencies. The most basic approach was to have a fire investigator and a police officer work as a team to investigate the fire incident.

Because of the study performed by "America Burning," the cooperative venture between law enforcement and fire departments was brought to a new level with the concept of an "Arson Task Force." Now not only were fire departments and law enforcement agencies working together, but the district attorney or local prosecutor was added to the team. Agreements were entered into between the three participating agencies and a task force coordinator was identified to manage the cases through the process of scene investigation, documentation, and evidence recovery. The task force would identify a perpetrator and perform the arrest. The ultimate prosecution was the culmination of a coordinated effort. Seattle, Los Angeles, and San Francisco were early participants from the West Coast in the Arson Task Force approach to the fire problem.

The lack of standardized training pertaining to the investigation of fire scenes was another issue that was identified in the "America Burning" study. Because of that and other issues dealing with training, the National Fire Academy was established and specific curriculum dealing with fire and arson investigation was implemented. Now there is a standardized course of instruction with access provided for students throughout the country. The national course in cooperation with classes that were developed by State Fire Marshals helped to bring a level of professionalism and consistency to the field of fire investigation.

### **Professional Qualifications for Fire Investigators**

NFPA 1033 Standard for Professional Qualifications for Fire Investigator, 2009 Edition, describes the attributes and training necessary to meet the professional level of job performance requirements for fire investigators. The goal of State Fire Training under the auspices of the State Fire Marshal is that certification as a Fire Investigator will indicate that the individual has met the standard for professional qualifications.

The standard for professional qualifications addresses the following tasks that are necessary to meet the described criteria:

- Section 4.2: Conduct a fire scene examination.
- Section 4.2.1: Secure the fireground.
- Sections 4.2.2-4.2.3: Conduct an exterior and interior survey.
- Sections 4.2.3-4.2.5: Interpret and correlate burn patterns.
- Section 4.2.6: Examine and remove fire debris.

- Section 4.2.7: Identify and reconstruct the area of origin.
- Section 4.2.8: Inspect the performance of building systems.
- Section 4.2.9: Discriminate the effects of explosions.
- Sections 4.3-4.3.3: Document the scene with diagrams, photographs, and investigative notes.
- Sections 4.4-4.4.2: Collect evidence.
- Section 4.4.3: Select evidence for analysis.
- Section 4.4.4: Maintain a chain of custody.
- Section 4.4.5: Dispose of evidence in compliance with jurisdictional requirements.
- Section 4.5.1: Develop an interview plan.
- Section 4.5.2: Conduct interviews.
- Section 4.6: Conduct post-incident investigation.
- Section 4.6.2: Evaluate the investigative file.
- Section 4.6.3: Coordinate expert resources.
- Section 4.6.4: Develop evidence as to motive or opportunity if determined to be arson.
- Section 4.6.5: Formulate an opinion concerning origin, cause, or responsibility.
- Section 4.7.1: Prepare a written report based on use of the scientific method.
- Section 4.7.2: Express investigative findings verbally.
- Section 4.7.3: Testify during legal proceedings.
- Section 4.7.4: Conduct public informational presentations.

### Individual Activity 2-1: What Does It All Mean?

**Time:**

0:30

**Materials Needed:**

- NFPA 921: Guide to Fire & Explosion Investigations, NFPA, 2008, Chapter 3: Definitions, Pages 921-11 through 921-16
- Fire Investigation 1A Student Supplement, SFT, 2011, Glossary
- Pen or pencil

**Introduction:**

This activity provides you the opportunity to become familiar with the terms used in fire investigation.

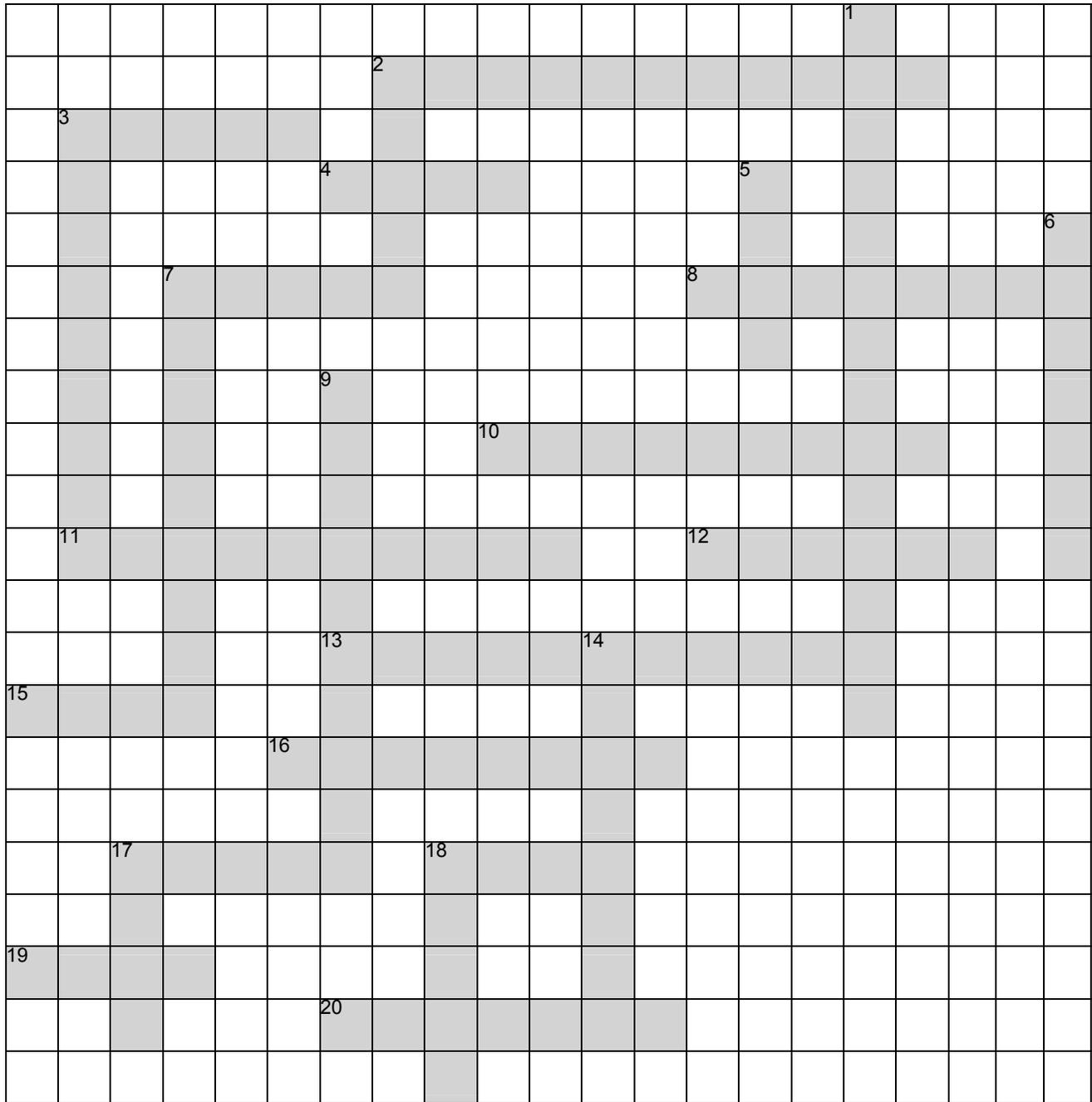
**Directions:**

1. Using the glossary in your student supplement and the definitions in NFPA 921, solve the crossword puzzle below.
2. You have 20 minutes to complete this step.
3. Be prepared to discuss your results with the class.

# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 2: The Role of the Fire Investigator



### **Across**

- 2** The assumption by a third party (insurance company) of another's legal right to collect a debt or damages.
- 3** The column of hot gases, flames, and smoke rising above a fire.
- 4** Black particles of carbon produced in a flame.
- 7** A body or stream of gaseous material involved in the combustion process and emitting radiant energy at specific wavelength bands determined by the combustion chemistry of the fuel.
- 8** The shattering effect of an explosion.
- 10** A transition phase in the development of a compartment fire in which surfaces exposed to thermal radiation reach ignition temperature more or less simultaneously and fire spreads rapidly throughout the space, resulting in full room involvement or total involvement of the compartment or enclosed space.
- 11** Combustion without flame, usually with incandescence and smoke.
- 12** Any arrangement of material used to start a fire or explosion.
- 13** The process of air or gases being drawn into a fire, plume, or jet.
- 15** Carbonaceous material that has been burned or pyrolyzed and has a blackened appearance.
- 16** The systematic process of removing debris from the top down and observing the relative location of artifacts at the fire scene.
- 17** The actual point of detonation of an explosive at the scene.
- 19** A form of energy characterized by vibration of molecules and capable of initiating and supporting chemical changes and changes of state.
- 20** The decomposition of material by the application of heat and oxidation.

### **Down**

- 1** The fundamental facts necessary to prove the elements of a crime (two words).
- 2** The airborne solid and liquid particulates and gases evolved when a material undergoes pyrolysis or combustion, together with the quantity of air that is entrained or otherwise mixed into the mass.
- 3** The chemical decomposition of a compound into one or more other substances by heat alone; pyrolysis often precedes combustion.
- 5** A rapid oxidation process, which is a chemical reaction resulting in the evolution of light and heat in varying intensities.
- 6** The weight of a substance per unit volume, usually specified at standard temperature and pressure.
- 7** The condition where unburned fuel (pyrolysate) from the originating fire has accumulated in the ceiling layer to a sufficient concentration that it ignites and burns; can occur without ignition of, or prior to, the ignition of other fuels separate from the origin.
- 9** A fuel or oxidizer, often an ignitable liquid, used to initiate a fire or increase the rate of growth or spread of fire.
- 14** The process of initiating self-sustained combustion.
- 17** A rounded globule of re-solidified metal at the end of the remains of an electrical conductor that was caused by arcing and is characterized by a sharp line of demarcation between the melted and unmelted conductor surfaces.
- 18** A moving particle of solid material that emits radiant energy due either to its temperature or the process of combustion on its surface.

## Glossary of Terms

- ANFO** .....A high explosive mixture of ammonium nitrate and fuel oil and has been classified as a blasting agent. A commercial and clandestine explosive.
- Black powder** .....A low explosive consisting of a mixture of potassium nitrate or sodium nitrate, sulfur and charcoal.
- Blast seat** .....The actual point of detonation of an explosive at the scene. Also called seat of the explosion.
- Blasting agent** .....Any material or mixture consisting of a fuel and oxidizer, intended for blasting which is not blasting cap sensitive, i.e., ANFO.
- Brisance**.....The shattering effect of an explosion.
- Burning** .....The decomposition of material by the application of heat and oxidation.
- Corpus delicti**.....The fundamental facts necessary to prove the elements of a  
**(Body of the Crime)** crime.
- Craze**.....Stress cracks in glass because of heating or cooling.
- Deep-seated** .....Fire that has burrowed into baled stocks, grain storage, and other combustibles as contrasted with a surface fire. Fire that has gained headway and built up heat in a structure and requires greater cooling for extinguishment. Deep charring of structural members, a stubborn fire.
- Detonating cord**.....Flexible cord with a center core of high explosives (PETN, RDX, or HMX) protected by sheaths of various textile materials, waterproofing material, or plastics; also called Det Cord or Prima Cord.
- Device** .....Any arrangement of material used to start a fire or explosion.
- Fire bomb**.....A breakable container filled with a flammable liquid that has a flashpoint of 150°F or less and has a wick or similar device capable of being ignited (Molotov Cocktail). California Penal Code §12301(a)(5) Destructive Device

- Fire door** .....A tested, listed, or approved door and door enclosure constructed for preventing the spread of fire through a standard firewall, partition, vertical, or horizontal opening.
- Fire load** .....Everything at the fire scene that can burn.
- Flame resistant** .....Material that does not propagate flame once an outside source of flame has been removed.
- Flashback**.....The recognition of flammable vapors immediately following a suppression attempt.
- Fragmentation primary** .Actual parts or pieces of the bomb or improvised explosive device.
- Fragmentation secondary** .....Parts or pieces of material other than the pieces of the bomb or device which are thrown or projected by the blast.
- High-order explosion** .....The term "high-order" is used when an explosive detonates as designed. The explosive material is completely consumed and has reached its maximum detonation velocity. The terms "ideal" and "high-yield" are also used to describe a high-order explosion.
- Low/High explosive** Low explosives deflagrate or rapidly burn and high explosives detonate. On an average, high explosives will detonate at a supersonic velocity speed of greater than 3,300 feet per second. A low explosive has a subsonic velocity speed usually less than 3,300 feet per second.
- Low-order explosion** .....The term "low-order" is used when an explosive is not completely consumed. The terms "nonideal" and "low-yield" are also used to describe a low-order explosion. This could be due for several reasons, such as a malfunction or improper configuration of the improvised explosive device, the firing train, or the explosive was in a deteriorated state.
- Modus operandi**.....A distinct pattern of working that comes to be associated with a particular criminal. For example: the time of day, location of the fire, how an incendiary device is made, and the type of device used.
- Occupant**.....Person who lives in, uses, or otherwise has possession of premises.

- Overhaul** .....A term used to cover or describe the operation of looking for a hidden flame or spark that may rekindle fire.
- Pyrotechnic** .....A mixture of chemicals, one of which must be an oxidizer, designed to produce heat, light, smoke, gas, or noise.
- Subrogation**.....The assumption by a third party (insurance company) of another's legal right to collect a debt or damages.





## Topic 5: Legal Aspects of Fire Investigation

Student information for this topic can also be found in NFPA 921: Guide to Fire and Explosive Investigations, 2008 Edition, Chapter 11: Legal Considerations, Pages 921-102 and 921-103, Sections 11.1-11.3.3.4.2.

### Michigan v. Tyler

436 US 499

Shortly before midnight on January 21, 1970, a fire broke out in respondents' furniture store, to which the local fire department responded. When the fire chief arrived at about 2 a.m., as the smoldering embers were being doused, the discovery of plastic containers of flammable liquid was reported to him, and after he had entered the building to examine the containers, he summoned a police detective to investigate possible arson. The detective took several pictures but ceased further investigation because of the smoke and steam. By 4 a.m., the fire had been extinguished, and the firefighters departed. The fire chief and detective removed the containers and left. At 8 a.m., the chief and his assistant returned for a cursory examination of the building. About an hour later, the assistant and the detective made another examination and removed pieces of evidence. On February 16, a member of the state police arson section took photographs at the store and made an inspection, which was followed by several other visits, at which time additional evidence and information were obtained. Respondents were subsequently charged with conspiracy to burn real property and other offenses. Evidence secured from the building and the testimony of the arson specialist were used at respondents' trial, which resulted in their convictions, notwithstanding their objections that no warrants or consent had been obtained for entries and inspection of the building and seizure of evidentiary items. The State Supreme Court reversed respondents' convictions and remanded the case for a new trial, concluding that "[once] the blaze [has been] extinguished and the firefighters have left the premises, a warrant is required to reenter and search the premises, unless there is consent or the premises have been abandoned."

"Fire officials are charged not only with extinguishing fires, but with finding their causes. Prompt determination of the fire's origin may be necessary to prevent its reoccurrence. Immediate investigation may also be necessary to preserve evidence from intentional or accidental destruction. If the warrantless entry to put out the fire and determine its cause is constitutional, the warrantless seizure of evidence while inspecting the premises for these purposes is also constitutional."

The Supreme Court in this case made it clear that generally any reentry after the fire has been extinguished and officials have left the scene should be made pursuant to a search warrant unless justified by some other recognized exception to the warrant requirement.

**- Consent -**  
**- Emergency Circumstances -**  
**- Abandonment -**

"In summations, we hold that an entry to fight a fire requires no warrant, and that once in the building, officials may remain there for a **REASONABLE** time to investigate the cause of the blaze. Thereafter, additional entries to investigate the cause of the fire must be made pursuant to the warrant procedures governing administrative searches. Evidence of arson discovered in the course of such investigations is admissible at trial, but if the investigating officials find probable cause to believe that arson has occurred and require further access to gather evidence for a possible prosecution, they may obtain a warrant only upon a traditional showing of probable cause applicable to searches for evidence."

### **Michigan v. Clifford**

464 US 287

By a 5-4 votes, the United States Supreme Court ruled that evidence seized from the home of Raymond and Emma Jean Clifford, criminally charged in the 1980 fire that destroyed their home, may not be used in their prosecution.

This decision upheld a Michigan appeals court ruling that the evidence taken from the Clifford's home must be suppressed because a fire investigator who found it entered the home without first getting a search warrant.

Fire broke out at the house before 6:00 a.m. on October 18, 1980. The Cliffords were out of town. Fire fighters brought the blaze under control by about 7:00 a.m., and all police and fire units left the scene.

About six hours later, Lt. John Beyer of the Detroit arson squad arrived at the home to check on what fire fighters had reported as a "probable arson." Beyer found three empty cans of fuel, an electric cooker, and a timer with a cord in the basement. After the state court suppressed that evidence, prosecutors sought help from the nation's highest court.

"If the primary object is to determine the cause and origin of a recent fire, an Administrative Warrant will suffice," Justice Powell said. "To obtain such a warrant, fire officials need show only that a fire of undetermined origin has occurred on the premises, that the scope of the proposed search is reasonable and will not intrude unnecessarily on the fire victim's privacy."

But if the object is to search for evidence of arson or some other crime, Powell said, "A criminal search warrant may be obtained only on a showing of probable cause to believe that relevant evidence will be found in the place to be searched."

## **Authority to Investigate**

The authority to conduct a fire investigation falls under several different codes depending on your employing agency. Local fire and law enforcement agencies that have adopted the California Fire Code have their authority under Section 104.10. State Fire Marshal's Office Arson and Bomb investigators are given their authority to investigate fires under Section 13107 of the California Health and Safety Code. CAL FIRE investigators are given their authority to investigate fires under Section 714(d) of the California Public Resources Code. Federal agencies, such as the U.S. Forest Service, Bureau of Land Management, and the Department of Justice Bureau of Alcohol, Tobacco, Firearms, and Explosives are given their authority to investigate fires under the U.S. Code Title 18, Part 1, Chapter 40.

## **2010 California Fire Code Sections Related to Fire Investigation**

California Code of Regulations, Title 24, Part 9  
Chapter 1: Administration

### **Section 104.10: Fire Investigations**

The fire code official, the fire department, or other responsible authority shall have the authority to investigate the cause, origin, and circumstances of any fire, explosion, or other hazardous condition. Information that could be related to trade secrets or processes shall not be made part of the public record except as directed by a court of law.

### **Section 104.10.1: Assistance from Other Agencies**

Police and other law enforcement agencies shall have authority to render necessary assistance in the investigation of fires when requested to do so.

### **California Health and Safety Code**

The California Health and Safety Code delineates the responsibilities of the Office of the State Fire Marshal and the Department of Forestry and Fire Protection regarding the investigation of fires.

### **Section 13100**

- (a) The Office of the State Fire Marshal is hereby created in the Department of Forestry and Fire Protection. The Office of the State Fire Marshal shall be administered by the State Fire Marshal, who shall be a Chief Deputy Director of Forestry and Fire Protection in accordance with paragraph (1) of subdivision (b) of Section 702 of the Public Resources Code and appointed pursuant to Section 13101 of this code.
- (b) The Office of the State Fire Marshal and the State Fire Marshal in the Department of Forestry and Fire Protection succeed to, and are vested with, all of the powers, duties, responsibilities, and jurisdiction of the former Office of the State Fire Marshal and the former State Fire Marshal, as the case may be, in the State and Consumer Services Agency.



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 5: Legal Aspects of Fire Investigation



- (c) Wherever any reference is made in any law to the former Office of the State Fire Marshal or to the former State Fire Marshal in the State and Consumer Services Agency pertaining to a power, duty, responsibility, or jurisdiction transferred to, and vested in, the Office of the State Fire Marshal or the State Fire Marshal in the Department of Forestry and Fire Protection, the reference shall be deemed to be a reference to, and to mean, the Office of the State Fire Marshal or the State Fire Marshal in the Department of Forestry and Fire Protection, as the case may be.

### **Section 13107**

- (a) The State Fire Marshal shall investigate every explosion or fire occurring in any state institution, state-owned building, or any building which is determined, pursuant to regulations adopted by the State Fire Marshal, to be state occupied, and every explosion or fire occurring in those areas of the state not under the jurisdiction of a legally organized fire department or fire protection district or other public entity, including, but not limited to, the state, which provides fire protection in which there is suspicion that the crime of arson or attempted arson has been committed.
- (b) Upon request of the chief fire official of a legally organized fire department or fire protection district, or the governing body thereof, or upon request of the chief of a police department or the sheriff regarding a fire which occurs in an area where there is no operating arson investigation unit, the State Fire Marshal shall, within the limitation of resources and manpower established for those purposes, investigate any explosion or fire occurring within the jurisdiction of the requesting official in which there is suspicion that the crime of arson or attempted arson has been committed.
- (c) The State Fire Marshal shall cooperate in the establishment of a program for training fire department personnel in arson investigation and detection.
- (d) In order to carry out his or her responsibilities and duties pursuant to this section, the State Fire Marshal shall establish an arson investigation unit within his or her office, which shall be staffed with necessary personnel to perform the function for which the unit is established.
- (e) If there is reason to believe that any fire or explosion investigated by the State Fire Marshal resulted from a crime or that a crime has been committed in connection with it, the State Fire Marshal shall report that fact in writing to the district attorney of the county in which the fire or explosion occurred.

### **Public Resources Code**

The investigative functions performed by the Department of Forestry and Fire Protection are guided by statutes that are contained in the Public Resources Code.

### **Section 714**

The department is responsible for all of the following:



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 5: Legal Aspects of Fire Investigation



- (a) Providing fire protection, fire prevention, pest control, and forest and range protection and enhancement implements and apparatus as necessary.
- (b) Maintaining an integrated staff to accomplish fire protection, fire prevention, pest control, and forest and range protection and enhancement activities as needed.
- (c) Establishing and maintaining facilities for the performance of fire protection, fire prevention, pest control, and forest and range protection and enhancement activities.
- (d) Enforcing forest and fire laws, the Z'berg-Nejedly Forest Practice Act of 1973 (Chapter 8 commencing with Section 4511), Part 2, Division 4), and other laws specified in Division 4 (commencing with Section 4001).

### United States Code Title 18

The Federal Government also has jurisdiction for the Investigation of fires and explosions. The Department of Justice Bureau of Alcohol, Tobacco, Firearms, and Explosives investigates these incidents based on jurisdiction that is provided in Title 18 of the United States Code

#### ***Title 18: USC: Part I: Crimes: Chapter 40: Section 844. Penalties***

- (a) Any person who (1) violates any of subsections (a) through (i) or (l) through (o) of section 842 shall be fined under this title, imprisoned for not more than 10 years, or both;
- (i) Whoever maliciously damages or destroys, or attempts to damage or destroy, by means of fire or an explosive, any building, vehicle, or other real or personal property used in interstate or foreign commerce or in any activity affecting interstate or foreign commerce shall be imprisoned for not less than 5 years and not more than 20 years, fined under this title, or both; and if personal injury results to any person, including any public safety officer performing duties as a direct or proximate result of conduct prohibited by this subsection, shall be imprisoned for not less than 7 years and not more than 40 years, fined under this title, or both; and if death results to any person, including any public safety officer performing duties as a direct or proximate result of conduct prohibited by this subsection, shall also be subject to imprisonment for any term of years, or to the death penalty or to life imprisonment.

### **Inspection Warrant**

An Inspection Warrant is the Administrative Warrant in the State of California. It is required when the following **do not** exist:

- Consent
- Exigent circumstances
- Abandonment
- No probable cause for a criminal search warrant
- When entry to conduct an origin and cause investigation is beyond a reasonable time

### **Authority to Obtain**

The authority to obtain an Inspection Warrant is found under the California Code of Civil Procedure, Sections 1822.50 through 1822.57.

### **Code of Civil Procedure**

#### ***Section 1822.50***

An inspection warrant is an order, in writing, in the name of the people, signed by a judge of a court of record, directed to a state or local official, commanding him to conduct any inspection required or authorized by state or local law or regulation relating to building, fire, safety, plumbing, electrical, health, labor, or zoning.

#### ***Section 1822.51***

An inspection warrant shall be issued upon cause, unless some other provision of state or federal law makes another standard applicable. An inspection warrant shall be supported by an affidavit, particularly describing the place, dwelling, structure, premises, or vehicle to be inspected and the purpose for which the inspection is made. In addition, the affidavit shall contain either a statement that consent to inspect has been sought and refused or facts or circumstances reasonably justifying the failure to seek such consent.

#### ***Section 1822.52***

Cause shall be deemed to exist if either reasonable legislative or administrative standards for conducting a routine or area inspection are satisfied with respect to the particular place, dwelling, structure, premises, or vehicle, or there is reason to believe that a condition of nonconformity exists with respect to the particular place, dwelling, structure, premises, or vehicle.

#### ***Section 1822.53***

Before issuing an inspection warrant, the judge may examine on oath the applicant and any other witness, and shall satisfy himself of the existence of grounds for granting such application.

#### ***Section 1822.54***

If the judge is satisfied that the proper standard for issuance of the warrant has been met, he or she shall issue the warrant particularly describing each place, dwelling, structure, premises, or vehicle to be inspected and designating on the warrant the purpose and limitations of the inspection, including the limitations required by this title.

#### ***Section 1822.55***

An inspection warrant shall be effective for the time specified therein, but not for a period of more than 14 days, unless extended or renewed by the judge who signed and issued the original warrant, upon satisfying himself that such extension or renewal is in the public

interest. Such inspection warrant must be executed and returned to the judge by whom it was issued within the time specified in the warrant or within the extended or renewed time. After the expiration of such time, the warrant, unless executed, is void.

### ***Section 1822.56***

An inspection pursuant to this warrant may not be made between 6:00 p.m. of any day and 8:00 a.m. of the succeeding day, nor in the absence of an owner or occupant of the particular place, dwelling, structure, premises, or vehicle unless specifically authorized by the judge upon a showing that such authority is reasonably necessary to effectuate the purpose of the regulation being enforced. An inspection pursuant to a warrant shall not be made by means of forcible entry, except that the judge may expressly authorize a forcible entry where facts are shown sufficient to create a reasonable suspicion of a violation of a state or local law or regulation relating to building, fire, safety, plumbing, electrical, health, labor, or zoning, which, if such violation existed, would be an immediate threat to health or safety, or where facts are shown establishing that reasonable attempts to serve a previous warrant have been unsuccessful. Where prior consent has been sought and refused, notice that a warrant has been issued must be given at least 24 hours before the warrant is executed, unless the judge finds that immediate execution is reasonably necessary in the circumstances shown.

### ***Section 1822.57***

Any person who willfully refuses to permit an inspection lawfully authorized by warrant issued pursuant to this title is guilty of a misdemeanor.

### **Evidence Found**

When evidence of criminal activity, i.e., incendiary device, is found while conducting an origin and cause investigation under the authority of an Inspection Warrant, that evidence is admissible under the plain view doctrine. The investigator has to stop the investigation since criminal activity now has been established. The investigator must obtain a criminal search warrant in order to continue the investigation. These findings of criminal activity establish the probable cause required.



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 5: Legal Aspects of Fire Investigation



### Recommended Consent to Search Form

I, \_\_\_\_\_, consent to a search and do authorize \_\_\_\_\_ to conduct a complete search of my premises on \_\_\_\_\_.

I am aware that the search is being conducted for fire cause determination including evidence of arson and I agree to allow fire/law enforcement officials to conduct a thorough search. Such a search may include, but is not limited to, conducting scientific tests, taking photographs of the premises, removing papers or other property knowing they may be submitted for examination and analysis.

I am aware that fire/law enforcement officials will be on the premises for several hours and I have no objection to their reentering during the course of their investigation.

This written consent is being given by me voluntarily and without threats or promises of any kind.

I know that I can refuse, limit, and resend this consent to search at any time.

Signed: \_\_\_\_\_

Dated: \_\_\_\_\_

Witnessed: \_\_\_\_\_



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 5: Legal Aspects of Fire Investigation



### Inspection Warrant

INSPECTION WARRANT # \_\_\_\_\_

STATE OF CALIFORNIA - COUNTY OF \_\_\_\_\_

\_\_\_\_\_, being sworn, says that on the basis of the information obtained within this Inspection Warrant and Affidavit and the attached **Statement of Probable Cause**, which is incorporated herein as if set forth fully in this document, he has probable cause to believe and does believe that the property described below can lawfully be inspected pursuant to Code of Civil Procedure §1822.50 and \_\_\_\_\_, as indicated below to determine the cause of a fire. Wherefore, affiant requests that this Inspection Warrant be issued.

### INSPECTION WARRANT

**THE PEOPLE OF THE STATE OF CALIFORNIA TO THE AUTHORIZED REGULATORY PERSON OR THEIR REPRESENTATIVE IN THE COUNTY OF \_\_\_\_\_:**

proof by affidavit having been made before me by \_\_\_\_\_, that there is probable cause to believe that the property described herein may be inspected pursuant to Code of Civil Procedure §1822.50 and \_\_\_\_\_ to determine the cause of a fire.

**YOU ARE THEREFORE COMMANDED TO INSPECT:**

and return said warrant forthwith before me, or this court, at the courthouse of this court. This Inspection Warrant and incorporated Affidavit were sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, at \_\_\_\_\_ A.M./P.M. Wherefore, I find probable cause for the issuance of this Inspection Warrant and do issue it.

\_\_\_\_\_  
(Signature of the Magistrate) Judge of the Superior Court

### Group Activity 5-1: Am I There Legally?

**Time Frame:** 0:30

**Materials Needed:**

- Legal scenarios (one for each student)
- Pen or pencil

**Introduction:** This activity provides the students the opportunity to use the information learned from the lesson and apply it appropriately to each scenario.

**Directions:**

1. In your group, read and answer each scenario.
2. You will have 15 minutes to complete this part of the activity.
3. Select a spokesperson for your group
4. When asked by the instructor, read the scenario aloud, followed by your group's answer.
5. Be prepared to discuss your group's answer with the instructor and class.

1. At approximately 0200 hours, a fire burned the interior and exterior of a single-family dwelling. At the time of the fire, the occupants were not home. Fire suppression crews extinguished the fire and completed their suppression duties. You, the fire investigator, arrived at 0330 hours. Since it was still hot and smoky inside the residence, you decided to leave and come back when the smoke cleared. Fire suppression crews setup a fire watch. The scene was secured until your arrival at 0800 hours. You decided to conduct a fire scene investigation without consent or a warrant.

Are you there legally?

Explain your answer.

---

2. At approximately 0200 hours, a fire burned the interior and exterior of a single-family dwelling. At the time of the fire, the occupants were not home. Fire suppression crews extinguished the fire and completed their suppression duties. You, the fire investigator, arrived at 0330 hours. Since it was still hot and smoky inside the residence, you decided to leave and come back when the smoke cleared. The scene was secured until your arrival at 0800 hours. You decided to conduct a fire scene investigation with permission from the landlord, but not the occupants.

Are you there legally?

Explain your answer.

---

3. At approximately 0730 hours, a fire burned the interior and exterior of a vehicle parked in the driveway of a residence. The fire spread from the vehicle and burned a small portion of the attached garage of the residence. No one was at home at the time of the fire. Fire suppression crews extinguished the fire and left the scene. You are informed of the fire by the fire captain who was going off duty for four days. The fire captain thought the fire was arson. You arrive at the scene at approximately 1500 hours and conduct a cause and origin investigation without consent. During your investigation, you notice that the stereo is missing from the vehicle's dash. The residents are not at home.

Are you there legally?

Explain your answer.

---

4. At approximately 0930 hours, a fire burned the interior and exterior of a three-bedroom apartment that housed three people. Fire crews extinguished the fire, completed their overhaul duties, and left the scene. Before leaving, they secured the scene with yellow barrier tape and told the three residents to keep out until the fire investigator's arrival. Due to a heavy preassigned work schedule, you do not arrive until the following morning. When you arrive on-scene, you obtain consent from two of the three residents. After searching the living room, kitchen, bathroom, and the two bedrooms (for which you received consent), you conclude that the fire started in the third bedroom. Through the opened doorway, you observe a burned charcoal lighter container lying on the carpet in the center of the room. That room's occupant is not available.

Are you there legally?

Explain your answer.

---

## Topic 6: Expert Testimony

Student information for this topic can also be found in NFPA 921: Guide to Fire & Explosion Investigations, 2008 Edition, Chapter 11: Legal Considerations, Pages 921-104 through 921-107, Sections 11.4-11.5.6.

The fire investigator may be called either to testify in the courtroom regarding their activities at the fire scene or to render an opinion concerning the origin and cause of the fire. When the fire investigator is presenting testimony about an opinion or conclusion, they are rendering an opinion as an expert witness. The magistrate acts as a gatekeeper in deciding whether an individual can testify as an expert. The voir dire process is a series of questions presented to the witness by both the prosecution and defense. During the voir dire, the witness must be able to demonstrate to the magistrate that they have the training, experience, and knowledge to render an expert opinion.

Recent court cases have had an impact on expert testimony in Federal Court. The Daubert Rule governs expert witnesses. Prior to the Daubert Rule, the qualification of experts was governed by guidelines established under the Frye vs. United States decision. Testimony in California criminal courts concerning expert witnesses is still controlled by the Frye decision and the California Evidence Code. The Daubert Rule applies to testifying in federal courts in California.

### **The Frye Opinion**

This opinion, which is much discussed but little read, is remarkable both for its brevity and for its lack of citational adornment. Because the opinion is not readily available on the web, it is reproduced below.

### Frye v. United States (1923)

#### FRYE v. UNITED STATES (1923)

54 App. D. C. 46, 293 F. 1013

No. 3968

#### Court of Appeals of District of Columbia

Submitted November 7, 1923 December 3, 1923, Decided

Before SMYTH, Chief Justice, VAN ORSDEL, Associate Justice, and MARTIN, Presiding Judge  
of the United States Court of Customs Appeals.

**VAN ORSDEL, Associate Justice. Appellant, defendant below, was convicted of the crime of murder in the second degree, and from the judgment prosecutes this appeal.**

A single assignment of error is presented for our consideration. In the course of the trial counsel for defendant offered an expert witness to testify to the result of a deception test made upon defendant. The test is described as the systolic blood pressure deception test. It is asserted that blood pressure is influenced by change in the emotions of the witness, and that the systolic blood pressure rises are brought about by nervous impulses sent to the sympathetic branch of the autonomic nervous system. Scientific experiments, it is claimed, have demonstrated that fear, rage, and pain always produce a rise of systolic blood pressure, and that conscious deception or falsehood, concealment of facts, or guilt of crime, accompanied by fear of detection when the person is under examination, raises the systolic blood pressure in a curve, which corresponds exactly to the struggle going on in the subject's mind, between fear and attempted control of that fear, as the examination touches the vital points in respect of which he is attempting to deceive the examiner.

In other words, the theory seems to be that truth is spontaneous, and comes without conscious effort, while the utterance of a falsehood requires a conscious effort, which is reflected in the blood pressure. The rise thus produced is easily detected and distinguished from the rise produced by mere fear of the examination itself. In the former instance, the pressure rises higher than in the latter, and is more pronounced as the examination proceeds, while in the latter case, if the subject is telling the truth, the pressure registers highest at the beginning of the examination, and gradually diminishes as the examination proceeds.

Prior to the trial defendant was subjected to this deception test, and counsel offered the scientist who conducted the test as an expert to testify to the results obtained. The offer was objected to by counsel for the government, and the court sustained the objection. Counsel for defendant then offered to have the proffered witness conduct a test in the presence of the jury. This also was denied.

Counsel for defendant, in their able presentation of the novel question involved, correctly state in their brief that no cases directly in point have been found. The broad

### FRYE v. UNITED STATES (1923)

ground, however, upon which they plant their case, is succinctly stated in their brief as follows:

"The rule is that the opinions of experts or skilled witnesses are admissible in evidence in those cases in which the matter of inquiry is such that inexperienced persons are unlikely to prove capable of forming a correct judgment upon it, for the reason that the subject-matter so far partakes of a science, art, or trade as to require a previous habit or experience or study in it, in order to acquire a knowledge of it. When the question involved does not lie within the range of common experience or common knowledge, but requires special experience or special knowledge, then the opinions of witnesses skilled in that particular science, art, or trade to which the question relates are admissible in evidence."

Numerous cases are cited in support of this rule. Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

We think the systolic blood pressure deception test has not yet gained such standing and scientific recognition among physiological and psychological authorities as would justify the courts in admitting expert testimony deduced from the discovery, development, and experiments thus far made.

The judgment is affirmed.

### Depositions

Investigators and fire officials are not only involved with testifying in a courtroom setting, but they may receive a subpoena compelling them to provide testimony at a deposition. They may be called either as a percipient or expert witness. A percipient witness is one who provides testimony on his or her observations, however is not allowed to provide opinion testimony. A deposition is the taking of sworn testimony of a witness outside of court. It is part of the discovery process whereby litigants can obtain information from each other in preparation for trial. The person to be deposed (questioned) is known as the deponent.

A person gives his or her deposition when he or she answers questions asked by the attorney regarding the facts of the case. Depositions are under oath and generally take place in an attorney's office. A court reporter is present and everything that is said is recorded.

Attorneys for at least two, and often all of the litigants involved in the action are present to represent the interests of their respective clients. The attorney who has ordered the deposition begins questioning of the deponent (this questioning is referred to as direct examination or "direct" for short). Since nods and gestures cannot be recorded, the witness is instructed to answer all questions aloud. After the direct examination, other attorneys present cross-examine the witness. The first attorney may ask more questions at the end, in *redirect*, which may be followed by *recross*.

During the course of the deposition, one attorney or another may object to questions asked. The purpose of this is to preserve the objection for trial. Usually, the deponent will still be instructed to answer the question, but between the time of the deposition and the time of trial, a judge may be asked to rule on objections made during the deposition. Any objection which is upheld will result in the exclusion of evidence given in response to it from being presented at trial.

The chief value of a deposition, as with any discovery proceeding, is to give all litigant parties in a contested case a fair preview of the evidence. Another benefit of deposition is to preserve a witness's recollection while it is still fresh, though the trial may still be some time off. In the event a witness dies or is otherwise unavailable for trial, his deposition testimony may be read into the record.

Some depositions are videotaped, in anticipation of the unavailability of a witness at trial, so that if necessary the videotape may be played for judge and jury.

Sometimes, after a number of witnesses have been deposed, the parties will have enough information that they can reasonably predict the outcome of a prospective trial, and may decide to arrive at a compromise settlement, thus avoiding trial and preventing additional costs of litigation. The fundamental rules regarding preparation and answering questions for a courtroom also apply for a deposition.

### **Expert Testimony**

Federal Rules of Evidence (Rule 702 Testimony by Experts) and (Rule 703 Bases of Opinion Testimony by Experts) both address issues concerning the legal threshold for testifying. There has been a recent trend with U.S. Supreme Court decisions to define the admissibility of technical and expert scientific opinions, particularly as those opinions relate to fire investigation.



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 6: Expert Testimony



### **Excerpt from the Investigation & Prosecution of Arson**

*By the California District Attorney's Association in cooperation with the California State Fire Marshal's Office*

#### THE INVESTIGATION & PROSECUTION OF ARSON

##### TRIAL PREPARATION AND COURTROOM DEMEANOR

##### CHAPTER XXIII

###### Introduction

Any criminal investigation has several aspects. The scene examination, collection of and preservation of evidence, interviewing witnesses, developing suspects, arresting the responsible, and finally presenting the case in court. Each segment builds on one another to solidify the case. For the successful conclusion of any investigation, each portion of the investigation has to be competently investigated. Your goal as a fire investigator is to anticipate that each case will end up in court. Any criminal investigation does not stop once the suspect is arrested. The arrest is only one segment of an investigation. After the arrest of the suspect, the investigator should prepare for the upcoming court proceedings.

Once a defendant is charged with a crime, they are arraigned in the superior court where the incident occurred. A person can be charged with an offense either in a criminal complaint issued by the local prosecutor or in an indictment by a grand jury. If a criminal complaint is filed by the prosecution, the defendant enters their plea of guilt or innocence at the arraignment. There can be motions presented to the court for dismissing the charges, discovering evidence, and suppressing evidence. The defendant's bail is set. If the defendant is charged with a misdemeanor and enters a plea of not guilty, a date for a trial is set. The trial will be in the same court at a later date. If the defendant is charged with a felony, a date for the probable cause hearing or preliminary examination will be set at the arraignment.

A criminal indictment is through the grand jury. The grand jury is a panel of citizens selected to investigate public corruption and crimes. The grand jury will hear testimony on incidents and events. If the specified majority of the jury finds there is probable cause, an indictment is handed down. The defendant, then, will be arraigned in superior or county court. He can demand a probable cause hearing in the justice, circuit, or municipal court. If the defendant is held to answer to the charges, the court procedure is the same as if a criminal complaint had been initially filed.

At the probable cause or preliminary hearing, the prosecution introduces evidence that shows the defendant committed the offense and that all the elements of the felony offense had occurred. At this hearing, factual and expert witnesses testify, along with physical evidence being presented by both the prosecution and defense. The prosecution will present their case first. A witness will be questioned by the prosecutor first under direct examination. After direct examination, the defense attorney will have the opportunity to cross-examine each witness. After the prosecution has completed presenting their case, the defense will have the chance of presenting witnesses and evidence. Once all the witnesses and evidence are presented for both sides, the magistrate gives each side an opportunity to argue the case. Following the arguments, the judge will decide if there is probable cause to show that a felony has occurred and that the defendant committed it.

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

If the judge concludes that there is probable cause, the defendant is held to answer the charges. At the conclusion of the hearing, a date is set for the defendant's arraignment. An information is filed with the court by the prosecution. An information is a legal document accusing the defendant with felony charges. Once the information is filed, a date is set for the defendant's arraignment in superior court. This is very similar to the previous arraignment in the lower court. The defendant is informed of the felony charge and will be asked to enter a plea. If the defendant pleads not guilty, a date is set for a jury trial.

During the period of time after the arraignment and before the jury trial, motions to suppress and discover evidence, dismiss and/or revise the charges, can be filed by the prosecution and the defense. This can delay the start of the jury trial for months. At times, the investigator may have to provide testimony for these motions. The judge will rule on each of the motions. There is a possibility that the case could be dismissed based on one of the defense motions. If the case is not dismissed, it continues with pretrial conferences. At these pretrial conferences, a settlement or a plea bargain can occur. The defendant may plea guilty to a lesser offense. If a plea bargain is reached, a date for sentencing in the superior court is set. If a settlement cannot be agreed upon, the case will be set for trial.

The next step for the defendant in the court procedure is a trial. In most instances, it is a trial by a jury. There are few cases where the defendant elects to be tried by a judge or the court. In some jurisdictions, a jury trial is required whether or not if the defendant wants one. If the defendant has a trial by a judge or court, certain procedures are omitted. They include the jury selection, instructions, opening and closing statements.

The first stage of the jury trial is the selection of the jury. Members of the jury can be selected from driver license lists, voter registering indexes, and tax rolls. Thirty to forty people are selected and report to the superior court. Both the prosecution and the defense will question each of the prospective jurors. This process is called voir dire. Each jury usually consists of twelve members. There can be one or two alternative members if the case is scheduled to be lengthy. After the jury members are selected, they are sworn in and the case is ready to advance.

Following the selection of the jury, opening statements are made by the prosecution and the defense. Since the prosecution has the burden of proof, they are allowed to go first. In a criminal case, the prosecution has the burden to prove to the jury "beyond a reasonable doubt or cause." In a civil case, a lower standard of proof is used. It is based on the preponderance of the evidence. The defense can elect to make an opening statement right after the prosecution, or they can wait until they present their case. In the opening statement, the prosecutor will briefly state the charges, evidence, and what their expectations are in the case. After the opening statements, the prosecution will call witnesses. The witnesses will testify about factual events, give expert opinions, and present evidence. Each witness is questioned under direct examination by the prosecutor. The defense attorney then will cross-examine each witness. Once the cross examination of the witness has been concluded, the prosecution may ask further questions of the witness under redirect examination. Again, the defense can cross-examine the witness.

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

At the completion of the prosecution's case, the defense presents their case. The defense will have witnesses testify. The defense witnesses will also testify about factual events, give expert opinions, and present evidence. They will be questioned by the defense counsel first, then the prosecution can cross-examine each defense witness. The defendant may or may not testify. Defendants have the constitutional right not to be a witness against himself or herself. If the defendant takes the stand, they will be subjected to cross-examination by the prosecution.

After the defense rest, the prosecution may call witnesses to rebut the defense case. Then the defense can call witnesses to refute the testimony of the prosecution's rebuttal witnesses. At the end of this rebuttal and surrebuttal process, both sides present closing arguments and statements to the jury. The prosecution will proceed with their statement, outlining all the points brought out in testimony. The defense then will continue with their statement to the jury. Once the defense has completed their final arguments, the prosecution will be given an additional opportunity to address the jury. Here the prosecution answers any questions raised by the defense. The prosecution is entitled to have the last word.

Before the jury considers the case, the judge will instruct the jury. This instruction will include a definition of "beyond a reasonable doubt," the legal considerations in the case, and the elements of the crime. The judge will instruct the jury on the mechanics of reaching a verdict. The jury will leave the courtroom and go to the jury room to deliberate. Once they have reached a verdict, they will return to the courtroom and announce their verdict. The judge and the defendant have to be present. For the defendant to be found guilty or not guilty, all of the jurors have to agree unanimously. If they cannot reach a unanimous decision, the judge can instruct the jury to reconvene again. If the jury still cannot reach a unanimous decision, it is called a hung jury. The prosecution will have to decide if they are going to retry the case. If the defendant is found guilty, the same judge will sentence the defendant at a later date.

#### Pretrial Preparation

Pretrial preparation is the key for a successful witness. One of your goals as a skilled investigator is to know every aspect of your case. An investigator has to know all of the strengths and weaknesses of the case, what every witness is going to testify to, and anticipate the questions raised by the defense. Investing your time into pretrial preparation will enhance your self-confidence and skill level.

An investigator should give pretrial planning the same importance as testifying. The judge and jury can easily distinguish the prepared and unprepared witness. Fire investigators have to be preparing for court the minute they are dispatched to the fire. They have to have the mind-set that each case they are investigating, will terminate in court. While conducting the examinations of the fire scene, the collection of evidence, and through the interviewing of witnesses and suspects, investigators have to ask themselves, "Am I following proper procedures? How will the court view this action?" When they are preparing the written report, they should ask themselves, "Have I included all of the pertinent information? Are the witnesses statements correct?" It is common for months and even years to pass since the case ever goes to trial. Your report has to be accurate.

Once a trial date has been established and you learn that you are going to testify, the first thing

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

you should do is thoroughly read your report and review all diagrams and documents. There is no substitute. Check your report closely for any errors. If you find an error, inform the prosecutor. Do not rely on reading your report the night before court, while driving to the courthouse, or while you are sitting in the hallway to testify.

The investigator's next pretrial assignment is reading the transcript of prior court proceeding in the case. Review your and other witness testimony at any of the prior hearings. You should plan to read your report and the transcript of your prior testimony repeatedly. There is going to be plenty of lead-time for you to adequately prepare for a jury trial. A well-informed investigator is a well-informed witness. During the court proceedings, there are going to be times when investigators have to refer to their report to refresh their memory. This is not usually a problem, unless the investigator abuses it. If it occurs too often, the jury and judge can be distracted and wonder if the investigator did anything to prepare for court.

Investigators should revisit the fire scene. Even though the burned remains may be long gone and the structure rebuilt, the fire investigator's memory will be renewed. They will be able to recall the particular investigation in detail. Names of streets, location of intersections, arrangements of landmarks will still be there, assisting your memory. If there is a certain location where a witness was located, go there. You might even need to bring the witness back out to that location to refresh their memory. You want to have a clear picture of the case. Do not put yourself in a situation where you might confuse this case with another.

The investigator and the prosecutor have to meet and review the case. This meeting should be arraigned with enough time to conduct additional interviews, view photographs, diagrams, and prepare the necessary court exhibits. The prosecutor will present the direction of the case to the investigator. This will include information about the education, training, and work experience of the investigator. If the investigator is going to give expert testimony, this should be reviewed by the prosecution. The investigator has to inform the prosecutor of any problems or mistakes in the investigation. If there is something that is bothering you about the case, bring it up at the pretrial conference, not while you are testifying. The strong and weak points of the case will be discussed. The investigator will be able to walk through their testimony with the prosecutor. The prosecutor may not be familiar with the crime of arson. They might have to rely on your expertise in preparing technical questions. In major involved cases, there might be several pretrial meetings with the prosecutor.

As a fire investigator, you may be subpoenaed to appear in a court outside of your jurisdiction. Allow yourself plenty of time to overcome traffic, parking, and other difficulties and delays which would make you late for court. Judges and juries do not like to be kept waiting. Know where you are going. A visit to the court prior to your testifying can alleviate some of these problems. Viewing the courtroom prior to your testimony might eliminate some of the distractions and allow you to focus your attention on your testimony. Do not allow something that you can control alter your concentration.

Remember, the prepared witness will be able to address the judge and jury with confidence. When the prepared investigator encounters intense questioning, they can respond with certainty. Pretrial preparation is the key to effective testimony.

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

##### Trial Exhibits

In fire related cases, testimony by witnesses can be technical and scientific. This testimony can be above the understanding level of the average juror. During the presentation of your case, the investigator should use exhibits to allow the jury to further understand complicated and complex issues. Exhibits can be charts, diagrams, drawings, enlarged photographs, actual objects, slides, video presentations, and models. These are all used to increase the jurors understanding of the case. While you are on the stand, there are going to be instances where you will actually be teaching. You will be presenting new information about your profession to the jury.

As you are preparing for your testimony and while you are testifying, you must keep the learning level of the jury in mind. Remember, the most juries are a cross section of the community. The educational and learning levels of the jurors are going to be varied. Jurors learn and comprehend in a variety of different manners. Some people are visual learners, others are auditory learners. When you are preparing and using an exhibit, do it in a way that it helps the juror understand.

Your exhibit should be large enough so all the members of the jury can see it at one time. The use of enlargements of charts, diagrams, and photographs, work well if placed near the jury box. If you use a slide presentation, make sure that you have an extension cord and a spare bulb. If you plan to shown a video in your presentation, use a new video tape and have a television monitor large enough so the entire jury can see. The simpler the exhibit, the better. Only include what is necessary and try to limit the number of exhibits. You do not want to get the jurors overwhelmed. During your pretrial preparation, review any exhibits. Make sure diagrams are correct, the right photographs are enlarged, and the charts are accurate. Do not find yourself hurrying to redo an exhibit, moments before court or even worse, not using one, because it was wrong.

When you are presenting your exhibits, present them to the jury not yourself. Stand in a location to the side of the exhibit, out of the way. Remember, you are educating the jury about your case. Tell the jury in a language that is easily understood and tell them what you are going to show. You are previewing the exhibit. After previewing, now explain the exhibit using a pointer. After explaining the exhibit, review to the jury what the exhibit showed.

##### Physical Appearance for Court

All of the actions, movements, and behaviors of a witness are evaluated by the jury from the time the person walks into the courtroom until the person has completed their testimony. The juror's first impression of the witness can influence the witness's credibility. People's first impressions of the witness are visual and can be the most important. Your dress, physical appearance, and the manner in which you first address the court will significantly influence the jury's perception. Any impression, good or bad, will be remembered by the jury.

Juries have their own prejudices, biases, and partialities. By taking a slight conservative approach, a witness can have the jury temporary put aside their prejudices, and listen to the matter at hand. So, your clothing and dress should be conservative.

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

Investigators have to consider their physical appearance while testifying. The investigator has to be well groomed, wearing clean and pressed clothing, and with your shoes polished. An investigator who normally wears a uniform can either dress in a "Dress, Formal, or Class A Uniform," or wear civilian clothing. If a uniform is worn, please remove all the unnecessary gear.

Normally, an investigator wears civilian clothing. A suit or sports coat and tie for male and a business suit or a dress for female are standard attire for court. You should avoid ties that are loud, too short, or too long. Your dress is just important as your testimony. If it shows that you have paid attention to details on your physical appearance, it can convey to the jury that you paid attention to details in the investigation. You are a professional, so dress like one.

An investigator has to keep in mind, the reason why you are in court. You are there to provide testimony, not to make a fashion statement. Do not wear or display anything that might distract attention away from what you are saying, to what you are wearing. Wearing dark or tinted glasses should be avoided. Jurists like to see your eyes while you are testifying. Certain belt buckles, flashy ties, association pins, gaudy jewelry, and other distracters should be left at home. Wearing your wedding band and a watch with a plain strap are fine. You should avoid wearing expensive watches and jewelry. Some jury members might wonder how you were able to afford such expensive items. A pen and a pencil can be displayed in your pocket. All other items should be kept out of sight. Instead of making your pockets bulge, a small briefcase can help you temporary store keys, rulers, extra pens and pencils, marking pens, cigarettes, sunglasses, and any other items. It can also add a professional trait to your image.

#### **Testifying**

As a fire investigator, there is going to be an occasion where you will be required to testify about one of your investigations. At a preliminary hearing, in front of the grand jury, or at a jury trial, you and your case will be questioned, challenged, and scrutinized. As the fire investigator, your testimony will include finding the cause of the fire. Your testimony can expand into other areas of the investigation, but the main reason why you are providing testimony, is to determine the cause of the fire.

Testifying is a skill. It is just like conducting a thorough fire scene investigation or writing a complete report. It is a skill that is developed with experience and time. The first investigation, the first report, and the first time you testify, can be the hardest. Each of these skills will become easier each time they are accomplished. Each investigator should look forward to providing testimony on their case. This is the reason why good investigations and reports are written. This is the final step in your investigative process.

There are two kinds of testimony: factual and expert. Factual testimony can be given by anyone. The witness is testifying about what they saw or heard. Expert testimony is given by a person who renders an opinion on a particular subject. This person has training, experience, and knowledge about the subject, beyond that of a layperson. Whatever the type of testimony you are giving, there are common rules of court demeanor. A witness has to realize, that they communicate verbally and nonverbally. Both are equally important.

#### **Verbal Communication**

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

When you are addressing member of the court, please not do not use first names. The judge is addressed as "Your Honor," and attorneys as "Sir or Madam, Mr. \_\_\_\_, Ms. \_\_\_\_ or Counselor."

While you are testifying, please speak clearly and loud enough so all of the members of the jury can hear your voice. Each courtroom is designed differently. In some, the acoustics are better than others are. Some courtrooms have microphones at the witness stands, other are not so equipped. You will find the location of the witness stand to be different also.

The investigator should avoid using terminology that the average person does not understand. Keep your choice of words simple. You have to communicate to the jury on their level of understanding. Remember, they have to understand what you are talking about. It is not your job to confuse the jury. If you cannot avoid using a technical term, tell the jury what this particular term means, and explain it so they can clearly understand it. You might have to relate it to something that everyone is familiar with. You should strive to have your testimony like a normal conversation. Keep in mind how fast you are talking. Every word you say is being recorded by the court reporter. Only one person can talk at a time. Speak clear, slow enough for the jury, judge, and court reporter to understand, and do not interrupt anyone.

While you are addressing the jury, never display a condescending attitude. You have more knowledge about the case than anyone has in the courtroom, but do not become overly confident. When you are answering a question, answer it directly. Do not ramble. Answer just what has been asked. Do not volunteer any information.

You talk to the jury only when you are testifying. Do not talk to a juror on breaks, in the hallway, or anytime while court is out of session. Do not talk to anyone about your case or testimony within hearing distance of a jury member. If you are approached by a juror, politely tell them that you are a witness in the case and that you cannot converse with them at the present time. A mistrial can occur if you have any outside of court conversation with any member of the jury.

#### **Nonverbal Communication**

Nonverbal or visual communication is just as important, if not more. Studies have confirmed that nonverbal signals are the largest source of data in interpersonal exchanges. Nonverbal communication is communication that is not spoken. It is your tone and speed of your voice, your dress, posture, and your attitude.

The jury will be watching you from your first step into the courtroom until the completion of your testimony. They will be watching your stride, your posture, and your apparel. Your attitude will be apparent before you even say one word. Your impression to the jury should be one of confident, not conceitedness.

Walk directly to the stand without talking or looking at anyone. Always carry your report file in your left hand. Your right hand is kept free and ready to be raised to take the oath. Think about how you would feel if you dropped the case file, while switching it from hand to hand. Your confidence and credibility could start to eroded immediately. Look directly at the clerk and raise your hand to be sworn in. After replying in a firm voice, sit down carefully in the witness chair. Place your notes or report on the witness stand face down. Within a matter of seconds, the jury will have already formed an impression of you.

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

While sitting or standing, your head and shoulders should be straight. Slouching can communicate that you are lazy, bored, and not interested. Sitting at the edge of your chair can give the impression that you are anxious, fearful, or apprehensive. Standing and sitting with too much rigidity can convey that you are not flexible. So sit with your shoulders back, head up, and make plenty of eye contact.

You are going to be nervous. There are some nonverbal signs and signals that show nervousness. Rocking back and forth, moving side to side, and rearing back in the witness chair should be avoided. The constant crossing of arms, feet, and legs, touching your hair, rearranging your clothes are all signs of nervousness. Besides being signs of nervousness, it is also very distracting. Put your nervous energy to work for you, not against you. Use gestures, make good eye contact with the jury, and utilize exhibits. This will funnel your nervous energy into providing good testimony.

Hands folded, arms crossed, and hands in your pockets can give a negative message. If your arms and hands are at your sides, you are in a position to move them freely, allowing you to naturally gesture while you are talking.

It is very important to make eye contact with the attorney when asked a question and with the jury when you are answering. You are giving your answers for the benefit of the jury, so look at them when you answer. When you avoid making eye contact with a person, it gives the impression that you are not telling the truth or you are hiding something.

While you are answering a question, keep in mind that if you direct your answer to the attorney, instead of the jury, you are ignoring the jury. If you continue to ignore the jury, they are going to tune you out. If this occurs at a critical point in your testimony, some jurists may not remember what you said.

At all times, while you are in the courtroom, in the parking lot outside the court building, or during a recess, your nonverbal communication is just as important as what you say.

#### **Fundamental Rules to Remember**

While you are testifying, the most importance rule is to tell the truth. Always tell the truth even if it is going to harm your case. You are an unbiased witness. If you are not telling the truth, there is a good chance that the attorneys and even the jury will realize it. After that, anything you had said, saying, or will say, will be of no value. Your credibility is gone.

The second important thing to remember as a witness is to listen to the question being asked. Listen to the question being asked and only provide information to answer that question. If answering yes or no will suffice, then just do that. You will be asked compound questions, two questions at once, and questions that contain double negatives. Pause, think, and then answer the question, one by one. While you are thinking about your answer, an objection might be raised. This can give you more time to think and even in some instances, the objection might be sustained.

If you are asked a question that you do not know the answer to, then just say that, "I do not know." If you cannot remember a certain point, than say, "I do not remember." Do not bluff. You are there just to tell what you know and what you remember about the case.

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

There are going to be times when you will have to refer to your investigation report. Before you pick up your report and start looking at it, ask for permission from the judge first. They will allow you to refer to your report only to refresh your memory. It is good policy for your report and all other documents to be kept face down on the witness stand. This will keep you from taking peaks at it without permission. The investigator should realize that anything brought up to the witness stand is subjected to examination by all attorneys. Leave your personal items at home. Take only the case file you are going to testify about with you to the witness stand.

Most jury members do not want to be there. There are other things they would rather do than spend countless days in court. The attention span of the juror is not going to be very long. While you are explaining important points in your testimony, make them short, to the point and tell the jury just that. "I am going to be making three very important points about this case. Point number one is ... Point number two is ... and Point number three is ..." After telling them all three important points, do not be afraid to review it. You will find yourself teaching. You want to make a lasting impression with the jury. It might be days and even weeks before they get a chance to deliberate.

At the completion of your testimony and if you have been excused by the judge, you should walk out of the courtroom in a direct manner, being aware of your nonverbal communication. There is no need for you speak to anyone, including the jury. After the conclusion of the case, you should confer with the prosecutor and talk about your testimony.

#### **Direct Examination**

As a fire investigator employed by a public agency, you represent the people of the state in an investigation. You will be providing testimony for the prosecution in the arson trial. The prosecutor and you should meet in advance and prepare the case for trial. Part of the preparation will include the strategy the prosecutor will employ in the case. As one of the key prosecution witnesses, the investigator has to be aware of the strategy used. During pretrial preparation, the prosecutor will review the direct examination questions with the investigator. In reviewing the direct examination, the prosecutor can feel comfortable with the investigator's answers. This review will eliminate surprise answers and misunderstandings in court.

Everyone in the court will be focused on you while you answer the first few questions. Your nonverbal and verbal communication skills will materialize after a few minutes. Even though you have gone over the direct examination with the prosecutor in your pretrial meeting, your testimony should not be rehearsed.

The investigator should listen to the question being asked and only provide information to answer the particular question. Do not volunteer any information. The investigator has to realize, that the prosecutor has the duty to try the case. The investigator is the witness. If there is further information you want to bring out, discuss the matter with the prosecutor at the recess.

As you testify under direct examination, your testimony should be going smooth. The investigator has to keep in mind, that they are a neutral, unbiased witness. If the investigator is going out of their way for the prosecution, it can be just as damaging as arguing with the defense attorney. It is your job to remain neutral, unbiased, and polite to all parties involved.

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

##### Cross Examination

During cross-examination, you will be questioned about most of your actions in the case. Now is the time, more so than any other time, to really listen to the question. Pause, think, and only answer what is being asked.

You should behave the same way towards the defense attorney as you did for the prosecutor. That is easily said, but can be a very difficult task. Even though, you testify for the people of the state, your testimony is actually for the jury. Your demeanor, voice inflection, attitude, and method of testifying, should be a mirror image of your direct testimony. Do not give the jury the impression that you are favoring one side.

While you are being cross-examined, attorneys may use certain techniques to make you feel uncomfortable, angry, and upset. These tactics can be from questioning your integrity, asking the same question repeatedly, getting you into an argument, having your name continually mispronounced, and giving you the silence treatment. These are trial tactics used just to confuse, complicated the matter, and attack your credibility. The attorney may become hostile, belligerent, point their finger at you, and even yell and scream in your face. Your job is to remain cool, calm, collective, and polite.

There are going to be occasions when mistakes and errors are brought up under cross-examination. If they are trivial, admit them and move forward. An explanation may be in order, but do not try to hide or cover up the error.

During cross-examination, it is very careless of the witness to second-guess the attorney. The attorney has prepared an avenue of defense. You do not know what that avenue of defense is going to be. Just as you have prepared to be a skilled witness, the attorney has also prepared to be a skilled attorney. You have years of experience and professional training in your field, they also have years of experience and training in courtroom tactics.

You are a professional, so just be that, a professional who can provide testimony to the jury in a neutral manner. Do not buckle under and put yourself on the same level as a combative attorney. The attorney might be acting, you are testifying.

##### Expert Witness

An expert witness is one who can give an opinion in their testimony. This person has special skills, training, experience, or education on a particular subject or area. The expert witness has the task to help the jury and the judge understand complex issues that are beyond the scope of the average person. The expert witness does not have to possess any certain degrees, but just has to demonstrate that they have more knowledge about the subject than the average person does. This knowledge may be based on education, experience, and specialized training. In both criminal and civil court, expert witnesses are frequently used to assist both sides.

The prosecution has to establish the corpus delicti of arson. The corpus delicti of arson includes the cause of the fire and that it was a deliberate and malicious act. The job of the expert witness is to give an opinion on the cause of the fire, and if it was arson, that it was a deliberate and malicious act. This has to be done independently, without the use of statements and admissions by the defendant. These can be introduced after the establishment of the corpus by

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

the expert witness.

Prior to giving an opinion, the expert witness has to show the court, that they have the skills, experience, or knowledge to give such an opinion. During direct examination, the prosecutor may question the witness about their expertise before an opinion is given. Before the opinion is entered into court, the defense attorney can object and request to voir dire or question the witness about their expertise. After the defense attorney has concluded questioning the witness, the judge will rule on the objection. If the judge believes that there was sufficient testimony given about your expertise, they will overrule the objection. If the objection is sustained, the prosecutor will further question the witness obtaining more information until the objection is overruled. Once the judge is satisfied with the qualifications of the witness, opinions will be allowed into court.

The expert witness can use information from other sources to assist in forming an opinion. The witness can testify about a laboratory report they reviewed prior to testifying. If the report assisted the witness in rendering an opinion, the report can be used in court.

#### **Qualifying**

A person can qualify as an expert witness if they demonstrate before the court that they possess training, experience, or special skill in their particular field.

In demonstrating to the court, the witness will cite their work related experiences. This would include when and how long a person has been in this occupation. They will indicate if there was any formal education or if they taught themselves on the subject. Any specialized training acquired by the witness and if the witness was supervised and taught under another qualified expert will be explored. The court should be informed of any prior court testimony where the witness was allowed to give an opinion. All these areas will be examined, before the court will permit the witness to give an opinion.

So who can qualify as an expert witness? You can, if you possess knowledge, skills, experience, and education in a given field beyond that of a layperson. In the area of fire investigation, a fire investigator, fire captain, fire fighter, fire chief, fire marshal, fire prevention officer, and law enforcement officers have qualified as expert witnesses. This has been at various courts. Once a person is qualified to give an opinion in court, it is only good for that particular court and case. If the investigator is called to testify in another case in the same court, the qualification process starts over. This is true for testifying in different types of courts, even on the same case.

#### **Opinion**

Once a person is qualified as an expert in court on fire investigation, they can give their opinion on what had happened. Their opinion must be based on information gained at the fire scene, interviews with victims and witnesses, fire fighters, other investigators, evidence technicians, and laboratory personnel. When giving your opinion on the case, keep it short and to the point. Cite your reasons in a logical order, using language that the jury can fully understand. It is the jury's decision on how much weight your testimony will influence their opinion. Remember, the jury decides the case.

### THE INVESTIGATION & PROSECUTION OF ARSON

#### TRIAL PREPARATION AND COURTROOM DEMEANOR

#### CHAPTER XXIII

#### CURRICULUM VITAE

A curriculum vitae is used as a tool for the witness, the attorneys, and the court. Information about your current duties, past positions, investigative experiences, formal and vocational related education and training, certificates, memberships, and court experience should all be recorded. Under voir dire, your curriculum vitae will service as a guide to the attorney asking about your qualifications. It will also serve as a refresher tool, just like your written report, while you are on the witness stand. Having a complete and current curriculum vitae can give you some credibility with the jury.

The curriculum vitae you develop for court should be different from a resume you would generate for employment. During your career, you may have had numerous training classes, work experiences, and investigative practices unrelated to your expertise. This information should be omitted. Personal information such as your date of birth, home address and telephone number, and hobbies should also be excluded. This information is documented in your resume, not your curriculum vitae.

Some expert witnesses may have more than one curriculum vitae based on their field or fields of expertise. An investigator that conducts arson/fire investigations and bombing/explosion investigations may have two curriculum vitas: one representing their arson/fire qualifications and the other curriculum vitae presenting their bomb/explosion qualifications. Your curriculum vitae should be kept up to date. Today this is an easy task utilizing a word processing program. It is easy to change, add, and update the information with little effort.



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 6: Expert Testimony



### Example of a Curriculum Vitae

#### JOHN FIRE INVESTIGATOR CURRICULUM VITAE

##### CURRENT POSITION

Fire Investigator - Big City Fire Department, Big City, California

##### DUTIES AND RESPONSIBILITIES

Investigate fires of accidental, suspicious, and incendiary origin; investigate post blast, bombing, and explosion scenes

##### POLICE/FIRE EMPLOYMENT HISTORY

Big City Fire Department - February 1998 to Present  
Fire Investigator

Big City Fire Department - February 1992 to February 1998  
Fire Suppression Captain

Little Town Public Safety Department - August 1987 to February 1992  
Patrol Officer, Fire Fighter, Fire Inspector

##### INVESTIGATIVE EXPERIENCE

	Cases/Scenes	Accidental	Arson/Criminal	Undetermined
Structure Fires	369	86	205	78
Vehicle Fires	30	12	16	2
Wildland Fires	43	30	11	2
Fatal Fire Investigations	9	4	2	3
Explosions	14	10	4	

I have been involved in suppression activity of approximately 125 fires and assisted in approximately 150 fire investigations.

##### FORMAL EDUCATION

- Associate of Science Degree in Fire Science, California Mission College, Santa Clara - 1987
- Bachelor of Science Degree in Fire Service Management , San Jose State University - 1990

##### VOCATIONAL CERTIFICATES

- Fire Fighter I - California State Board of Fire Service - 1990
- Fire Investigator I - California State Board of Fire Service - 2001
- Fire Investigator II - California Board of Fire Service - 2004
- Basic, Intermediate, and Advanced Peace Officer Standard and Training Certificates
- Certified Fire Investigator - International Association of Arson Investigators - 2005

##### VOCATIONAL TRAINING AND EDUCATION

- Fire Investigation - Mission College - 1992 - 45 hours
- Basic Fire/Arson Investigation - State Fire Marshal's Office - 1994, 80 hours
- Advanced Fire Investigation - California Fire Academy - 1995 - 40 hours
- Bomb Scene Investigation - FBI - 1996 - 40 hours



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 6: Expert Testimony



### VOCATIONAL TRAINING AND EDUCATION (continued)

- Hazardous Explosive Device Training - USAF, EOD Unit - 1997 - 8 hours
- Explosive Investigation - State Fire Marshal's Office - 1999 - 24 hours
- Adv. Fire Investigation- CA. Conference of Arson Investigators - July 2000 - 40 hours
- NFPA 921 Training Course - National Fire Protection Association - Jan. 2001 - 16 hours
- Fraud Investigation - ATF- Nov. 2002 - 40 hours
- Fire Developmental and Behavior - San Joaquin Valley Fire-Arson Unit - May 2004 - 24 hours
- Fire Investigation-Interviewing and Interrogation - National Fire Academy - June 2005 - 80 hours
- Vehicle Fire Investigation- CA Conference of Arson Investigators - Oct. 2005 - 4 hours
- Electricity and Fire Investigation-CA Conference of Arson Investigators-Jan. 2006 - 2 hours
- Public Display Fireworks Training-State Fire Marshal's Office-April 2006- 6 hours
- LPG/Natural Gas Training-CA Conference of Arson Investigators-July 2006-2 hours

I have deliberately set 20 fires and explosions in all types of structures and vehicles to observe fire spread and behavior and explosion effects. The fires and explosion duplicated accidental and incendiary fires and explosions.

I have instructed fire fighters in classes on Fire Investigation and on Basic Arson Investigation.

I have attended approximately eight seminars, eight to thirty two hours in length sponsored by the International Association of Bomb Technicians and Investigators, the International Association of Arson Investigators, and the California Conference of Arson Investigators.

### MEMBERSHIPS

I am a member of the International Association of Arson Investigators (IAAI), International Association of Bomb Technicians and Investigators (IABTI) and the California Conference of Arson Investigators (CCAI).

### COURT QUALIFICATIONS

- I have testified as an expert witness in fire and explosion related incidents in:

Superior Court of El Dorado County

Willis case: Court doc. #00-234, Arson, vehicle, incendiary device, May 2000

Fisher case: Court doc. #01-2771, Arson, structure, ignitable liquids-gasoline, October 2001

Superior Court of San Joaquin County

Hawks case: Court doc. #03-8776, Arson, structure, ignitable liquids-lacquer thinner, Feb. 2003

Superior Court of Placer County

Ross case: Court doc. #04-19008, Arson, wildland, unknown open flame to grassland, August 2004

Superior Court of Sacramento County

Smith case: Court doc. #04-22319, Arson, vehicle-farm equipment, ignitable liquids- gasoline, March 2004

Jones case: Court doc. #06-84553, Arson, structure, unknown open flame and newspapers, May 2006

Court Expert Witness: Arson: 6 times

### PUBLISHED ARTICLE

"Investigating Fires Involving Ignitable Liquids," Published in the June 2007 issue of The Fire Investigation Quarterly

### Group Activity 6-1: Testifying With Body Language

**Time:** 0:30

**Materials Needed:**

- Pen or pencil
- Paper

**Introduction:** This activity provides the students the opportunity to observe nonverbal clues that set the tone for a witness' first impression to the court and directly relates to the value placed on the testimony.

**Directions:**

1. Write as many nonverbal communications as you can in two minutes.
2. Participate in a brief discuss on some of the student's responses.
3. Observe the "witness" enter the chair and determine what the nonverbal communication suggests to the judge and jury.
4. Discuss your opinion with the class when asked.

## Topic 7: Arson Law

Student information for this topic can also be found in NFPA 921: Guide to Fire and Explosive Investigations, 2008 Edition, Chapter 11: Legal Considerations, Pages 921-107 and 921-108, Sections 11.5.6.1.2-11.5.6.5.

### The Criminal Aspects of the Investigation

The fire investigator should approach the fire scene with an open mind and no preconceived ideas about the cause of the fire. If after a systematic examination, a conclusion is reached that the fire is the result of an incendiary act and the crime of arson has occurred there are statutes that are contained in the penal code that will determine what action needs to be taken. The fire investigator should have a clear understanding of what constitutes a crime, what action can be legally taken, and who can take that action.

### Criminal Act of Burning

To constitute the setting fire to, or the burning of property, it is not necessary that the property involved be completely destroyed. The burning of any part, however small, is all that is required. The mere blackening of property by smoke is not a burning. A charring which destroys any of the material is a burning. (CALJIC 14.91)

### Relevant Sections of the California Penal Code

#### **Section 15: Crime and Public Offense Identified**

A crime or public offense is an act committed or omitted in violation of a law forbidding or commanding it, and to which is annexed, upon conviction, either of the following punishments: 1. Death; 2. Imprisonment; 3. Fine; 4. Removal from office; or, 5. Disqualification to hold and enjoy any office of honor, trust, or profit in this State.

#### **Section 16: Crimes; Kinds**

Crimes and public offenses include felonies, misdemeanors, and infractions.

#### **Section 17: Felony and Misdemeanor**

- (a) A felony is a crime which is punishable with death or by imprisonment in the state prison. Every other crime or public offense is a misdemeanor except those offenses that are classified as infractions.

### **Section 26: Persons Capable of Committing Crimes; Exceptions**

All persons are capable of committing crimes except those belonging to the following classes:

Children under the age of 14, in the absence of clear proof that at the time of committing the act charged against them, they knew its wrongfulness.

Persons who are mentally incapacitated.

### **California Penal Code Sections for Arson and Destructive Device**

#### **Sections 450-457.1**

Statutes that are related to arson, reckless burning, and attempting to burn as well as definitions are found in the Penal Code starting at Section 450 and continue through Section 457.1.

An important concept is to remember that arson is the crime of maliciously and intentionally or recklessly starting a fire or causing explosion as defined in NFPA 921, 2008 Edition, Section 3.3.11. When the term incendiary is used, it refers to a fire cause. Incendiary is a fire cause, not a crime type. An incendiary fire is a fire that has been deliberately ignited under circumstances in which the person knows the fire should not be ignited.

#### **Section 450: Definitions**

In this chapter, the following terms have the following meanings:

- (a) "Structure" means any building, or commercial or public tent, bridge, tunnel, or power plant.
- (b) "Forest land" means any brush covered land, cutover land, forest, grasslands, or woods.
- (c) "Property" means real property or personal property, other than a structure or forestland.
- (d) "Inhabited" means currently being used for dwelling purposes whether occupied or not. "Inhabited structure" and "inhabited property" do not include the real property on which an inhabited structure or an inhabited property is located.
- (e) "Maliciously" imports a wish to vex, defraud, annoy, or injure another person, or intent to do a wrongful act, established either by proof or by presumption of law.
- (f) "Recklessly" means a person is aware of and consciously disregards a substantial and unjustifiable risk that his or her act will set fire to, burn, or cause to burn a structure, forestland, or property. The risk shall be of such nature and degree that disregard thereof constitutes a gross deviation from the standard of conduct that a reasonable person would observe in the situation. A person who creates such a risk but is unaware thereof solely by reason of voluntary intoxication also acts recklessly with respect thereto.

### ***Section 451: The Crime of Arson***

A person is guilty of arson when he or she willfully and maliciously sets fire to or burns or causes to be burned or who aids, counsels, or procures the burning of, any structure, forestland, or property.

- (a) Arson that causes great bodily injury is a felony punishable by imprisonment in the state prison for five, seven, or nine years.
- (b) Arson that causes an inhabited structure or inhabited property to burn is a felony punishable by imprisonment in the state prison for three, five, or eight years.
- (c) Arson of a structure or forestland is a felony punishable by imprisonment in the state prison for two, four, or six years.
- (d) Arson of property is a felony punishable by imprisonment in the state prison for 16 months, two, or three years. For purposes of this paragraph, arson of property does not include one burning or causing to be burned his or her own personal property unless there is an intent to defraud or there is injury to another person or another person's structure, forestland, or property.
- (e) In the case of any person convicted of violating this section while confined in a state prison, prison road camp, prison forestry camp, or other prison camp or prison farm, or while confined in a county jail while serving a term of imprisonment for a felony or misdemeanor conviction, any sentence imposed shall be consecutive to the sentence for which the person was then confined.

### ***Section 451.1: Arson Enhancements***

- (a) Notwithstanding any other law, any person who is convicted of a felony violation of Section 451 shall be punished by a three-, four-, or five-year enhancement if one or more of the following circumstances are found to be true:
  - (1) The defendant has been previously convicted of a felony violation of Section 451 or 452.
  - (2) A firefighter, peace officer, or other emergency personnel suffered great bodily injury as a result of the offense. The additional term provided by this subdivision shall be imposed whenever applicable, including any instance in which there is a violation of subdivision (a) of Section 451.
  - (3) The defendant proximately caused great bodily injury to more than one victim in any single violation of Section 451. The additional term provided by this subdivision shall be imposed whenever applicable, including any instance in which there is a violation of subdivision (a) of Section 451.
  - (4) The defendant proximately caused multiple structures to burn in any single violation of Section 451.

- (5) The defendant committed arson as described in subdivision (a), (b), or (c) of Section 451 and the arson was caused by use of a device designed to accelerate the fire or delay ignition.
- (b) The additional term specified in subdivision (a) shall not be imposed unless the existence of any fact required under this section shall be alleged in the accusatory pleading and either admitted by the defendant in open court or found to be true by the trier of fact.

**Section 451.5: Aggravated Arson**

- (a) Any person who willfully, maliciously, deliberately, with premeditation, and with intent to cause injury to one or more persons or to cause damage to property under circumstances likely to produce injury to one or more persons or to cause damage to one or more structures or inhabited dwellings, sets fire to, burns, or causes to be burned, or aids, counsels, or procures the burning of any residence, structure, forest land, or property is guilty of aggravated arson if one or more of the following aggravating factors exists:
- (1) The defendant has been previously convicted of arson on one or more occasions within the past 10 years.
- (2) (A) The fire caused property damage and other losses in excess of five million six hundred fifty thousand dollars (\$5,650,000).
- (B) In calculating the total amount of property damage and other losses under subparagraph (A), the court shall consider the cost of fire suppression. It is the intent of the Legislature that this paragraph be reviewed within five years to consider the effects of inflation on the dollar amount stated herein. For that reason, this paragraph shall remain in effect until January 1, 2010, and as of that date is repealed, unless a later enacted statute, which is enacted before January 1, 2010, deletes or extends that date.
- (3) The fire caused damage to, or the destruction of, five or more inhabited structures.
- (b) Any person who is convicted under subdivision (a) shall be punished by imprisonment in the state prison for 10 years to life.
- (c) Any person who is sentenced under subdivision (b) shall not be eligible for release on parole until 10 calendar years have elapsed.

**Section 452: Unlawfully/Recklessly Causing a Fire**

A person is guilty of unlawfully causing a fire when he recklessly sets fire to or burns or causes to be burned, any structure, forestland, or property.

- (a) Unlawfully causing a fire that causes great bodily injury is a felony punishable by imprisonment in the state prison for two, four or six years, or by imprisonment in the county jail for not more than one year, or by a fine, or by both such imprisonment and fine.

- (b) Unlawfully causing a fire that causes an inhabited structure or inhabited property to burn is a felony punishable by imprisonment in the state prison for two, three or four years, or by imprisonment in the county jail for not more than one year, or by a fine, or by both such imprisonment and fine.
- (c) Unlawfully causing a fire of a structure or forest land is a felony punishable by imprisonment in the state prison for 16 months, two or three years, or by imprisonment in the county jail for not more than six months, or by a fine, or by both such imprisonment and fine.
- (d) Unlawfully causing a fire of property is a misdemeanor. For purposes of this paragraph, unlawfully causing a fire of property does not include one burning or causing to be burned his own personal property unless there is injury to another person or to another person's structure, forestland, or property.
- (e) In the case of any person convicted of violating this section while confined in a state prison, prison road camp, prison forestry camp, or other prison camp or prison farm, or while confined in a county jail while serving a term of imprisonment for a felony or misdemeanor conviction, any sentence imposed shall be consecutive to the sentence for which the person was then confined.

### ***Section 452.1: Aggravated Unlawfully/Recklessly Causing a Fire***

- (a) Notwithstanding any other law, any person who is convicted of a felony violation of Section 452 shall be punished by a one-, two-, or three-year enhancement for each of the following circumstances that is found to be true:
  - (1) The defendant has been previously convicted of a felony violation of Section 451 or 452.
  - (2) A firefighter, peace officer, or other emergency personnel suffered great bodily injury as a result of the offense. The additional term provided by this subdivision shall be imposed whenever applicable, including any instance in which there is a violation of subdivision (a) of Section 452.
  - (3) The defendant proximately caused great bodily injury to more than one victim in any single violation of Section 452. The additional term provided by this subdivision shall be imposed whenever applicable, including any instance in which there is a violation of subdivision (a) of Section 452.
  - (4) The defendant proximately caused multiple structures to burn in any single violation of Section 452.
- (b) The additional term specified in subdivision (a) of Section 452.1 shall not be imposed unless the existence of any fact required under this section shall be alleged in the accusatory pleading and either admitted by the defendant in open court or found to be true by the trier of fact.

### ***Section 453: Incendiary Devices***

- (a) Every person who possesses, manufactures, or disposes of any flammable, or combustible material or substance, or any incendiary device in an arrangement or preparation, with intent to willfully and maliciously use this material, substance, or device to set fire to or burn any structure, forest land, or property, shall be punished by imprisonment in the state prison, or in a county jail, not exceeding one year.
- (b) For the purposes of this section:
- (1) "Disposes of" means to give, give away, loan, offer, offer for sale, sell, or transfer.
  - (2) "Incendiary device" means a device that is constructed or designed to start an incendiary fire by remote, delayed, or instant means, but no device commercially manufactured primarily for the purpose of illumination shall be deemed to be an incendiary device for the purposes of this section.
  - (3) "Incendiary fire" means a fire that is deliberately ignited under circumstances in which a person knows that the fire should not be ignited.

### ***Section 455: Attempted Arson***

Any person who willfully and maliciously attempts to set fire to or attempts to burn or to aid, counsel or procure the burning of any structure, forest land or property, or who commits any act preliminary thereto, or in furtherance thereof, is punishable by imprisonment in the state prison for 16 months, two or three years. The placing or distributing of any flammable, explosive or combustible material or substance, or any device in or about any structure, forest land or property in an arrangement or preparation with intent to eventually willfully and maliciously set fire to or burn same, or to procure the setting fire to or burning of the same shall, for the purposes of this act constitute an attempt to burn such structure, forest land or property.

### ***Section 457.1: Arson Registration***

- (a) As used in this section, "arson" means a violation of Section 451, 451.5, or 453, and attempted arson, which includes, but is not limited to, a violation of Section 455.
- (b) (1) Every person described in paragraph (2), (3), and (4), for the periods specified therein, shall, while residing in, or if the person has no residence, while located in California, be required to, within 14 days of coming into, or changing the person's residence or location within any city, county, city and county, or campus wherein the person temporarily resides, or if the person has no residence, is located:
- (A) Register with the chief of police of the city where the person is residing, or if the person has no residence, where the person is located.
  - (B) Register with the sheriff of the county where the person is residing, or if the person has no residence, where the person is located in an unincorporated area or city that has no police department.

- (C) In addition to (A) or (B) above, register with the chief of police of a campus of the University of California, the California State University, or community college where the person is residing, or if the person has no residence, where the person is located upon the campus or any of its facilities.

### ***11413: Terrorism; Use of a Destructive Device or Explosive or Commission of Arson in Certain Places***

- (a) Any person who explodes, ignites, or attempts to explode or ignite any destructive device or any explosive, or who commits arson, in or about any of the places listed in subdivision (b), for the purpose of terrorizing another or in reckless disregard of terrorizing another is guilty of a felony, and shall be punished by imprisonment in the state prison for three, five, or seven years, and a fine not exceeding ten thousand dollars (\$10,000).
- (b) Subdivision (a) applies to the following places:
- (1) Any health facility licensed under Chapter 2 (commencing with Section 1250) of Division 2 of the Health and Safety Code, or any place where medical care is provided by a licensed health care professional.
  - (2) Any church, temple, synagogue, mosque, or other place of worship.
  - (3) The buildings, offices, and meeting sites of organizations that counsel for or against abortion or among whose major activities are lobbying, publicizing, or organizing with respect to public or private issues relating to abortion.
  - (4) Any place at which a lecture, film-showing, or other private meeting or presentation that educates or propagates with respect to abortion practices or policies, whether on private property or at a meeting site authorized for specific use by a private group on public property, is taking place.
  - (5) Any bookstore or public or private library.
  - (6) Any building or facility designated as a courthouse.
  - (7) The home or office of a judicial officer.
  - (8) Any building or facility regularly occupied by county probation department personnel in which the employees perform official duties of the probation department.
  - (9) Any private property, if the property was targeted in whole or in part because of any of the actual or perceived characteristics of the owner or occupant of the property listed in subdivision (a) of Section 422.55.
  - (10) Any public or private school providing instruction in kindergarten or grades 1 to 12, inclusive.

- (c) As used in this section, "judicial officer" means a magistrate, judge, justice, commissioner, referee, or any person appointed by a court to serve in one of these capacities, of any state or federal court located in this state.
- (d) As used in this section, "terrorizing" means to cause a person of ordinary emotions and sensibilities to fear for personal safety.
- (e) Nothing in this section shall be construed to prohibit the prosecution of any person pursuant to Section 12303.3 or any other provision of law in lieu of prosecution pursuant to this section.

### ***Section 12301: Destructive Device Definitions***

- (a) The term "destructive device," as used in this chapter, shall include any of the following weapons:
  - (5) Any breakable container which contains a flammable liquid with a flashpoint of 150 degrees Fahrenheit or less and has a wick or similar device capable of being ignited, other than a device which is commercially manufactured primarily for the purpose of illumination.
  - (6) Any sealed device containing dry ice (CO<sub>2</sub>) or other chemically reactive substances assembled for the purpose of causing an explosion by a chemical reaction.

### ***Section 12303.2: Possession of a Destructive Device or Explosive In or Near Certain Places***

Every person who recklessly or maliciously has in his possession any destructive device or any explosive on a public street or highway, in or near any theater, hall, school, college, church, hotel, other public building, or private habitation, in, on, or near any aircraft, railway passenger train, car, cable road or cable car, vessel engaged in carrying passengers for hire, or other public place ordinarily passed by human beings is guilty of a felony, and shall be punishable by imprisonment in the state prison for a period of two, four, or six years.

### ***Section 12303.3: Wrongful Possession, Explosion Etc., of a Destructive Device or Explosive with Intent to Injure or Intimidate Person or to Injure or Destroy Property***

Every person who possesses, explodes, ignites, or attempts to explode or ignite any destructive device or any explosive with intent to injure, intimidate, or terrify any person, or with intent to wrongfully injure or destroy any property, is guilty of a felony, and shall be punished by imprisonment in the state prison for a period of three, five, or seven years.

## California Penal Code Sections for Time of Commencing Criminal Actions

The following two Penal Code sections regulate the statutes of limitations for an arson investigation.

### **Section 800: Offenses Punishable by Imprisonment for Eight Years or More**

Except as provided in Section 799, prosecution for an offense punishable by imprisonment in the state prison for eight years or more shall be commenced within six years after commission of the offense.

- Section 451a: Arson that Causes Great Bodily Injury
- Section 451b: Arson of an Inhabited Structure
- Section 451.5: Aggravated Arson

### **Section 801: Offenses Punishable by Imprisonment**

Except as provided in Sections 799 and 800, prosecution for an offense punishable by imprisonment in the state prison shall be commenced within three years after commission of the offense.

- Section 451c: Arson of a Structure or Forestland
- Section 451d: Arson of Property
- Section 452a: Unlawfully/Recklessly Causing a Fire that Causes Great Bodily Injury
- Section 452b: Unlawfully/Recklessly Causing a Fire that Causes an Inhabited Structure to Burn
- Section 452c: Unlawfully/Recklessly Causing a Fire of a Structure or Forestland
- Section 455: Attempted Arson

## Health and Safety Code Sections Related to Fire Investigation

Statutes concerning the negligent causing of a fire as well as discarding of cigarettes are found in the Health and Safety Code. These sections of the code address careless and negligent acts as compared to the reckless acts described under Penal Code Section 452.

### **Section 13000: Liability in Relation to Fires**

Every person is guilty of a misdemeanor who allows a fire kindled or attended by him to escape from his control or to spread to the lands of any person other than the builder of the fire without using every reasonable and proper precaution to prevent the fire from escaping.

### **Section 13001**

Every person is guilty of a misdemeanor who, through careless or negligent action, throws or places any lighted cigarette, cigar, ashes, or other flaming or glowing substance, or any substance or thing which may cause a fire, in any place where it may directly or indirectly

start a fire, or who uses or operates a welding torch, tar pot or any other device which may cause a fire, who does not clear the inflammable material surrounding the operation or take such other reasonable precautions necessary to insure against the starting and spreading of fire.

### **Section 13002**

(a) Every person is guilty of a misdemeanor who throws or discharges any lighted or nonlighted cigarette, cigar, match, or any flaming or glowing substance, or any substance or thing which may cause a fire upon any highway, including any portion of the right-of-way of any highway, upon any sidewalk, or upon any public or private property. This subdivision does not restrict a private owner in the use of his or her own private property, unless the placing, depositing, or dumping of the waste matter on the property creates a public health and safety hazard, a public nuisance, or a fire hazard, as determined by a local health department, local fire department or fire district, or the Department of Forestry and Fire Protection, in which case this section applies.

### **Section 13007: Liability to Owner of Property Damaged by Fire**

Any person who personally or through another willfully, negligently, or in violation of law, sets fire to, allows fire to be set to, or allows a fire kindled or attended by him to escape to, the property of another, whether privately or publicly owned, is liable to the owner of such property for any damages to the property caused by the fire.

### **Vehicle Code Section Related to Fire Investigation**

#### **Section 23111: Throwing Substances on Highways**

No person in any vehicle and no pedestrian shall throw or discharge from or upon any road or highway or adjoining area, public or private, any lighted or nonlighted cigarette, cigar, match, or any flaming or glowing substance. This section shall be known as the Paul Buzzo Act.

### **Court Cases and General Intent**

Two court cases influence the prosecution of arson and the General Intent doctrine. The People v. Fry (1993) 19 Cal.App.4<sup>th</sup> 1334, 24 Cal.Rptr.2d 43 decision addresses the general intent component of the crime of arson and also addresses issues concerning Penal Code Section 654 regarding punishment under different provisions of the law.

The other case is People v. Atkins (2001), Cal.4<sup>th</sup> [No S082662, Mar. 12, 2001]. That case also addresses the general intent of the crime of arson and voluntary intoxication.

### **Penal Code Section 654: Offenses Punishable in Different Ways by Different Provisions; Double Jeopardy; Denial of Probation**

- (a) An act or omission that is punishable in different ways by different provisions of law shall be punished under the provision that provides for the longest potential term of imprisonment, but in no case shall the act or omission be punished under more than one provision. An acquittal or conviction and sentence under any one bars a prosecution for the same act or omission under any other.
- (b) Notwithstanding subdivision (a), a defendant sentenced pursuant to subdivision (a) shall not be granted probation if any of the provisions that would otherwise apply to the defendant prohibits the granting of probation.

## People v. Fry (1993)

### PEOPLE V. FRY (1993)

19 Cal.App.4th 1334, 24 Cal.Rptr.2d 43

[No. H010121. Sixth Dist. Oct 2

**THE PEOPLE, Plaintiff and Respondent, v. WADE WILLIAM FRY, Defendant and Appellant.**

(Superior Court of Santa Cruz County, No. CR 5625, William M. Kelsay, Judge.)  
(Opinion by Wunderlich, J., with Premo, Acting P. J., and Elia, J., concurring.)

#### **Statement of the Case**

Defendant Wade William Fry appeals from a judgment entered after a court trial in which he was found guilty of arson of a structure and four counts of arson of a vehicle. (Pen. Code, § 451, subds. (c) and (d).) The court imposed the four-year midterm sentence for arson of a structure and concurrent two-year midterm sentences for the other arson offenses. The court suspended execution of the sentence and placed defendant on probation for five years on condition that he spend one year in the county jail, crediting him with one hundred and fifteen days in custody. The court then stayed imposition of the jail time pending defendant's successful completion of a residential treatment program. [19 Cal.App.4th 1337]

On appeal, defendant claims there is insufficient evidence to support a conviction for arson of a structure. He also claims the court violated Penal Code section 654 in sentencing him for both arson of a structure and arson of the vehicle that was inside the structure and miscalculated the amount of custody credit to which he was entitled. We conclude that defendant was properly convicted of arson of a structure. However, we agree that the court erred at sentencing and in calculating custody credits.

#### **Facts**

During the course of February 15, 1992, defendant drank fifteen beers and one mixed drink and took two "Vicodin" pain pills. He ended up at a bar called "The Edgewater." He left at about midnight, "really drunk" and "emotionally upset and angry" at his girlfriend, with whom he had argued earlier in the day. On his way home, he intentionally set fire to four vehicles with a "BIC" lighter. The fire in one of the vehicles, a convertible, damaged the carport it was parked in. Later, when defendant got home, he felt guilty, called "911," and reported the fires.

Defendant testified that he did not intend for the carport to burn. In fact, he said it did not even occur to him that setting fire to the convertible would cause the carport to burn, and had he known so, he would not have set fire to the car there.

### PEOPLE V. FRY (1993)

#### Discussion

##### I. Conviction for Arson of a Structure

[1] Defendant cites *In re Stonewall F.* (1989) 208 Cal.App.3d 1054 [256 Cal.Rptr. 578], for the proposition that to commit arson of a structure requires a specific intent to burn that structure.<sup>1</sup> Thus, because the trial court expressly found that he did not intend to burn the carport, he claims his conviction for arson of a structure, i.e., the carport, cannot stand and that at [19 Cal.App.4th 1338] most he may properly remain convicted of only the lesser offense of unlawfully causing a fire (see Pen. Code, § 452<sup>2</sup>). We disagree. There is now a conflict of authority concerning whether the crime of arson requires a specific intent.

*In re Stonewall F.*, supra, 208 Cal.App.3d 1054, juveniles intentionally set fire to a pile of leaves near a school and the fire spread to and damaged a school building. The appellate court concluded that because juvenile court specifically found that the juveniles did not intend to burn the school, it could not properly have found that the juveniles committed arson of a structure. (Id. at p. 1067.) Using logical deduction, the court inferred a requirement of specific intent from the express requirement that a perpetrator act willfully and maliciously. Reduced to its essence, the opinion reasons that because the lesser offense of unlawful burning requires recklessness, i.e., a subjective awareness of the risk, the greater offense of arson must require a higher mental state. Thus, "[t]o 'willfully and maliciously' cause the burning of a structure under section 451 ... must mean that the burning of the structure is the end in view of the wrongful conduct, to wit intended." (Id. at p. 1067; accord, *People v. Schwartz* (1992) 2 Cal.App.4th 1319, 1324 -1325 [3 Cal.Rptr.2d 816].)

In *People v. Glover* (1991) 233 Cal.App.3d 1476 [285 Cal.Rptr. 362], the court reviewed the history of California's arson statute and concluded that arson was a general, not specific, intent crime. (Id. at p. 1479; accord, *People v. Lopez* (1993) 13 Cal.App.4th 1840, 1845 [17 Cal.Rptr.2d 317].) "Accordingly, because the statute ... does not [expressly] require a specific intent and the general rule of law throughout this country is that no specific intent is required absent language in an arson statute which requires the existence of a specific intent, we respectfully disagree with [*Stonewall*]." (233 Cal.App.3d at pp. 1483-1484.)<sup>3</sup>

Clearly, the arson statute requires something more than a general intent or willingness to do the proscribed act. (See *People v. Hood* (1969) 1 Cal.3d [19 Cal.App.4th 1339] 444, 456-457 [82 Cal.Rptr. 618, 462 P.2d 370].) However, we are unpersuaded by the reasoning in *Stonewall* and agree with *People v. Glover*, supra, 233 Cal.App.3d 1476, that the something more is not the specific intent to burn a particular piece of property. The Legislature defined the crime of arson, and we do not consider it appropriate to add an element they did not see fit to expressly require. Rather, to convict a defendant of arson, the trier of fact must find only that he or she acted willfully and maliciously in

### PEOPLE V. FRY (1993)

setting fire to, burning, or causing to be burned a structure, forestland, or property.

Here, it is undisputed that defendant's conduct actually and proximately caused the carport, i.e., a structure, to be burned: setting fire to the car created a substantial and unjustifiable risk that the carport would burn, the carport did in fact burn, and its burning, as the trial court found, was the natural and probable consequence of his conduct.<sup>4</sup> Consequently, whether defendant committed arson of a structure or unlawful burning of a structure depends only on whether he willfully and maliciously performed the acts that caused the carport to burn, in which case the offense is arson, or recklessly, in which case the offense is unlawful burning.

Here, in finding defendant guilty of arson of the car in the carport, the trial court implicitly found that he willfully and maliciously set fire to the car. The record reveals substantial evidence to support this finding, and defendant does not claim otherwise. It follows, a fortiori, that in causing the carport to be burned, defendant acted willfully and maliciously. Thus, we conclude that the trial court properly found defendant guilty of arson of a structure. (Cf. *People v. Green* (1983) 146 Cal.App.3d 369 [194 Cal.Rptr. 128].) The court's comments that defendant did not specifically intend for the carport to burn are of no legal import on the issue of guilt. Moreover, that defendant's willful and malicious conduct may also have been reckless does not suggest that he may not be convicted of arson of the carport or that his culpability is the same as someone who recklessly starts a fire that causes a structure to be burned. [19 Cal.App.4th 1340]

#### II. Dual Punishment

As noted above, the court imposed a four-year midterm sentence for arson of the carport and concurrent midterm sentences for all four counts of arson of property, i.e., the vehicles. [2] Although the court suspended execution of the sentence and placed defendant on probation, he contends that under Penal Code section 654, he may not properly be punished for both arson of the carport and arson of the vehicle that was inside it because the two offenses were part of a single, indivisible course of conduct and shared the same criminal objective.<sup>5</sup> (See *People v. Pearson* (1986) 42 Cal.3d 351, 359 [228 Cal.Rptr. 509, 721 P.2d 595]; *People v. Coleman* (1989) 48 Cal.3d 112, 162 [255 Cal.Rptr. 813, 768 P.2d 32].)

The Attorney General concedes, and we agree, that it was error to impose, but not stay, the sentence on one of the two offenses. Both resulted from a single act and, in light of the trial court's finding that defendant did not intend to burn the carport, both shared the same criminal objective. The Attorney General suggests that we need do nothing about this error because defendant was placed on probation. "[T]hus, regardless of whether [we] stay[ ] the imposition of that term, appellant's probation time will not be [affected]."

Defendant was entitled to have the trial court follow the proper procedures in imposing sentence, and the judgment should so reflect. Thus, having decided to treat the four-

### PEOPLE V. FRY (1993)

year term for arson of a structure as the principal term, the court should have separately stayed execution of the term imposed for arson of the vehicle in the carport. (People v. Pearson, supra, 42 Cal.3d at pp. 361-362.)

#### III. Custody Credit

[3] Defendant contends, and the Attorney General agrees, that he did not receive all of the custody credit to which he was entitled. The record supports this contention.

"Penal Code section 4019, specifies how prisoners may obtain certain credits. Subdivisions (b) and (c) of that section provide: 'for each six-day period in which a prisoner is confined in or committed to a specified facility' one day shall be deducted from his period of confinement for performing [19 Cal.App.4th 1341] labors, and one day shall be deducted for compliance with the rules and regulations of the facility. Subdivision (f) of that section provides 'if all days are earned under this section, a term of six days will be deemed to have been served for every four days spent in actual custody.' (Italics added.)" (People v. Bobb (1989) 207 Cal.App.3d 88, 97 [254 Cal.Rptr. 707].)

The correct amount of credit is calculated by dividing the number of days spent in custody by four and rounding down to the nearest whole number. This number is then multiplied by two and the total added to the original number of days spent in custody. (People v. Smith (1989) 211 Cal.App.3d 523, 527 [259 Cal.Rptr. 515].) Here, the court credited defendant with only the 115 days actually spent in custody. However, defendant was also entitled to an additional 56 days of credit under Penal Code section 4019 for a total of 171 days.<sup>6</sup>

#### **Disposition**

The judgment is modified to stay the sentence on count 2 (arson of the vehicle in the carport) and to credit defendant with an additional 56 days of custody credit. As modified, the judgment is affirmed. The clerk of the superior court is directed to amend the abstract of judgment in accordance with the above-noted modifications. Premo, Acting P. J., and Elia, J., concurred.

Appellant's petition for review by the Supreme Court was denied January 20, 1994. Kennard, J., was of the opinion that the petition should be granted.

<sup>1</sup> Penal Code section 451 provides, in relevant part, "A person is guilty of arson when he or she willfully and maliciously sets fire to or burns or causes to be burned or who aids, counsels, or procures the burning of, any structure, forestland, or property."  
Penal Code section 450, subdivision (e), provides, " 'Maliciously' imports a wish to vex, defraud, annoy, or injure another person, or an intent to do a wrongful act, established either by proof or presumption of law."  
Penal Code section 7, subdivision 1, provides "The word 'willfully,' when applied to the intent with which an act is done or omitted, implies simply a purpose or willingness to commit the act, or make the omission referred to. It does not require any intent to violate law, or to injure another, or to acquire any advantage."

- 2 Penal Code section 452 provides, in relevant part, "A person is guilty of unlawfully causing a fire when he recklessly sets fire to or burns or causes to be burned, any structure, forestland, or property."  
Penal Code section 450, subdivision (f), defines "[r]ecklessly" to mean "a person is aware of and consciously disregards a substantial and unjustifiable risk that his or her act will set fire to, burn, or cause to burn a structure, forest land, or property. The risk shall be of such nature and degree that disregard thereof constitutes a gross deviation from the standard of conduct that a reasonable person would observe in the situation. A person who creates such a risk but is unaware thereof solely by reason of voluntary intoxication also acts recklessly with respect thereto."
- 3 Interestingly, although the court in *People v. Lopez*, supra, 13 Cal.App.4th 1840, followed the holding in *Glover*, it found it unnecessary to disagree with the decision in *Stonewall* because the discussion therein of whether arson required a specific intent "can only have been, and was, an archetypical example of dicta." (Id. at p. 1845, fn. omitted, italics in original.)
- 4 This finding distinguishes this case from *Stonewall*, where the court observed that the intentional burning of the leaves was "causally distant" from the burning of the school. (In re *Stonewall F.*, supra, 208 Cal.App.3d at p. 1066.)  
Defendant suggests that the facts here do not indicate that the damage to the carport was more foreseeable than the damage to the school in *Stonewall*, noting that there the juveniles set fire to a pile of leaves near a wall which was near the doors to the multipurpose room of a school (In re *Stonewall F.*, supra, 208 Cal.App.3d at p. 1066), and here "the vehicle [defendant] set afire was similarly near a building."  
Defendant understates his facts. The car was inside a covered carport, not just near a building. Thus, in our view, it is far more foreseeable that the car fire would directly damage, if not spread to, the carport than that a leaf fire would spread laterally to adjacent areas.
- 5 Penal Code section 654 provides, in relevant part, that "[a]n act ... which is made punishable in different ways by different provisions of this code may be punished under either of such provisions, but in no case can it be punished under more than one[.]"
- 6 The calculation is as follows: 115 days divided by 4 equals 28, times 2 equals 56, plus 115 equals 171 days of credit.

## People v. Atkins (2001)

### PEOPLE V. ATKINS (2001)

[No. S082662. Mar. 12, 2001.]

**THE PEOPLE, Plaintiff and Respondent, v. ROBERT NELSON ATKINS, Defendant and Appellant.**

(Superior Court of Tehama County, No. NCR46234, Dennis E. Murray, Judge.)  
(Opinion by Chin, J., with George, C.J., Kennard, J., Baxter, J., and Werdegar, J., concurring.  
Concurring opinion by Mosk, J. Concurring opinion by Brown, J.)

#### **Opinion - Chin, J.**

Is evidence of voluntary intoxication admissible, under Penal Code section 22, on the issue of whether defendant formed the required mental state for arson (Penal Code §451)?<sup>1</sup> We conclude that such evidence is not admissible because arson is a general intent crime. Accordingly, we reverse the judgment of the Court of Appeal.

#### **Facts and Procedural History**

On September 26, 1997, defendant told his friends that he hated Orville Figgs and was going to burn down Figs' house. On the afternoon of September 27, defendant and his brother David drove by Figgs' home on the Ponderosa Sky Ranch. Defendant "flipped the bird" at Figgs as they passed by.

Later that day, around 5:00 p.m., a neighbor saw David drive a white pickup truck into the Ponderosa Sky Ranch canyon, but could not tell if he had a passenger. Around 9:00 p.m., the same neighbor saw the pickup truck drive out of the canyon at a high rate of speed. A half-hour later, a fire was reported. Shortly after 10:00 p.m., Figgs was awakened by a neighbor. Because the fire was rapidly approaching his house, Figgs set up a fire line. The fire came within 150 feet of his house.

At 9:00 or 9:30 p.m., one of defendant's friends saw defendant at David's apartment. He was angrily throwing things around. When asked if defendant was heavily intoxicated, the friend replied, "Yes. Agitated, very agitated."

The county fire marshal, Alan Carlson, responded to the fire around 1:30 a.m. and saw a large fire rapidly spreading in the canyon below the ranch. He described fire conditions on that night as "extreme." Both the weather and the vegetation were particularly dry. The wind was blowing from 12 to 27 miles per hour, with gusts up to 50 miles per hour. The canyon had heavy brush, trees, grass, and steep sloping grades. The fire could not be controlled for three days and burned an area from 2.5 to 2.8 miles long.

The fire marshal traced the origin of the fire to an approximately 10-foot square area that was completely burned and smelled of "chainsaw mix," a combination of oil and

### PEOPLE V. ATKINS (2001)

gasoline. A soil sample taken from that area tested positive for gasoline. About 40 feet away, the marshal found defendant's wallet, which was near a recently opened beer can, and tire tracks. He also found a disposable lighter nearby and two more beer cans in other parts of the canyon. All the cans had the same expiration date.

Several days later, defendant spoke with the fire marshal. After waiving his Miranda rights (*Miranda v. Arizona* (1966) 384 U.S. 436), defendant told the marshal that he and his brother had spent much of the day drinking. They then drove in David's white pickup to the Ponderosa Sky Ranch canyon, where they drank some more and stayed between three and one-half to five hours. Defendant saw that the area was in poor condition and decided to burn some of the weeds. His family had once lived there. He pulled out the weeds, placed them in a small pile in a cleared area, retrieved a plastic gasoline jug from David's truck, and from the jug poured "chainsaw mix" on the pile of weeds. Defendant put the jug down a few feet away and lit the pile of weeds with a disposable lighter. The fire quickly spread to the jug and got out of hand. He and David tried to put the fire out, unsuccessfully. They panicked and fled while the jug was still burning. Defendant told the marshal that he meant no harm, claimed the fire was an accident, but admitted that he and his family had hard feelings with the Figgs family.

The marshal testified that the fire had not been started in a cleared area. The area was covered with vegetation, and there was no evidence that the fire started accidentally during a debris burn or that someone had tried to put it out. The marshal opined that the fire was intentionally set.

An information charged defendant with arson of forestland. (§ 451, subd. (c)) The trial court instructed on arson (§ 451, subd. (c))<sup>2</sup> and on the lesser offenses of arson to property (§ 451, subd. (d)), unlawfully causing a fire of forest land (§ 452, subd. (c)), and misdemeanor (§ 452, subd. (d)) unlawfully causing a fire of property. It described arson and all lesser offenses as general intent crimes and further instructed that voluntary intoxication is not a defense to arson and the lesser crimes and does not relieve defendant of responsibility for the crime. The jury found defendant guilty as charged.

Defendant appealed, arguing that evidence of voluntary intoxication was admissible to show that he lacked the requisite mental state for arson. The Court of Appeal agreed. It reasoned that, as defined in its prior decisions of *In re Stonewall F.* (1989) 208 Cal.App.3d 1054 (*Stonewall F.*) and *People v. Fabris* (1995) 31 Cal.App.4th 685 (*Fabris*), the mens rea for arson is the intent to set fire to or burn or cause to be burned forest land, a specific mental state, as to which voluntary intoxication evidence is admissible under section 22, subdivision (b). The court reversed because the instruction that voluntary intoxication was not a defense to arson "denied defendant the opportunity to prove he lacked the required mental state." We granted the People's petition for review on the issue of whether evidence of voluntary intoxication is admissible, under

### PEOPLE V. ATKINS (2001)

section 22, to negate the required mental state for arson.

#### Discussion

Section 22 provides, as relevant: "(a) No act committed by a person while in a state of voluntary intoxication is less criminal by reason of his or her having been in that condition. Evidence of voluntary intoxication shall not be admitted to negate the capacity to form any mental states for the crimes charged, including, but not limited to, purpose, intent, knowledge, premeditation, deliberation, or malice aforethought, with which the accused committed the act.

"(b) Evidence of voluntary intoxication is admissible solely on the issue of whether or not the defendant actually formed a required specific intent, or, when charged with murder, whether the defendant premeditated, deliberated, or harbored express malice aforethought."

Evidence of voluntary intoxication is inadmissible to negate the existence of general criminal intent. (*People v. Whitfield* (1994) 7 Cal.4th 437, 448.) In *People v. Hood* (1969) 1 Cal.3d 444 (*Hood*), we first addressed the question whether to designate a mental state as a general intent, to prohibit consideration of voluntary intoxication or a specific intent, to permit such consideration. There, we held that intoxication was relevant to negate the existence of a specific intent, but not a general intent, and that assault is a general intent crime for this purpose. (*Id.* at pp. 455-459.) We stated:

"The distinction between specific and general intent crimes evolved as a judicial response to the problem of the intoxicated offender. That problem is to reconcile two competing theories of what is just in the treatment of those who commit crimes while intoxicated. On the one hand, the moral culpability of a drunken criminal is frequently less than that of a sober person affecting a like injury. On the other hand, it is commonly felt that a person who voluntarily gets drunk and while in that state commits a crime should not escape the consequences. (See Hall, *General Principles of Criminal Law* (2d ed. 1960), p. 537.)

"Before the nineteenth century, the common law refused to give any effect to the fact that an accused committed a crime while intoxicated. The judges were apparently troubled by this rigid traditional rule, however, for there were a number of attempts during the early part of the nineteenth century to arrive at a more humane, yet workable, doctrine. The theory that these judges explored was that evidence of intoxication could be considered to negate intent, whenever intent was an element of the crime charged. As Professor Hall notes, however, such an exculpatory doctrine could eventually have undermined the traditional rule entirely, since some form of mens rea is a requisite of all but strict liability offenses. (Hall, *Intoxication and Criminal Responsibility*, 57 Harv.L.Rev. 1045, 1049.) To limit the operation of the doctrine and achieve a compromise between the conflicting feelings of sympathy and reprobation for

### PEOPLE V. ATKINS (2001)

the intoxicated offender, later courts both in England and this country drew a distinction between so-called specific intent and general intent crimes." (Hood, supra, 1 Cal.3d at pp. 455-456, fn. omitted.)

Although we noted in Hood that specific and general intent have been notoriously difficult terms to define and apply, we set forth a general definition distinguishing the two intents: "When the definition of a crime consists of only the description of a particular act, without reference to intent to do a further act or achieve a future consequence, we ask whether the defendant intended to do the proscribed act. This intention is deemed to be a general criminal intent. When the definition refers to defendant's intent to do some further act or achieve some additional consequence, the crime is deemed to be one of specific intent." (Hood, supra, 1 Cal.3d at pp. 456-457.) The basic framework that Hood established in designating a criminal intent as either specific or general for purposes of determining the admissibility of evidence of voluntary intoxication has survived. (People v. Mendoza (1998) 18 Cal.4th 1114, 1128.)

Defendant argues that arson requires the specific intent to burn the relevant structure or forestland, a mental state that may be negated by evidence of voluntary intoxication. The People argue that arson is a general intent crime with a mental state that cannot be negated by such evidence. The Courts of Appeal have disagreed on the intent requirement for arson.

In *Stonewall F.*, supra, 208 Cal.App.3d 1054, two minors set fire to a pile of leaves near a school building. The fire spread to the school, causing considerable damage. The juvenile court found that the minors intentionally set fire to the leaves, but that they did not intend to burn the school building. The court further found that the fire had been set recklessly, within the meaning of section 450, subdivision (f), and that the minors had also committed the more serious offense of arson. (§ 451.) The Court of Appeal, Third Appellate District, reasoned that, since section 452 created the less culpable crime of recklessly starting a fire (requiring a subjective awareness of the risk), the arson statute required a more culpable mental state "transcending recklessness," which the court labeled "intentional." (208 Cal.App.3d at p. 1067.) It concluded: "To 'willfully and maliciously' cause the burning of a structure under section 451, subdivision (c) must mean that the burning of the structure is the end in view of the wrongful conduct, to wit intended." (Ibid. ) In light of the juvenile court's factual findings, the Court of Appeal reduced the finding from arson to the lesser offense of recklessly causing a fire.

In *People v. Glover* (1991) 233 Cal.App.3d 1476, 1479-1484 (Second App. Dist., Div. Five) (*Glover*), defendant invoked *Stonewall F.*, claiming that the evidence did not support a specific intent to burn the relevant structure, a requirement for arson. The *Glover* court characterized *Stonewall F.*'s holding to be that arson is a specific intent crime (*Glover*, supra, at pp. 1479-1480), but disagreed. It held that arson is a general intent crime, that it was not necessary for the evidence to show that defendant

### PEOPLE V. ATKINS (2001)

possessed a specific intent to set fire to the apartment that had burned, and that it was required only that the acts that caused the apartment to burn were done willfully and maliciously. (Glover, *supra*, at pp. 1479, 1483-1484.) Other Courts of Appeal have agreed with Glover. (People v. Lee (1994) 28 Cal.App.4th 659, 664 [Second App. Dist., Div. Six]; People v. Fry (1993) 19 Cal.App.4th 1334, 1338-1339 [Sixth App. Dist.]<sup>3</sup>; People v. Lopez (1993) 13 Cal.App.4th 1840, 1845-1846 [Fourth App. Dist., Div. One]; see People v. Bolden (1996) 44 Cal.App.4th 707, 717 [Second App. Dist., Div. Seven; disagreeing with Stonewall F., but refraining "from detailing our own views" because issue necessarily resolved under other, properly given instructions].)

In *Fabris*, the Third Appellate District revisited the issue and reaffirmed its decision in *Stonewall F.* (*Fabris, supra*, 31 Cal.App.4th at p. 693.) Applying the general test in *Hood* for distinguishing between general and specific intent, the court acknowledged that arson can be characterized as a general intent crime. (*Fabris*, at p. 697.) It held that the trial court did not prejudicially err in describing arson as a general intent crime as long as "the jury is correctly appraised of the elements of arson--that the intent required is to set fire to or cause a structure to burn--and there is no issue of voluntary intoxication . . ." (Id. at p. 698.) Because intoxication was not an issue in *Fabris*, as it was with *Stonewall F.*, the court "impl[ie]d no view whether arson, as defined in section 451, is a 'specific intent crime' for purposes of section 22." (*Fabris, supra*, 31 Cal.App.4th at p. 696, fn 10.)

In this case, the Third Appellate District addressed the issue that was left unanswered in *Fabris*. It held that the mens rea for arson, as defined in *Stonewall F.* and *Fabris*--the intent to set fire to or burn or cause to be burned forest land--is a "required specific intent" for which evidence of voluntary intoxication is admissible under section 22, subdivision (b). The Court of Appeal continued to characterize arson as a general intent crime, but relied on our opinion in *People v. Mendoza, supra*, 18 Cal.4th at page 1131 in concluding that the intent required for section 451 arson " "is closely akin to *Hood's* definition of specific intent, which requires proof that the defendant acted with a specific and particularly culpable mental state." ' ' "

We agree with the People that arson requires only a general criminal intent and that the specific intent to set fire to or burn or cause to be burned the relevant structure or forestland is not an element of arson. "Our analysis must . . . begin with an examination of the statutory language describing the proscribed conduct, including any express or implied reference to a mental state." (People v. Hering (1999) 20 Cal.4th 440, 445.) "A person is guilty of arson when he or she willfully and maliciously sets fire to or burns or causes to be burned or who aids, counsels, or procures the burning of, any structure, forest land, or property." (§ 451.) "Maliciously" is defined in the arson chapter as "a wish to vex, defraud, annoy, or injure another person, or an intent to do a wrongful act, established either by proof or presumption of law." (§ 450, subd. (e); see also §7, subd.

## PEOPLE V. ATKINS (2001)

4.) "Willfully" is not defined in the arson chapter, but in section 7, subdivision 1: "The word 'willfully,' when applied to the intent with which an act is done or omitted, implies simply a purpose or willingness to commit the act, or make the omission referred to. It does not require any intent to violate law, or to injure another, or to acquire any advantage."

"[T]he terms 'willful' or 'willfully,' when applied in a penal statute, require only that the illegal act or omission occur 'intentionally,' without regard to motive or ignorance of the act's prohibited character." (Hale v. Morgan (1978) 22 Cal.3d 388, 396 and cases cited therein.) "Willfully implies no evil intent; ' it implies that the person knows what he is doing, intends to do what he is doing and is a free agent." [Citation.] " (People v. Bell (1996) 45 Cal.App.4th 1030, 1043; see also In re Trombley (1948) 31 Cal.2d 801, 807.) The use of the word "willfully" in a penal statute usually defines a general criminal intent, absent other statutory language that requires "an intent to do a further act or achieve a future consequence." (People v. Bell, supra, 45 Cal.App.4th at p. 1043; see also People v. Sargent (1999) 19 Cal.4th 1206, 1215, 1219, 1224; People v. Colantuono (1994) 7 Cal.4th 206, 213-215.)

As with "willfully," the statutory definition of "maliciously," in the context of arson, requires no specific intent. Section 450, subdivision (e) defines "maliciously" in terms of the arson statutes as "a wish to vex, defraud, annoy, or injure another person, or an intent to do a wrongful act . . ." This is the same definition found in section 7, subdivision 4, except for the addition of "defraud." Outside the context of arson, the term "malicious," as used in section 7, subdivision 4, does not transform an offense into a specific intent crime. (See People v. Laster (1997) 52 Cal.App.4th 1450, 1468 [willful and malicious discharge of firearm from motor vehicle is a general intent crime]; People v. Jischke (1996) 51 Cal.App.4th 552, 556 [willful and malicious discharge of firearm at inhabited dwelling house is a general intent crime]; People v. Sekona (1994) 27 Cal.App.4th 443, 448, 453 [mayhem, defined as unlawful and malicious, is a general intent crime]; People v. Froom (1980) 108 Cal.App.3d 820, 826 [diminished capacity evidence inadmissible on charge of willful and malicious shooting at inhabited dwelling]; People v. Williams (1980) 102 Cal.App.3d 1018, 1029 [the words "willfully" and "maliciously" are generally expressions of general criminal intent when used in a penal statute]; People v. Bohmer (1975) 46 Cal.App.3d 185, 190-191 [malicious placement of obstruction on railroad track is a general intent crime].) Nor does the term "malicious" transform an offense into a specific intent crime in the context of arson. (People v. Nance (1972) 25 Cal.App.3d 925, 930 [arson does not require a specific mental state which would permit defense of diminished capacity]; see also People v. Green (1983) 146 Cal.App.3d 369, 379; People v. Tanner (1979) 95 Cal.App.3d 948, 955-956 [citing Nance with approval]; People v. Williams (1971) 19 Cal.App.3d 339, 345-346; People v. Andrews (1965) 234 Cal.App.2d 69, 75.)

## PEOPLE V. ATKINS (2001)

As relevant here, the proscribed acts within the statutory definition of arson are to: (1) set fire to; (2) burn; or (3) cause to be burned, any structure, forest land, or property." (§ 451.) Language that typically denotes specific intent crimes, such as "with the intent" to achieve or "for the purpose of" achieving some further act, is absent from section 451. (People v. Hering, supra, 20 Cal.4th at p. 446.) "A crime is characterized as a 'general intent' crime when the required mental state entails only an intent to do the act that causes the harm; a crime is characterized as a 'specific intent' crime when the required mental state entails an intent to cause the resulting harm." (People v. Davis (1995) 10 Cal.4th 463, 518-519, fn 15.) The statute does not require an additional specific intent to burn a "structure, forest land, or property," but rather requires only an intent to do the act that causes the harm. This interpretation is manifest from the fact that the statute is implicated if a person "causes to be burned . . . any structure, forest land, or property." (People v. Hittel (1901) 131 Cal. 577, 579-580 [defendant "caused" building to be burned even though he set fire to different structure].) Thus, the intent requirement for arson fits within the Hood definition of general intent, i.e., the description of the proscribed act fails to refer to an intent to do a further act or achieve a future consequence. (Hood, supra, 1 Cal.3d at pp. 456-457.)

The statutory history of California's arson law further indicates that the Legislature did not consider arson, as defined in section 451, a specific intent crime. The common law crime of arson was the "'willful and malicious burning of the dwelling house of another.'" (In re Bramble (1947) 31 Cal.2d 43, 48; see United States v. Doe (9th Cir. 1998) 136 F.3d 631, 635 [common law crime of arson is a general intent crime].) Before 1872, the arson statute contained no language supporting specific intent as an element of the offense, but rather paralleled the common law crime of arson as a "willful and malicious burning." (Stats. 1856, ch. 110, §§ 4-5, p. 132; In re Bramble, supra, "31 Cal.2d at pp. 48-49.) This changed with the adoption of the Penal Code in 1872, which provided that "[a]rson is the willful and malicious burning of a building, with intent to destroy it." (Former § 447, enacted 1872 and repealed by Stats. 1929, ch. 25, § 6, p. 47; In re Bramble, supra, "31 Cal.2d at p. 49.) That offense required a specific intent to destroy the property that was burned. (People v. Mooney (1899) 127 Cal. 339, 340; People v. Hong (1898) 120 Cal. 685, 687.)

When arson was recodified in 1929, section 447 was repealed (Stats. 1929, ch. 25, § 6, p. 47), and the new primary arson statutes (former §§ 447a, 448a, & 449a) dropped the specific intent requirement, leaving "willfully and maliciously" as the only mental element. (Stats. 1929, ch. 25, §§ 1-3, p. 46; see Glover, supra, 233 Cal.App.3d at p. 1480 & fn. 3 [setting forth statutory language of former §§ 447a, 448a, & 449a].) Other arson-related crimes (former §§ 450a & 451a), as part of the 1929 enactment, contained a specific intent requirement. (Stats. 1929, ch. 25, § 4, p. 46.) Former section 450a prohibited arson when done "with intent to injure or defraud the insurer." Former section 451a prohibited the placing of a "flammable, explosive, or combustible material"

### PEOPLE V. ATKINS (2001)

in a building "with intent to eventually willfully and maliciously set fire to or burn same." (Stats. 1929, ch. 25, § 5, p. 47; see Glover, *supra*, 233 Cal.App.3d at pp. 1480-1481 & fn. 4 [sets forth statutory language of former §§ 450a & 451a].)

In 1979, sections 447a, 448a, 449a, and 450a were repealed and section 451 was added to the Penal Code. (Stats. 1979, ch. 145, §§ 1-3, 7, p. 338.) The basic language in former sections 447a, 448a, and 449a, "Any person who willfully and maliciously sets fire to or burns or causes to be burned . . .," was retained in section 451. (See Stats. 1979, ch. 145, § 8, p. 338.) Also, section 451a was amended and renumbered; it is currently section 455. (Stats. 1979, ch. 145, § 9, p. 339.)

Since the 1929 recodification, specific intent has remained separate from the basic definition of arson as willful and malicious. (See § 451, subd. (d) [burning of one's own property not arson "of property" absent an intent to defraud]; § 451.5 [aggravated arson]; § 453 [possession or manufacture of combustible material or incendiary device with intent to willfully and maliciously use]; § 455 [placement of flammable material in or about structure is an attempt only when done with intent to eventually willfully and maliciously set fire to it].)

Also, as part of the 1979 recodification of the arson statutes, the Legislature enacted section 452, which created the crime of recklessly causing a fire, and section 450, which defined various terms, including "recklessly" (§ 450, subd. (f)) and "maliciously" (§ 450, subd. (e)).<sup>4</sup> (Stats. 1979, ch. 145, §§ 6, 11, pp. 338-339.) Section 452 provides, in pertinent part, that, "A person is guilty of unlawfully causing a fire when he recklessly sets fire to or burns or causes to be burned, any structure, forest land or property." Section 450, subdivision (f) states: " 'Recklessly' means a person is aware of and consciously disregards a substantial and unjustifiable risk that his or her act will set fire to, burn, or cause to burn a structure, forest land, or property. The risk shall be of such nature and degree that disregard thereof constitutes a gross deviation from the standard of conduct that a reasonable person would observe in the situation. A person who creates such a risk but is unaware thereof solely by reason of voluntary intoxication also acts recklessly with respect thereto."

Defendant reasons that, since arson is the more serious crime, it should have a more culpable mental state than the recklessness requirement of section 452. From that premise, he infers that the more culpable mental state of arson must be a specific intent. However, the lesser offense requires mere recklessness; arson requires the general intent to perform the criminal act. This is a continuum that does not support specific intent. The fact that a crime requires a greater mental state than recklessness does not mean that it is a specific intent crime, rather than a general intent crime. (People v. Rocha (1971) 3 Cal.3d 893, 898 [although assault cannot be committed recklessly, "[i]t does not follow, however, that assault with a deadly weapon should be classified as a specific intent crime"].) The fact that reckless burning is a lesser offense

## PEOPLE V. ATKINS (2001)

of arson is also not dispositive. For example, attempted rape, a specific intent crime, is a lesser included offense of rape, a general intent crime. (People v. Osband (1996) 13 Cal.4th 622, 685; People v. Kelly (1992) 1 Cal.4th 495, 526, 528.)

Arson's malice requirement ensures that the act is "done with a design to do an intentional wrongful act . . . without any legal justification, excuse or claim of right." (5 Am.Jur.2d (1995) Arson and Related Offenses, § 7.) Its willful and malice requirement ensures that the setting of the fire must be a deliberate and intentional act, as distinguished from an accidental or unintentional ignition or act of setting a fire; " 'in short, a fire of incendiary origin.' "(People v. Green, supra, 146 Cal.App.3d at p. 379; People v. Andrews, supra," 234 Cal.App.2d at p. 75; 5 Am.Jur.2d, supra, Arson and Related Offenses, § 7; accord, United States v. Doe, supra, 136 F.3d at p. 635.)" Because the offensive or dangerous character of the defendant's conduct, by virtue of its nature, contemplates such injury, a general criminal intent to commit the act suffices to establish the requisite mental state." (Cf. People v. Colantuono, supra, 7 Cal.4th at p. 215 [assault].) Thus, there must be a general intent to willfully commit the act of setting on fire under such circumstances that the direct, natural, and highly probable consequences would be the burning of the relevant structure or property. (See People v. Fry, supra, 19 Cal.App.4th at p. 1339; Perkins & Boyce, Criminal Law (3d ed. 1982) Arson, ch. 3, § 2, pp. 276-277; cf. People v. Rocha, supra, 3 Cal.3d at p. 899 [assault]; People v. Bohmer, supra, 46 Cal.App.3d at p. 190 [malicious placement of obstruction on railroad tracks].) On the other hand, the offense of unlawfully causing a fire covers reckless accidents or unintentional fires, which, by definition, is committed by a person who is "aware of and consciously disregards a substantial and unjustifiable risk that his or her act will set fire to, burn, or cause to burn a structure, forest land, or property." (§§ 450, subd. (f), 452.) For example, such reckless accidents or unintentional fires may include those caused by a person who recklessly lights a match near highly combustible materials.

Defendant argues that, because the Legislature expressly made voluntary intoxication inadmissible to negate the recklessness required for the lesser offense, but did not expressly do so for arson, it intended that voluntary intoxication evidence is admissible to negate the mental state of arson. We disagree. Unlawfully causing a fire was a new crime added by the 1979 recodification of arson. (Stats. 1979, ch. 145, §11, p. 339, adding Pen. Code, § 452; Review of Selected 1979 California Legislation (1980) 11 Pacific L.J. 412, 414.) The Legislature chose expressly to state its intent as to the new offense, one without an interpretative history. On the other hand, the Legislature did not redefine the basic definition of arson in the 1979 recodification; it retained the same "willful and malicious" language in section 451. The arson statutes, prior to the 1979 amendment (former §§ 447a, 448a, & 449a), had been construed generally as general intent crimes. (People v. Andrews, supra, "234 Cal.App.2d at pp. 74-75; see also People v. Tanner, supra, 95 Cal.App.3d at pp. 955-958; People v. Nance, supra, 25

### PEOPLE V. ATKINS (2001)

Cal.App.3d at p. 930; *People v. Williams*, supra, 19 Cal.App.3d at pp. 345-346; *People v. Woods* (1958) 157 Cal.App.2d 617, 621-623 [voluntary intoxication not a defense to malicious burning under former § 449a]; *People v. Mooney*, supra, 127 Cal. at p. 340 [the words "willfully" and "maliciously" "import only that criminal intent which is a necessary part of every felony or other crime"].) We had also previously held, prior to the 1979 amendment, that evidence of intoxication was admissible to negate a specific intent crime, but not a general intent crime. (*Hood*, supra, 1 Cal.3d at pp. 455-456.) "[W]hen the Legislature amends a statute without changing those portions of the statute that have previously been construed by the courts, the Legislature is presumed to have known of and to have acquiesced in the previous judicial construction." (*People v. Blakeley* (2000) 23 Cal.4th 82, 89; *People v. Weidert* (1985) 39 Cal.3d 836, 844.) Thus, we decline to infer an intent, which is contrary to the weight of legislative history, prior judicial interpretation, and statutory text, from legislative silence.

Defendant concedes that, prior to 1979, this court had not decided whether arson is a general or specific intent crime. Rather he argues that we indicated, in several cases, that arson required a specific intent. (*People v. Nichols* (1970) 3 Cal.3d 150, 163; *People v. Chavez* (1958) 50 Cal.2d 778, 789; *People v. Ashley* (1954) 42 Cal.2d 246, 264, fn. 4.) However, in *Nichols* and *Chavez*, we adopted the defendants' characterization of arson as including a specific intent requirement, without squarely addressing the issue. In addressing those defendants' instructional claims as they related to felony-murder arson, we assumed their underlying predicate arguments that arson included a specific intent, but nevertheless, concluded that the jury had been instructed properly. Although, at one point in *Nichols*, we referred to arson as containing a specific intent requirement (*Nichols*, supra, 3 Cal.3d at p. 163), our analysis suggested that arson was a general intent crime. (*Id.* at pp. 164-165 ["[I]n felony murder based on arson the jury need find only that the defendant intended to set the fire"]; see *Glover*, supra, 233 Cal.App.3d at p. 1481.) In *Ashley*, involving a grand theft conviction, we listed arson as a specific intent crime in dicta. (See *People v. Ashley*, supra, "42 Cal.2d at p. 264, fn. 4) Even if we accept defendant's claim that the law of arson was unsettled before the 1979 amendment, the salient fact is that the Legislature has retained the same basic definition of arson as willful and malicious since the 1929 recodification, when it omitted the specific intent requirement. We infer that if the Legislature meant for arson to have a specific intent requirement, it would have done so expressly.<sup>5</sup>

Defendant further argues that, because the mental state for arson, as with assault, can be characterized as general intent or specific intent, like *Hood*, the decision whether or not to give effect to evidence of intoxication must rest on policy considerations. (*Hood*, supra, 1 Cal.3d at pp. 457-458.) He emphasizes that, as a matter of policy, allowing intoxication evidence to negate the mental state element for arson would not necessarily result in complete acquittal, since a defendant could still be held

### PEOPLE V. ATKINS (2001)

accountable for a reckless burning, to which intoxication evidence is irrelevant. (§§ 452, 450, subd. (f); cf. *People v. Whitfield*, supra, 7 Cal.4th at p. 451.) However, as explained above, arson's mental state can be classified clearly as a general intent. In any event, policy considerations do not support defendant's claim. Although the policy consideration advanced by defendant may be valid, the policy considerations expressed in *Hood* itself appear to be more consistent with the legislative intent to exclude voluntary intoxication evidence from negating the mental state of arson. There, we stated:

"A compelling consideration is the effect of alcohol on human behavior. A significant effect of alcohol is to distort judgment and relax the controls on aggressive and anti-social impulses. (Beck and Parker, *The Intoxicated Offender - A Problem of Responsibility* (1966), 44 *Can. Bar Rev.* 563, 570-573; Muelberger, *Medico-Legal Aspects of Alcohol Intoxication* (1956), 35 *Mich. State Bar J.* 36, 40-41.) Alcohol apparently has less effect on the ability to engage in simple goal-directed behavior, although it may impair the efficiency of that behavior. In other words, a drunk man is capable of forming an intent to do something simple, such as strike another, unless he is so drunk that he has reached the stage of unconsciousness. What he is not as capable as a sober man of doing is exercising judgment about the social consequences of his acts or controlling his impulses toward anti-social acts. He is more likely to act rashly and impulsively and to be susceptible to passion and anger. It would therefore be anomalous to allow evidence of intoxication to relieve a man of responsibility for the crimes of assault with a deadly weapon or simple assault, which are so frequently committed in just such a manner. As the court said in *Parker v. United States* (D.C. Cir. 1966) 359 F.2d 1009, 1012-1013, 'Whatever ambiguities there may be in distinguishing between specific and general intent to determine whether drunkenness constitutes a defense, an offense of this nature is not one which requires an intent that is susceptible to negation through a showing of voluntary intoxication.' " (*Hood*, supra, 1 Cal.3d at p. 458.)

Later, in *People v. Rocha*, supra, 3 Cal.3d 893, we rejected a contention that assault with a deadly weapon is a specific intent crime. (*Id.* at pp. 898-899.) We based that conclusion on the legislative history of section 245, cases that have traditionally viewed assault as a general intent crime, and the *Hood* consideration that voluntary intoxication so naturally lends itself to the commission of assault. "Since alcohol is so often a factor inducing simple assaults . . . it would be anom[a]lous to permit exculpation because of intoxication." (*Rocha*, at p. 898.)

In arson, as with assault, there is generally no complex mental state, but only relatively simple impulsive behavior. A typical arson is almost never the product of pyromania (see *Leong*, *A Psychiatric Study of Persons Charged with Arson* (1992) 37 *J. Forensic Sci.* 1319, 1324; *Ritchie & Huff*, *Psychiatric Aspects of Arsonists* (1999) 44 *J. Forensic*

## PEOPLE V. ATKINS (2001)

Sci. 733, 738-739 (Ritchie & Huff); Räsänen et al., *The Mental State of Arsonists as Determined by Forensic Psychiatric Examinations* (1995) 23 Bull. Am. Acad. Psychiatry L. 547, 548 (Räsänen et al.)). Instead, "it often is an angry impulsive act, requiring no tools other than a match or lighter, and possibly a container of gasoline." (Ritchie & Huff, *supra*, 44 J. Forensic Sci. at p. 733.) "Arson is one of the easiest crimes to commit on the spur of the moment . . . it takes only seconds to light a match to a pile of clothes or a curtain." (Ibid.)

The apparent legislative policy concerns are consistent with studies that have shown the following: that revenge and vindictiveness are principal motives for arson (see, e.g., Ritchie & Huff, *supra*, 44 J. Forensic Sci. at p. 735; Leong & Silva, *Revisiting Arson from an Outpatient Forensic Perspective* (1999) 44 J. Forensic Sci. 558, 562); that there is a strong relationship between alcohol intoxication and arson (see, e.g., Räsänen et al., *supra*, 23 Bull. Am. Acad. Psychiatry L. at p. 549 [86 percent of arsonists intoxicated on alcohol during arson]; Ritchie & Huff, *supra*, 44 J. Forensic Sci. at p. 737 [55 percent of arsonists intoxicated on alcohol and more than 60 percent of arsonists under influence of some intoxicant during arson]; Koson & Dvoskin, *Arson: A Diagnostic Study* (1982) 10 Bull. Am. Acad. Psychiatry L. 39, 42-43 (Koson & Dvoskin) [57.7 percent of arsonists intoxicated on alcohol or drugs and alcohol during arson]); and that recidivist arsonists committing chronic or repetitive arson have high levels of alcohol dependence (see, e.g., Koson & Dvoskin, *supra*, 10 Bull. Am. Acad. Psychiatry L. at p. 47). Thus, the motivations for most arsons, the ease of its commission, and the strong connection with alcohol reflect the crime's impulsiveness. "It would therefore be anomalous to allow evidence of intoxication to relieve a man of responsibility for the crime[] of [arson], which [is] so frequently committed in just such a manner." (Hood, *supra*, 1 Cal.3d at p. 458.)

Relying on *Mendoza*, defendant argues that even if arson is a general intent crime, the mental state for arson is a "required specific intent" for purposes of section 22. (*People v. Mendoza*, *supra*, 18 Cal.4th at p. 1131.) In *Mendoza*, we held that the mental state for aider and abettor liability, which has intent and knowledge components, is a "required specific intent" for purposes of section 22, subdivision (b). (*People v. Mendoza*, *supra*, 18 Cal.4th at p. 1131.) An aider and abettor must " 'act with knowledge of the criminal purpose of the perpetrator and with an intent or purpose either of committing, or of encouraging or facilitating commission of, the offense.' " (Id. at p. 1123, original italics.) Although we concluded that the intent requirement for an aider and abettor fit the Hood definition of specific intent, we also recognized that knowledge did not expressly fall within section 22. (*Mendoza* at pp. 1129, 1131.)

*Mendoza* does not support defendant's position. An aider and abettor must intend not only the act of encouraging and facilitating, but also the additional criminal act the perpetrator commits. (*People v. Mendoza*, *supra*, 18 Cal.4th at p. 1129.) Because the

### PEOPLE V. ATKINS (2001)

knowledge requirement was intimately entwined with intent, we concluded that it "is closely akin to Hood's definition of specific intent." (Id. at p. 1131.) On the other hand, the definition of arson does not refer to defendant's intent to do some further act or achieve some additional consequence. Moreover, our holding in Mendoza "is very narrow," limited to admission of evidence of intoxication solely on the question of aider and abettor liability. (Id. at p. 1133.) Finally, we reject defendant's argument that the withholding of voluntary intoxication evidence to negate the mental state of arson violates his due process rights by denying him the opportunity to prove he did not possess the required mental state. (*Montana v. Egelhoff* (1996) 518 U.S. 37, 39-40, 56.)

#### **Conclusion**

We reverse the judgment of the Court of Appeal and remand the case to the Court of Appeal for further proceedings consistent with this opinion. George, C.J., Kennard, J., Baxter, J., and Werdegar, J., concurred.

#### **Concurring**

Mosk, J.- I concur in the result.

I join in the majority's conclusion that evidence of voluntary intoxication is inadmissible to disprove the mental state required for the crime of arson. But I cannot join in the analysis that they present in support. The admissibility of evidence of voluntary intoxication to disprove the mental state required for a crime does not depend, ultimately, on relevance. Such evidence has a tendency in reason, either greater or lesser, to disprove any mental state. (See Evidence Code §210.) Some mental state, if only consciousness, is required for every crime, even one termed a "strict liability" offense. (See Pen. Code, § 26, par. Four.)

Rather, the admissibility of evidence of voluntary intoxication to disprove the mental state required for a crime depends, ultimately, on policy--specifically, as we explained in *People v. Hood* (1969) 1 Cal.3d 444, the policy of the Legislature, implicit in section 22 of the Penal Code, to "achieve" a "humane, but workable," "compromise between the conflicting feelings of sympathy and reprobation for the intoxicated offender" (*People v. Hood*, supra, 1 Cal.3d at p. 456).

In implementing the legislative policy on voluntary intoxication, we use the notions of general intent and specific intent.

"General intent" and "specific intent" have "evolved as labels to identify" particular crimes, with "specific intent" crimes allowing the admission of evidence of voluntary intoxication to disprove the required mental element and "general intent" crimes not doing so. (*People v. Sargent* (1999) 19 Cal.4th 1206, 1228 (conc. opn. of Mosk, J.); accord, *People v. Cain* (1995) 10 Cal.4th 1, 83 (conc. opn. of Mosk, J.); *People v. Hood*, supra, 1 Cal.3d at pp. 455-457; see *People v. Whitfield* (1994) 7 Cal.4th 437, 463

## PEOPLE V. ATKINS (2001)

(conc. and dis. opn. of Mosk, J.)

Pursuant to the accepted rule of thumb, "[g]eneral intent' has usually been affixed if the mental element of" a crime "entails only an intent to engage in certain proscribed conduct." (People v. Sargent, supra, 19 Cal.4th at p. 1228 (conc. opn. of Mosk, J.); accord, People v. Hood, supra, 1 Cal.3d at pp. 456-457.) "In contrast, 'specific intent' has usually been affixed if the mental element of" a crime "entails an intent to engage in certain proscribed conduct for the purpose of bringing about, or allowing, a certain proscribed result." (People v. Sargent, supra, 19 Cal.4th at p. 1228 (conc. opn. of Mosk, J.); accord, People v. Hood, supra, 1 Cal.3d at p. 457.)

But even if "specific intent" could be affixed to a given crime in accordance with this rule of thumb, "general intent" must be affixed instead if the crime in question is itself closely linked to voluntary intoxication in its commission. (See People v. Hood, supra, 1 Cal.3d at p. 458.)

### Let Us Turn to the Crime of Arson:

"A person is guilty of arson when he . . . willfully and maliciously sets fire to or burns or causes to be burned . . . any structure, forest land, or property." (Pen. Code, § 451.) The perpetrator acts "willfully" when he acts with a "purpose or willingness to commit the act . . . referred to." (Id., §7, item 1.) The perpetrator acts "maliciously" when he acts with a "wish to vex, defraud, annoy, or injure another person" or with an "intent to do" any other "wrongful act." (Id., § 450, subd. (e).)

Thus, the crime of arson requires a mental state with two components. In its first component, arson requires that the perpetrator act with the "purpose" or "willingness" (Pen. Code, §7, item 1) to "set fire to" a "structure, forest land, or property," to "burn" any such object, or to "cause" it "to be burned" (id., § 451). Apparently, the perpetrator's intent need not be resultative, in the sense of aiming to burn down an indicated object.<sup>6</sup> But it must be inceptive, in the sense of aiming to start a fire. In its second component, arson requires that the perpetrator act for the purpose of "do[ing]" any other "wrongful act," including "vex[ing], defraud[ing], annoy[ing], or injur[ing] another person." (Pen. Code, §450, subd. (e).)

It follows that the mental state required for the crime of arson could readily be deemed to be one of specific intent--namely, an intent to engage in certain proscribed conduct, that is, setting fire to an indicated object, burning it, or causing it to be burned, for the purpose of bringing about, or allowing, a certain proscribed result, that is, any other wrong, including vexation, fraud, annoyance, or injury to another person.

But, even though "specific intent" could be affixed to the crime of arson, "general intent" should be affixed instead. That is because arson is itself closely, indeed very closely, linked to voluntary intoxication in its commission--voluntary intoxication attending arson more often, and perhaps far more often, than not. (See, e.g., Ritchie & Huff, Psychiatric

## PEOPLE V. ATKINS (2001)

Aspects of Arsonists (1999) 44 J. Forensic Sci. 733, 737; Räsänen et al., The Mental State of Arsonists as Determined by Forensic Psychiatric Examinations (1995) 23 Bull. Am. Acad. Psychiatry L. 547, 549; Koson & Dvoskin, Arson: A Diagnostic Study (1982) 10 Bull. Am. Acad. Psychiatry L. 39, 42-43.) "It would therefore be anomalous," in Hood's words, "to allow evidence of [voluntary] intoxication to relieve a man of responsibility for" arson, which is "so frequently committed in just such a manner." (People v. Hood, supra, 1 Cal.3d at p. 458.)

Although they apparently recognize that "general intent" should be affixed to the crime of arson because arson is itself closely linked to voluntary intoxication in its commission, the majority deny that the mental state required could readily be deemed to be one of specific intent. Their denial is inexplicable. It is also incorrect. They seem to rest on the premise that the perpetrator's intent must be inceptive, aiming to start a fire, and apparently need not be resultative, aiming to burn down an indicated object. Even if their premise is sound, it gives them no aid. For, even if the perpetrator's intent must be inceptive rather than resultative, the required mental state could readily be deemed to be one of specific intent--again, an intent to engage in proscribed conduct involving setting fire to an indicated object, burning it, or causing it to be burned, for the purpose of bringing about, or allowing, a proscribed result involving any other wrong, including vexation, fraud, annoyance, or injury to another person. At the end of the day, all that the majority has to justify their denial seems to be an assumption that the perpetrator's intent must be resultative rather than inceptive. Hood itself is plain: "When" a crime "refers to" the perpetrator's "intent to do some further act or achieve some additional consequence" beyond the "description of a particular act," the "crime is deemed to be one of specific intent." (People v. Hood, supra, 1 Cal.3d at pp. 456, 457, italics added.) The majority's assumption is that, beyond referring to the perpetrator's setting fire to an indicated object, burning it, or causing it to be burned, arson must refer to an intent on his part to achieve a particular additional consequence, that is, to burn the object down, as opposed to doing any other wrong, including vexation, fraud, annoyance, or injury to another person. Their assumption is unsupported. Hence, it falls of its own weight.

In sum, although I cannot join in the majority's analysis, I do indeed join in their conclusion that evidence of voluntary intoxication is inadmissible to disprove the mental state required for the crime of arson. Because I do so, I concur in the result.

### Concurring

Brown, J.- I concur in the determination that arson is a general intent crime precluding a defense of voluntary intoxication. I write separately because I remain convinced People v. Mendoza (1998) 18 Cal.4th 1114 (Mendoza) was wrongly decided (see id. at pp. 1138-1141 (dis. opn. of Brown, J.)) and, as this case illustrates, will continue to wreak havoc in the lower courts for years to come.

In finding arson to be a specific intent crime, the Court of Appeal initially cited its own

### PEOPLE V. ATKINS (2001)

decisions in re Stonewall F. (1989) 208 Cal.App.3d 1054 and People v. Fabris (1995) 31 Cal.App.4th 685; but it substantially bolstered this conclusion by drawing heavily on Mendoza, supra, 18 Cal.4th at pages 1126-1132, as well as People v. Whitfield (1994) 7 Cal.4th 437-on which the Mendoza court principally relied-and People v. Reyes (1997) 52 Cal.App.4th 975-which it cited with approval. The common thread of these cases is the transmutation of a knowledge requirement into a specific intent: Thus, the Mendoza court explained that "although knowledge 'may not fall literally within the Hood formulation of specific intent, the element [of aiding and abetting liability] that requires that the defendant act with knowledge of [the perpetrator's criminal intent] is closely akin to Hood's definition of specific intent, which requires proof that the defendant acted with a specific and particularly culpable mental state.' [Citations.]" (Mendoza, at p. 1131, quoting Whitfield, at p. 450, and citing Reyes, at pp. 982-986.) From this kernel and its analysis of Whitfield and Reyes, the Court of Appeal extracted the essential support for its earlier determination that voluntary intoxication is a defense to arson.

Unconvincingly, in my view, the majority attempts to distinguish Mendoza. (Maj. opn., ante, at pp. 20-21.) Consistent with the reasoning in my dissent, I anticipate this effort will likely cause more confusion than clarification by reinforcing the fundamental analytical error of Mendoza, which was to step outside the terms of Penal Code section 22 without a principled basis for doing so.

- 1 All further undesignated statutory references are to the Penal Code.
- 2 The trial court defined arson, in the language of CALJIC No. 14.80, as follows: "Any person who willfully and maliciously sets fire to or burns or causes to be burned any forest land is guilty of arson in violation of [section 451, subdivision (c)]. [¶] The word 'willfully' means intentionally. The word 'maliciously' means with a wish to vex, annoy, or injure another person, or with an intent to do a wrongful act. [¶] In order to prove this crime, each of the following elements must be proved: [¶] [1.] A person set fire to or burned or caused to be burned a forestland and [¶] [2.] The fire was set or burning was done willfully and maliciously."
- 3 As with Stonewall F., the defendant in Fry did not directly set fire to the relevant structure. In Fry, the defendant, while drunk and angry at his girlfriend, set fire to four vehicles, and the fire in one vehicle damaged the carport it was parked in. He was convicted of one count of arson of a structure and four counts of arson of a vehicle. Because there was substantial evidence that he willfully and maliciously set fire to a car, and his conduct actually and proximately caused the carport to be burned, Fry held there was substantial evidence to support the conviction for arson of a structure. It stated, "The [trial] court's comments that defendant did not specifically intend for the carport to burn are of no legal import on the issue of guilt." (People v. Fry, supra, 19 Cal.App.4th at p. 1339.)
- 4 Before the 1979 recodification, the term "maliciously" was defined in section 7, subdivision 4.
- 5 To the extent that Stonewall F., supra, 208 Cal.App.3d 1054, and Fabris, supra, 31 Cal.App.4th 685, are inconsistent with this opinion, we disapprove these decisions.
- 6 The crime of arson was formerly defined in language requiring that the perpetrator act with the "intent to destroy." (E.g., Pen. Code, former § 447, enacted 1872 and repealed Stats. 1929, ch. 25, § 6, p. 47.) It is not now so defined.

### Group Activity 7-1: What's the Code Section?

**Time Frame:** 0:15

**Materials Needed:**

- Arson law scenarios (one for each student)
- Pen or pencil

**Introduction:** This activity provides the students the opportunity to apply the appropriate arson or fire related laws.

**Directions:**

1. In your group, read and answer each scenario.
2. You will have 5 minutes to complete this part of the activity.
3. Select a spokesperson for your group
4. When asked by the instructor, read the scenario aloud, followed by your group's answer.
5. Be prepared to discuss your group's answer with the instructor and class.



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination



Topic 7: Arson Law

1. Fire fighters arrive to find a fully-involved interior of an older model vehicle in the backyard of Mr. Barns' residence. Fire has gutted the interior of vehicle and has extended from the vehicle to include charring of the neighbor's wooden fence. A check of the registered owner shows that Mr. Barns owns the vehicle outright, has no insurance coverage, and the vehicle has a nonoperative status. He's been issued a correction notice to get rid of the debris accumulated on his property, including this old vehicle. Mr. Barns claims he does not know how the fire started, although he smells of gasoline and has singeing to his eyebrows and the hair on his head and hands.

What CPC section(s) would best describe this scenario? \_\_\_\_\_

2. As an investigator, you are called out to a business where the owner has found the rear door of his business broken and in an open position. Inside, he has found three 1-gallon containers of gasoline with wadded newspaper strung between the containers.

What CPC section(s) would best describe this scenario? \_\_\_\_\_

3. As an investigator, you are called out to a business where the owner has found the rear door of his business broken and in an open position. Inside, he has found three 1-gallon containers of gasoline with wadded newspaper near the rear door that shows signs of charring and burning itself out.

What CPC section(s) would best describe this scenario? \_\_\_\_\_

4. You have responded to a vegetation fire where the area of origin is located adjacent to a newly installed wrought iron fence. A welder states that he was welding on a fence panel when he noticed the field next to him was on fire.

What CPC section(s) would best describe this scenario? \_\_\_\_\_

5. A traffic stop has been made on a vehicle in a wildland high hazard area known to be frequented by would-be arsonists. A search of the vehicle has turned up several "cigarette-match" time-delay devices.

What CPC section(s) would best describe this scenario? \_\_\_\_\_



### Individual and Group Activity 8-1: Scene Sketching

**Time:** 1:30

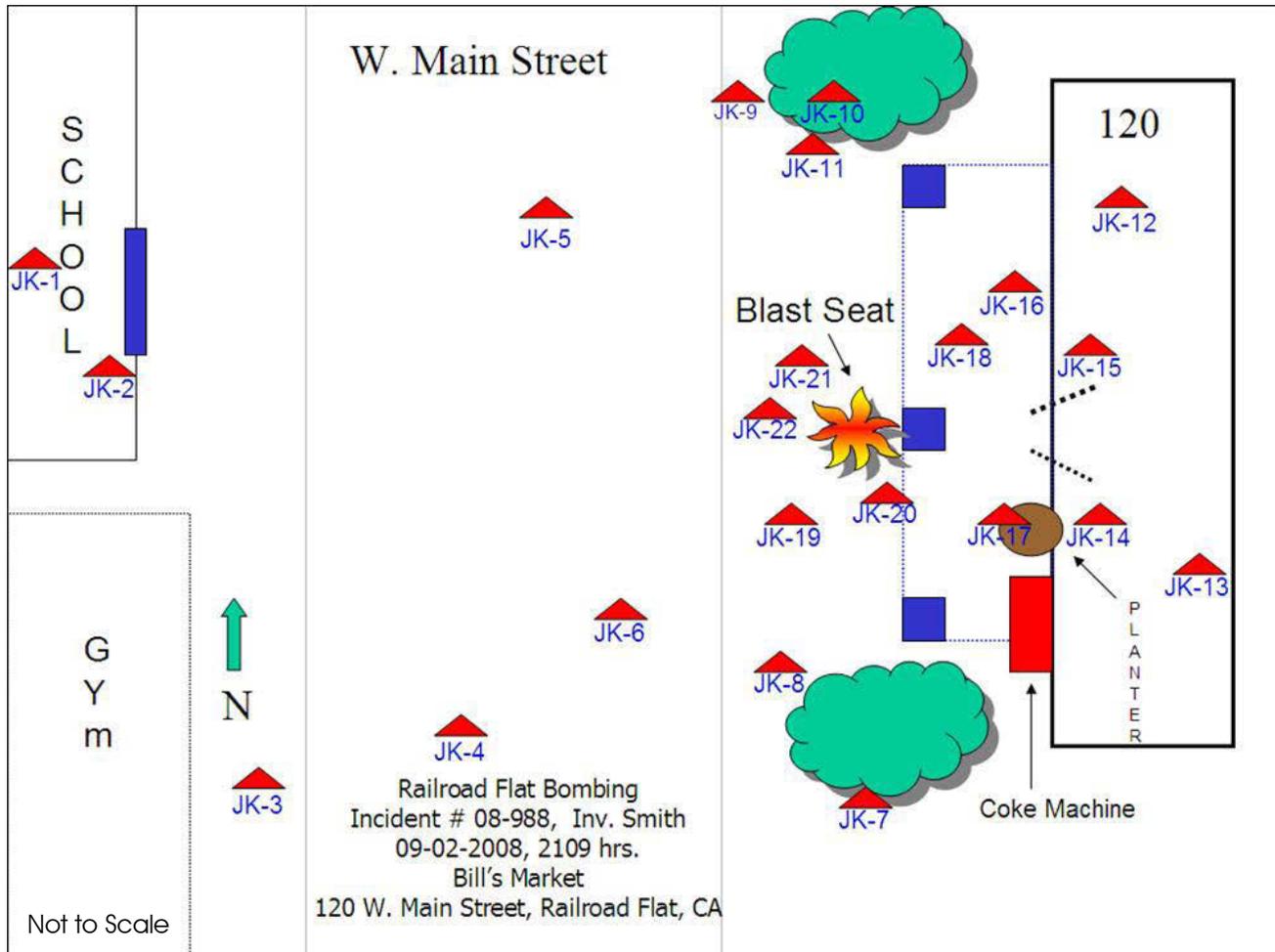
**Materials Needed:**

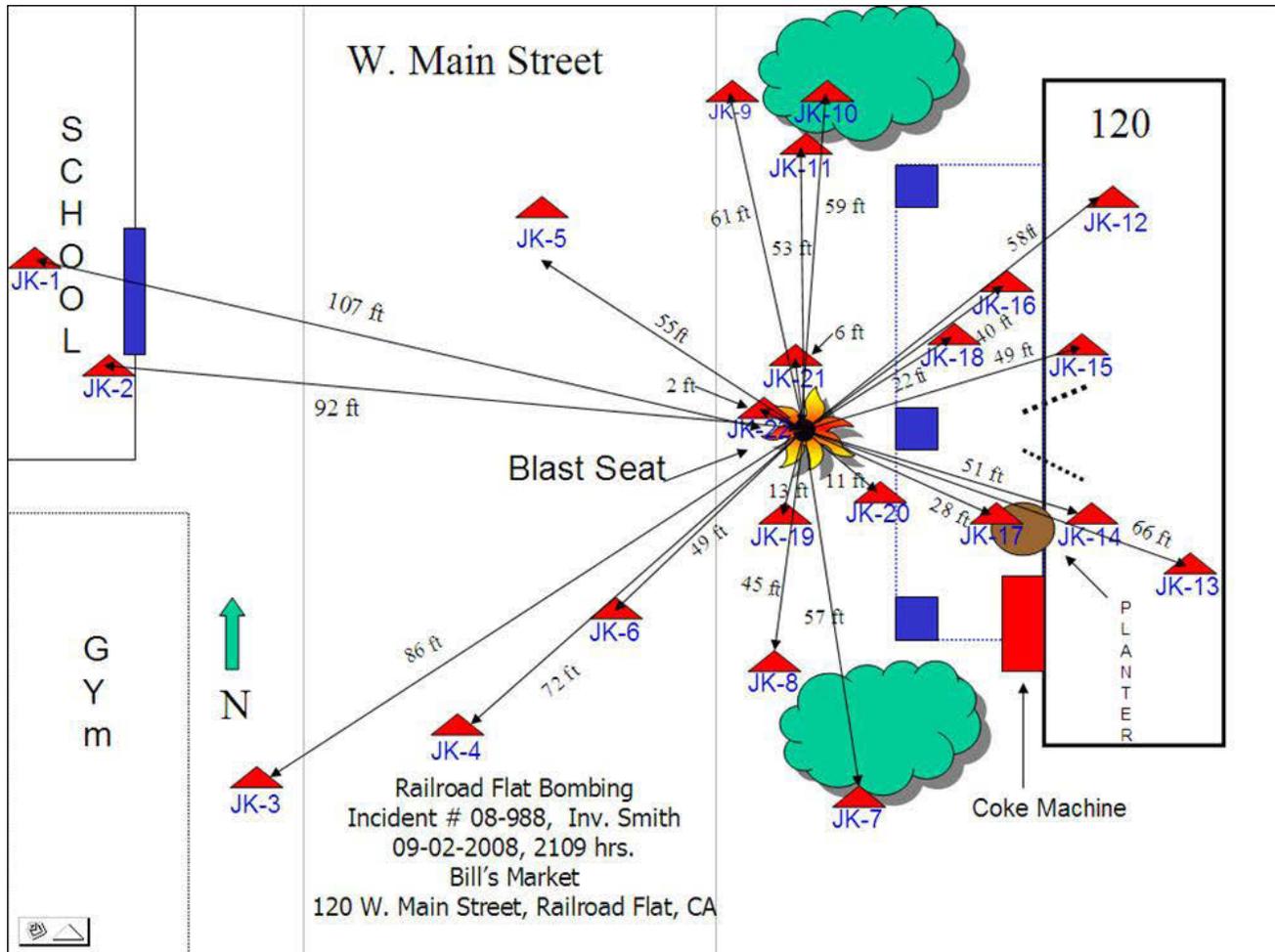
- Evidence
- Clipboard and paper or notepad
- Pen or pencil
- Conference board/pads with markers/erasers

**Introduction:** This activity provides you the opportunity to demonstrate the accurate skills of documenting evidence by completing a sketch.

**Directions:**

1. The instructor will divide the class into teams.
2. Each team will be assigned evidence.
3. Each member will individually sketch the evidence and surrounding location.
4. Accurately document its location in relation to the environment.
5. The following information must be included within the sketch:
  - a. Location
  - b. Date
  - c. Signature
  - d. Measurements
6. You have 45 minutes to complete this portion of the activity.
7. Review each team member's sketch and select the best one.
8. The team member whose sketch was selected will transfer his or her sketch to a conference board or pad.
9. You have 15 minutes for this portion of the activity.
10. Be prepared to present your team's sketch to the class.
11. At the end of this activity, submit your individual sketch to the instructor.





Not to Scale



### Group Activity 9-1: Burn Pattern Indicators (Option 1)

**Time:** 0:30

**Materials Needed:**

- Conference pad
- Marking pens

**Introduction:** This activity provides you the opportunity to determine the fire's point of origin by identifying burn pattern indicators for direction of fire travel.

**Directions:**

1. Select a scribe and a spokesperson for your team.
2. Review the first scenario photo and look for indicators of fire progression.
3. The scribe will write your team's list of indicators onto a conference pad for that photo.
4. The spokesperson will present your team's list to the class.
5. Proceed through each slide using the steps above until your team has identified the point of origin.

### Group Activity 9-1: Burn Pattern Indicators (Option 2)

**Time:** 0:30

**Materials Needed:**

- Copies of the fire scene scenario photographs (one set per team)
- Conference pad
- Marking pens

**Introduction:** This activity provides you the opportunity to determine the fire's point of origin by identifying burn pattern indicators for direction of fire travel.

**Directions:**

1. Select a scribe and a spokesperson for your team.
2. Review the first scenario photograph and look for indicators of fire progression.
3. The scribe will write your team's list of indicators onto a conference pad for that photo.
4. The spokesperson will present your team's list to the class.
5. Proceed through each photograph using the steps above until your team has identified the point of origin.





## Topic 12: Electrical Ignition Sources

Student information for this topic can also be found in NFPA 921: Guide to Fire and Explosive Investigations, 2008 Edition, Chapter 8: Electricity and Fire, Pages 921-66 through 921-90, Sections 8.1-8.12.8.5 and Chapter 24: Appliances, Pages 921-205 through 921-208.

### Excerpt from the Investigation & Prosecution of Arson

*By the California District Attorney's Association in cooperation with the California State Fire Marshal's Office*

#### THE INVESTIGATION & PROSECUTION OF ARSON

##### ELECTRICITY AND FIRE

##### CHAPTER IX

##### Watts Consumed by Common Devices

The following table should at times prove handy to estimate the amount of power required or the operating cost for various appliances. The figures are approximate, since different manufacturers make the same appliances with different power consumptions.

Air conditioner, room-type	800 - 1,500
Blanket, electric	150 - 200
Blender, food	500 - 1,000
Clock	2 - 3
Coffee maker (percolator)	500 - 1,000
Dishwasher	1,200 - 1,800
Dryer, clothes	4,000 - 5,000
Fan, portable	50 - 200
Food mixer	120 - 250
Freezer, household	300 - 500
Fryer, deep-fat	1,000 - 1,650
Frying pan	1,000 - 1,200
Garbage disposal unit	500 - 800
Hair dryer	350 - 1,000
Heat lamp (infrared)	250
Heater, portable, household	500 - 1,500
Heater, wall-type, permanently installed	1,000 - 2,500
Heating pad	50 - 75
Hot plate, per burner	600 - 1,000
Iron, hand (steam or dry)	660 - 1,200
Knife, electric	100
Lamps, fluorescent, residential	15 - 60
Lamps, incandescent	10 Upward
Lights, Christmas tree	30 - 150
Motor: 1/4 hp	300 - 400

### THE INVESTIGATION & PROSECUTION OF ARSON

Motor: 1/2 hp	450 – 600
Motor: Over 1/2 hp	950 - 1,000
Projector, slide or movie	300 - 1,000
Radio	40 – 150
Range (all burners/oven "on")	8,000 - 14,000
Range oven (separate)	4,000 - 5,000
Range top (separate)	4,000 - 6,000
Razor	8 – 12
Refrigerator, household	150 – 300
Roaster	1,000 - 1,650
Rotisserie (broiler)	1,200 - 1,650
Sewing machine	60 – 90
Sun lamp (ultraviolet)	275 – 400
Television	200 – 350
Toaster	500 - 1,200
Vacuum cleaner	500 - 1,500
Waffle iron	600 - 1,000
Washer, automatic	600 – 800
Washing machine	350 – 550
Water heaters	2,000 - 5,000

#### Symbols

#### **Insulation**

T	Plastic insulation
TW	Plastic insulation, moisture resistant
THW	Plastic insulation, moisture, and heat resistant
R	Rubber insulation
RH	Rubber insulation, heat resistant
RW	Rubber insulation, moisture resistant
RHW	Rubber insulation, moisture, and heat resistant

#### **Cables**

NM	Nonmetallic sheathed cable ("Romex")
MNC	Nonmetallic sheathed cable, moisture resistant
AC	Metallic sheathed cable (BX cable)
STP	Lamp cord (zip cord) (plastic)
SP	Lamp cord (zip cord) (rubber)
SJ	Heavy portable cable
S	Extra heavy portable cable
SV	Extension cord cable (vacuum cleaner)
SO	Similar to S but neoprene oil resistant
SJO	Similar to SJ but neoprene oil resistant
HPD	Heat resistant (asbestos)
HPN	Heat resistant (not asbestos)

### THE INVESTIGATION & PROSECUTION OF ARSON

#### Miscellaneous

EMT                      Electrical metallic tubing (thin wall conduit)  
Greenfield              Flexible metallic conduit

#### Color Codes

Wires usually have colored insulation that generally follows a code:

<u>Color</u>	<u>Meaning</u>
Black	"Hot"
White	Neutral
Green (or bare)	Grounding conductor

Other colors are additional "hot" wires.

#### Current-Carrying Capabilities

The current-carrying capability of wires is usually conservatively rated. The fusion current is in the order of ten times the rated current.

#### *Ampacity of Copper Wires*

Wire Size	In Conduit, Cable, or Buried Directly in the Earth		Single Conductors in Free Air		
	Types: T, TW	Types: RH, RHW, THW	Types: T, TW	Types: RH, RHW, THW	Weatherproof
	A	B	C	D	E
14	15	15	20	20	30
12	20	20	25	25	40
10	30	30	40	40	55
8	40	45	55	65	70
6	55	65	80	95	100
4	70	85	105	125	130
2	95	115	140	170	175
1/0	125	150	195	230	235
2/0	145	175	225	265	275
3/0	165	200	260	310	320

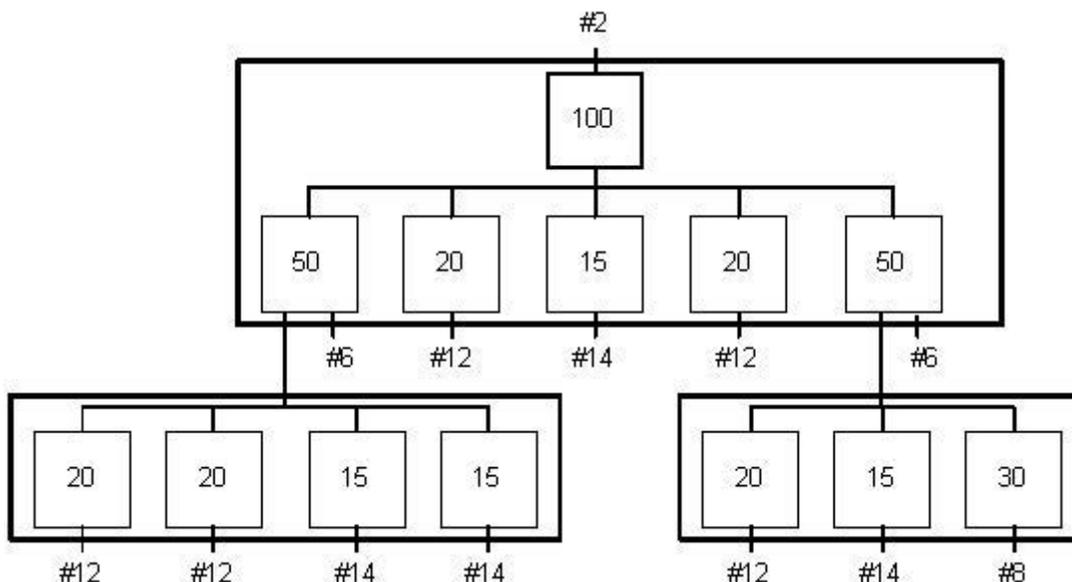
Even doubling the rated current will generally only raise the temperature to where it will feel warm to the touch. The mere finding of a slightly larger fuse, such as a 20-ampere size when a 15 is proper, is probably not indicative of a fire cause. Over an extended period of time, it is possible for the insulation to degrade if the current is slightly in excess and, therefore, the listed rating should be adhered to.

Also, heat generated in a conductor is uniform per unit length, provided that the entire conduct is the same size throughout the circuit. Where overcurrent is suspected as the fire cause, the wiring on the same circuit in an unburned location should be examined. If the wire's unburned area were in good condition, it would indicate that the current was not excessive in the questioned area.

### THE INVESTIGATION & PROSECUTION OF ARSON

#### Service Entrance

The service entrance, the point where connection to the utility company is made, usually contains the electric meter, disconnecting means, and overcurrent protection devices. In



addition, the system ground is made at this point. It is important for the fire investigator to become familiar with the fundamentals of wiring methods and especially the service entrance, since this is the basic electricity distribution center.

The breaker sizes (or fuses) are identified by size. Also, the required wire sizes are shown. Each breaker is selected to protect the circuit supplies from overloads. Therefore, 50 ampere breakers must be wired to #6 copper conductors (or larger), 20 ampere to #12 and so on. The usual appliance circuit is wired with #12 wire to a 20-ampere breaker. Small appliances and lamps are frequently supplied with #18 cords that are rated at 5 amperes. When failure occurs to these cords, they are not protected by the 20 ampere breaker, since four times their rated current must pass (sufficient to cause ignition by overcurrent) before the breaker is even passing its normal rated current.

Frequently breakers or fuses are found functioned after a fire. This can serve as a guideline in locating a possible point for investigation of possible electrical failure. However, one must also be sure of the time coordination of the protective device.

#### Time Coordination - Blackouts

An example of time coordination is possible using the preceding diagram. Consider an arc welder being in use on the 30-ampere circuit shown. In welding, sometimes a short circuit is accidentally caused. When this happens, the current can be over 100 amperes. In this situation the 30, 50, and/or 100-ampere breakers can trip. If only one trips, it is the fastest operating breaker. Therefore, any circuit supplied by a particular breaker, even if it is supplied by a

### THE INVESTIGATION & PROSECUTION OF ARSON

second smaller breaker, could be questioned. The term for such a conductor is a "blackout." Blackouts are the result of improper selection of the overcurrent protective devices. A blackout can occur when other circuits in addition to the faulty one are interrupted. Frequently the entire system is shut down when the main protective device needlessly opens before a branch or feeder protective device can clear an overcurrent.

The needless opening of feeder and main protective devices, because of a branch circuit fault, can be averted by selecting overcurrent protective devices that can be selectively coordinated with one another. Selectively coordinated systems assure that the nearest overcurrent protective device to the fault will clear the overcurrent before any of the larger upstream overcurrent protective devices begin to open. Rightfully, only the faulted circuit is removed from the system by the nearest protective device, while the rest of the system remains energized.

It is difficult to provide anything more than this caution due to the wide variety of protective devices in use. Before ruling out certain circuits, the investigator should consider the time coordination conditions and insure that the "obvious" circuit is really the faulty one.

#### Contact Resistance

In order to act as an ignition source, whether it be by overcurrent, sparks or arcs, there must be a flow of current. An electric circuit having voltage supplied to it but no current flow will not cause ignition. When current flows through a circuit, heat is produced throughout in proportion to the resistance at any particular point. The current flow through a circuit is inversely proportioned to the resistance: the greater the resistance, the less current flow. The total resistance of a circuit determines the current flow (at a certain voltage) and thus the total rate of heat production (watts). The distribution of the resistance throughout the circuit determines where the heat will be concentrated. The points of high resistance can be where a portion of the conductor size is smaller (as discussed previously). It can be where the conductor material is different (as in an electric heater) or at connection points (ends) where poor electrical contact or splices are made. Good practice calls for the latter to be made in protective enclosures (i.e., Romex can be used inside walls but boxes must be used at the ends).

In order to minimize heat build-up at connections, the following is mandatory:

- The full cross-sectional area of the conductor must be maintained.
- Positive contact of the conductors must be maintained. This means that no oxide or other films or foreign material may appear between the conductors.

An example of heat build-up in the first case would be the use of the inexpensive "zip" cord plugs that are installed by merely pushing the cord into a slot in the opened plug and then pushing it back together. The connection to the wire is made by needle-like points being pushed through the insulation and into the conductor. The cross-sectional area is diminished at this point and, if used for anything other than perhaps a clock or small lamp, excessive heating can occur. Frequently, drapery covers, wall outlets, and contact to such a plug can cause ignition. An example of heat build up in the second case would be failure to maintain positive electrical connections such as loose screws, poorly soldered connections, and improper connection techniques -- this is especially true with aluminum wire.

#### Aluminum Wiring

Aluminum is being used for electrical conductors at an increasing frequency due to the spiraling

### THE INVESTIGATION & PROSECUTION OF ARSON

cost of copper. Due to its decreased conductivity, a larger-sized aluminum conductor is necessary than one of copper for a similar current flow. However, since aluminum is lighter, less conductor weight is required. Also, its cost per pound is considerably less than copper.

The major problem with aluminum is making mechanical connections. Troubles in aluminum wiring are found not in the wire span but at the ends where the connections are made. Unsatisfactory performance has resulted from direct substitution of aluminum for copper, while utilizing fittings, receptacles, switches, and other devices that were designed for copper wire. In addition, quality of workmanship is very important on the part of the installer.

As previously mentioned, the electrical conductivity of aluminum is somewhat less than copper. Aluminum wire should be two sizes larger (two smaller AWG. numbers) than its copper equivalent. Wire tables should be consulted for exact confirmation.

Aluminum is very chemically active. Exposed surfaces always have an oxide coating. This oxide film acts as an insulator and is a major problem in making electrical connections. Chemical preservation is usually applied when making connections, to minimize this oxide film formation.

The thermal expansion coefficient of aluminum differs from copper, and any combination of these two metals must make allowances for this. Connections that are tight at one temperature may be loose at another. Also, the continued tightening and loosening by changing temperature can result in a permanently loose connection.

Another problem, mainly with the early products, was cold flow. Aluminum creeps like putty when subjected to pressure, and it flows away from the pressure points, resulting in a poor connection.

The basic problem with aluminum wiring has been largely corrected by new aluminum alloys and connectors. The connectors, receptacles, and switches appear similar to their old counterparts, but the selection of materials and their design have hopefully corrected the problem. The devices acceptable for aluminum are so marked.

#### Sparks and Arcs

A spark can be defined as the flow of electric current through a gas. This can range from a minute spark discharge from walking on a dry carpet, to a bolt of lightning. Except for lightning, sparks usually encountered are of low power and do not normally cause any concern in the presence of most solids and heavy liquids.

An arc can be defined as a flow of electric current through a vapor--usually a metallic vapor. Such a vapor could be the cloud of metal vapor surrounding a welding electrode or copper vapor surrounding arcing wires.

Sparks and arcs are very hot--thousands of degrees. The temperature is very localized and nearby adjoining surfaces are generally much cooler.

When excessive current is passed through a conductor, its temperature rises to its melting point. For copper this is approximately 2,000°F. When the first melting occurs, the wire severs and an arc occurs momentarily. At this instant, a temperature of thousands of degrees occurs at the point of failure.

The smallest discernible sparks can easily ignite combustible gas or dust mixtures with explosive violence. An automobile spark plug will not ignite paper under normal circumstances

### THE INVESTIGATION & PROSECUTION OF ARSON

but will dependably ignite the propellant mixture in the cylinder. The amount of energy required to ignite such mixtures is very small.

In considering sparks and arcs as ignition causes, it is important to estimate just how much energy was available and, if possible, the magnitude of the discharge. Then the feasibility of such a source causing ignition of the surrounding materials should be considered.

As we have discussed earlier, the fire investigator should gain some knowledge of combustion theory before attempting to explain an electrical fire start. It must be kept in mind that even though sparks and arcs are very hot they only last for, at most, a few seconds and the melted metal residue do not sustain high temperatures over a lengthy period of time. Therefore, if an electrical spark or arc is suspected there should be lighter combustibles in the area of spark or arc that have been ignited by these means. Ordinary wood products, such as wall studs, would not be very susceptible to ignition during application of sparks or arcing since the heat produced would be absorbed into the wood.

#### Electronic Equipment

Early electronic equipment contained heat-producing tubes that operated at light bulb temperatures and could cause ignition if in contact with combustible materials. Unless properly maintained, this outdated equipment can exhibit frayed or worn-out power cords, improper fuses, and missing cover plates that were for the purpose of retaining failures that could be fire-sensitive. Modern electronic equipment utilizes solid-state devices that function generally at a lower temperature.

Some manufacturers have historically shown some laxity in providing proper overcurrent protection. Rectifiers have been known to fail, cause power transformers to overheat and cause the insulation to ignite for lack of a proper protective fuse or breaker. Speaker cones have been known to ignite from excess current passed through the voice coil because of a defective power transistor with no fuse protection. Most household electronic equipment is low-power apparatus, but situations do occur that have not been anticipated by the designer.

#### **Insulation**

Old wire is usually insulated with rubber or cloth material. Modern insulation for wires is plastic. Insulation condition can frequently be used as a guideline to indicate whether the heat was produced internally (overcurrent) or externally (by the fire). Rubber is degenerated by heat. When overcurrent is passed through rubber-covered wire, the internal heat can destruct the rubber so that afterwards the insulation remains loose and free to slide back and forth over the wire (sleeving effect). The situation is somewhat different with plastic insulation since the insulation softens when heated and then rehardens upon cooling. However, deformation, sagging, and discoloration generally accompany this. Also, bubbling sometimes occurs from gas formation from overheating the conductor. Bubbling is not as noticeable on rubber insulation due to the porosity that minimizes entrapment of gases. When in doubt, a test can be made on undamaged wire by passing current through it and observing the effect on the particular insulation.



## Group Activity 13-1: What Would I Look For?

**Time Frame:** 0:30

**Materials Needed:**

- Conference board/pads with markers/erasers

**Introduction:** This activity provides you the opportunity to study the materials and actions or idiosyncrasies used by people who intentionally and willfully promote or extend an unwanted fire.

**Directions:**

1. Using the conference pads, your team will develop a list of as many indicators at a fire scene that may show there is possible incendiary activity.
2. Your team has 15 minutes to complete this portion of the activity.
3. Select a spokesperson for your team.
4. The spokesperson will present the team's list of indicators to the class for discussion.

## Topic 14: Incendiary Devices

Student information for this topic can also be found in NFPA 921: Guide to Fire and Explosive Investigations, NFPA, 2008 Edition, Chapter 22: Incendiary Fires, Page 921-185, Sections 22.2.4-22.2.7.3.2.

### Excerpts from the California Penal Code

#### **Section 453: Incendiary Devices**

- (a) Every person who possesses, manufactures, or disposes of any flammable, or combustible material or substance, or any incendiary device in an arrangement or preparation, with intent to willfully and maliciously use this material, substance, or device to set fire to or burn any structure, forest land, or property, shall be punished by imprisonment in the state prison, or in a county jail, not exceeding one year.
- (b) For the purposes of this section:
  - (1) "Disposes of" means to give, give away, loan, offer, offer for sale, sell, or transfer.
  - (2) "Incendiary device" means a device that is constructed or designed to start an incendiary fire by remote, delayed, or instant means, but no device commercially manufactured primarily for the purpose of illumination shall be deemed to be an incendiary device for the purposes of this section.
  - (3) "Incendiary fire" means a fire that is deliberately ignited under circumstances in which a person knows that the fire should not be ignited.
- (c) Subdivision (a) does not prohibit the authorized use or possession of any material, substance or device described therein by a member of the armed forces of the United States or by firemen, police officers, peace officers, or law enforcement officers authorized by the properly constituted authorities; nor does that subdivision prohibit the use or possession of any material, substance or device described therein when used solely for scientific research or educational purposes, or for disposal of brush under permit as provided for in Section 4494 of the Public Resources Code, or for any other lawful burning. Subdivision (a) does not prohibit the manufacture or disposal of an incendiary device for the parties or purposes described in this subdivision.

#### **Section 12301: Destructive Device Definitions**

- (a) The term "destructive device," as used in this chapter, shall include any of the following weapons:
  - (1) Any projectile containing any explosive or incendiary material or any other chemical substance, including, but not limited to, that which is commonly known as tracer or

incendiary ammunition, except tracer ammunition manufactured for use in shotguns.

- (2) Any bomb, grenade, explosive missile, or similar device or any launching device therefor.
- (3) Any weapon of a caliber greater than 0.60 caliber which fires fixed ammunition, or any ammunition therefor, other than a shotgun (smooth or rifled bore) conforming to the definition of a "destructive device" found in subsection (b) of Section 479.11 of Title 27 of the **Code** of Federal Regulations, shotgun ammunition (single projectile or shot), antique rifle, or an antique cannon.

For purposes of this section, the term "antique cannon" means any cannon manufactured before January 1, 1899, which has been rendered incapable of firing or for which ammunition is no longer manufactured in the United States and is not readily available in the ordinary channels of commercial trade. The term "antique rifle" means a firearm conforming to the definition of an "antique firearm" in Section 479.11 of Title 27 of the Code of Federal Regulations.

- (4) Any rocket, rocket-propelled projectile, or similar device of a diameter greater than 0.60 inch, or any launching device therefor, and any rocket, rocket-propelled projectile, or similar device containing any explosive or incendiary material or any other chemical substance, other than the propellant for that device, except those devices as are designed primarily for emergency or distress signaling purposes.
- (5) Any breakable container which contains a flammable liquid with a flashpoint of 150 degrees Fahrenheit or less and has a wick or similar device capable of being ignited, other than a device which is commercially manufactured primarily for the purpose of illumination.

**(5) Above is the California Penal Code definition of a Molotov Cocktail.**

- (6) Any sealed device containing dry ice (CO<sub>2</sub>) or other chemically reactive substances assembled for the purpose of causing an explosion by a chemical reaction.
- (b) The term "explosive," as used in this chapter, shall mean any explosive defined in Section 12000 of the Health and Safety Code.

### Excerpt from the Investigation & Prosecution of Arson

*By the California District Attorney's Association in cooperation with the California State Fire Marshal's Office*

#### THE INVESTIGATION & PROSECUTION OF ARSON

##### INCENDIARY DEVICES

##### CHAPTER XI

The most basic incendiary system consists of putting a lighted match to an easily combustible material. However, a simple match is not always effective. There are many important combustible targets that require far more heat for reliable ignition than is available from a match. There are also instances where delayed ignition is essential for the success of the fire.

Incendiary devices come in all shapes and sizes, and may be simple or elaborate in design. All have the same objective, to burn themselves or to set something else on fire. The degree of complexity of the devices is only limited by imagination and ingenuity. An incendiary device can be a simple match applied to a piece of paper, or a matchbook and cigarette arrangement, or a complicated self-igniting chemical device. Normally, an incendiary device is thought of as a material or mixture of materials, either liquid or powder, designed to produce enough heat and flame when used against combustible material to cause it to be self-sustaining once its ignition temperature has been reached. Another type of incendiary device is a compound mixture of metal powders used to produce intense heat for melting, cutting, or welding of metals.

Each device consists of three basic major components: the fuse (or initiator), the body (or container), and the filler (or incendiary material). The body will be either frangible or unbreakable, depending on its desired usage. A device employing the use of a flammable liquid will usually have a breakable container, while a device containing thermite material will be confined to nonbreakable, metal container.

The combination of matches and a cigarette is one of the most used and simplest incendiary devices. It can be assembled in several different ways. One of the most common methods is to place a cigarette horizontally, just along the tops of the heads of a book of matches. The distance that the end of the cigarette protrudes beyond the row of match heads measures the amount of delay time wanted by the arsonist. The cigarette is lit. As it burns, it eventually comes in contact with the matches, which in turn will burst into flames. The matches can be placed around the cigarette and wrapped with tape, rubber bands, string, or wire. The cigarette match device may be used with additional weight such as a nail, or placed in a bag weighted with rocks. This type of incendiary device is used in conjunction with any combustible or flammable materials, solid or liquid.

Candles have been in use by arsonists for over a century as a timed incendiary ignition device. A candle will burn at various rates, depending upon its composition and size. One way a candle may be used is to place it in an area of a readily combustible material, such as excelsior, stacked around the candle.

One of the simplest and safest incendiary devices to make and use is a paraffin wax/sawdust incendiary. Melted wax is combined with a quantity of sawdust and is allowed to cool in any desired shape. An effective way to use this mixture is to place it into a paper bag next to the

## THE INVESTIGATION & PROSECUTION OF ARSON

### INCENDIARY DEVICES

### CHAPTER XI

intended target. A match is used to ignite the paper bag, which in turn ignites the wax-sawdust mixture. The fire starts very slowly, taking about two or three minutes before the wax-sawdust mixture is burning strongly. This is a disadvantage where a hot flame is required quickly. Once it is started, this mixture burns vigorously because the paraffin itself gives off a fairly hot flame, while the sawdust acts like charcoal to increase the destructive effect. This material is very hard to detect as an incendiary after the fire is extinguished, especially if it has burned for an extended period of time.

Any wiring system, including doorbell and telephone circuits, can be used as a fire-setting tool. A wooden match may be affixed to the striking mechanism of a doorbell so that it comes in contact with an abrasive material, such as sandpaper, when the doorbell is rung. By using this ignition method in combination with flammable or combustible material or vapors, any unsuspecting person who may ring the doorbell could initiate the fire for the arsonist.

Almost all types of electrical heating appliances can be arranged in a manner in which they can come in contact with combustible materials in order to establish ignition after a period of time. They can also be tampered with in order to create a short circuit or overheating.

Water heaters are a very effective ignition source in areas where flammable substances are normally found. Gasoline or other flammable substances may be allowed to leak from storage containers, or even from automobile gasoline tanks inside a closed garage. Once the vapors from these substances reach the level of the pilot, or once the heater ignites, ignition is made and destruction is assured. Investigators should examine the storage containers for any sign of tampering, such as drill holes in the storage container. Hot water faucets left on within the home to provide a slow flow of water may give further evidence of this being an arson device. Where vehicles are involved, the investigator should look for punctures or signs of removal of clamps, fittings, and gas lines. The removal of road mud and other elements from the area of the leak should alert the investigator.

Usually, when the words "incendiary device" are mentioned, what comes to mind is the "Molotov Cocktail." A "Molotov Cocktail" is actually a destructive device under California Penal Code Section 12301. For it be classified as a destructive device, it must be constructed with breakable container filled with a flammable liquid that has a flashpoint of 150 degrees F or less, usually gasoline and is fitted with a wick or some other similar ignition device which ignites the contents upon impact or breakage. A variation of the straight gasoline "Molotov Cocktail" is the homemade Napalm or the "Poor Man's James Bond" type. In addition to the gasoline, powdered or liquid soap, rubber bands, or Styrofoam pellets can be addition to create a paste, thus allowing the gasoline to stick to a vertical surface causing the gasoline to burn for an extended time.

"Molotov Cocktails" are usually designed to be ignited in one of three ways. The most common method is with an open flame device, generally a match or lighter, applied to a cloth wick just prior to throwing the "Molotov Cocktails" at the intended target. A second method is with a time-delay device often consisting of a "Fuzee" taped to the side of the container, or a length of safety fuse and a nonelectric blasting cap attached to the container. This type of ignition device allows the bomber to place the device exactly where he wants it, and allows adequate time for

### THE INVESTIGATION & PROSECUTION OF ARSON

#### INCENDIARY DEVICES

#### CHAPTER XI

escape. The third and least detectable ignition source is the hypergolic/self-igniting method. Certain chemicals or compounds, when combined, tend to burst into flames and react with explosive violence. An example is a capped frangible container filled with gasoline and a mixture of concentrated sulfuric acid. On the outside of the container is attached a label coated with a dried solution of potassium chlorate and sugar. When the container is broken, the sulfuric acid reacts with the chlorate and sugar, resulting in instant ignition of the flammable liquid.

In order to charge the destructive device section under section 12301 of the California Penal Code, the following must be proved:

1. Breakable container
2. Wick or other means of ignition
3. Flammable liquid with a flashpoint of 150°F or less

Another type of incendiary device is a thermite incendiary. This device is used to cut and burn holes through metal objects. The container or body is nonfrangible. It is usually constructed of a crockery flowerpot or similar container with a hole in the bottom. The thermite is ignited by the use of a fuse and mixture of potassium chlorate and sugar. The resulting flame is high in intensity and short in duration. In arson-related fires in the Reno, Nevada, area, a copper oxide based mixture was discovered. This mixture was identified by trade names of "Cadweld" and "Thermoweld." These materials are available commercially, and are used for welding copper buss bars together in large-scale electrical applications. The material can be ignited by the use of an ordinary match. The resulting exothermic reaction produces temperatures in excess of 4,000°F.

Incendiary devices discovered prior to ignition must be handled only by experienced and trained explosive ordinance disposal or bomb squad personnel. Inexperienced handling of such devices can result in ignition.

Remainders of incendiary device material found at a crime scene should be taken as evidence and packaged properly. If the material is suspected of containing a hydrocarbon, it must be packaged in a clean, airtight metal or glass container as quickly as possible to prevent evaporation of the remaining volatile vapors. Pieces of glass, metals, or other material containing possible latent prints must be packaged in such a way as to avoid contact with the suspected surfaces. Any other suspected material found at the scene must be collected, protected from contamination, and submitted to the local crime lab for analysis.





# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 16: Vehicle Fire Investigation



### Topic 16: Vehicle Fire Investigation

Student information for this topic can also be found in NFPA 921: Guide to Fire and Explosive Investigations, NFPA, 2008 Edition, Chapter 25: Motor Vehicle Fires, Pages 921-208 through 921-223, Sections 25.1-25.15.2 and Annex A, Pages 921-266 and 921-267.

### Automobile Fire Investigation Checklist

DATE	LOCATION OF FIRE				
MAKE OF VEHICLE	YEAR	BODY TYPE	COLOR	LICENSE NUMBER	STATE
VEHICLE IDENTIFICATION #					
OPERATOR'S NAME		PHONE NUMBER	OPERATOR'S ADDRESS		
DRIVER'S LICENSE #	DATE OF BIRTH				
VEHICLE'S LEGAL OWNER		PHONE NUMBER	LEGAL OWNER'S ADDRESS		
VEHICLE'S REGISTERED OWNER		PHONE NUMBER	REGISTERED OWNER'S ADDRESS		
<b>EXAMINATION OF VEHICLE</b>					
<b>EXTERIOR CONDITION OF VEHICLE</b>					
	<b>FRONT</b>				
	CONDITION OF WINDSHIELD				
	<b>LEFT SIDE</b>				
	POSITION OF WINDOWS				
	POSITION OF DOORS				
	<b>REAR</b>				
	POSITION OF TRUNK LID/HATCHBACK				
	<b>RIGHT SIDE</b>				
	POSITION OF WINDOWS				



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 16: Vehicle Fire Investigation



### Automobile Fire Investigation Checklist

	POSITION OF DOORS
<b>ROOF</b>	
<b>HOOD</b>	
<b>INTERIOR CONDITION OF VEHICLE</b>	
	<b>TRUNK/REAR CARGO AREA</b>
	<b>REAR PASSENGER SIDE</b>
	DOOR PANEL
	SEAT(S)
	FLOOR
	<b>REAR DRIVER SIDE</b>
	DOOR PANEL
	SEAT(S)
	FLOOR
	<b>FRONT PASSENGER SIDE</b>
	DOOR PANEL
	SEAT(S)
	FLOOR
	<b>FRONT DRIVER SIDE</b>
	DOOR PANEL



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 16: Vehicle Fire Investigation



### Automobile Fire Investigation Checklist

SEAT(S)
FLOOR
<b>CEILING/HEAD LINER</b>
<b>DASH</b>
DRIVER SIDE
VIN NUMBER
IGNITION SWITCH
UNDERSIDE OF STEERING COLUMN
ODOMETER
PASSENGER SIDE
<b>ENGINE COMPARTMENT</b>
UNDERSIDE OF HOOD
OVERALL CONDITION
BULK HEAD (FIRE WALL) CONDITION
RADIATOR
INTERIOR SIDE
EXTERIOR SIDE
AIR CONDITIONING CONDENSER
BATTERY
POST
CABLES
POWER DISTRIBUTION CENTER
FUSES
ALTERNATOR
WIRING HARNESS
POWER STEERING PUMP AND RESERVOIR
MASTER CYLINDER
BRAKE FLUID LEVEL

### Automobile Fire Investigation Checklist

<b>FUEL COMPONENTS</b>	
FUEL LINES	
FUEL RAILS	
FUEL FILTER	
<b>POSITION OF DIP STICKS</b>	
OIL	
TRANSMISSION	
POWER STEERING	
<b>TIRES</b>	
CONDITION OF TIRES	
<b>UNDERSIDE OF VEHICLE</b>	
<b>REAR</b>	
SPARE TIRE	
FUEL TANK	
<b>PASSENGER COMPARTMENT</b>	
EXHAUST COMPONENTS	
<b>DRIVE TRAIN</b>	
ENGINE	
TRANSMISSION	
DRIVESHAFT	
<b>MISSING COMPONENTS</b>	



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 16: Vehicle Fire Investigation



### Vehicle Field Notes

CASE NUMBER:		VIN:	ODOMETER:
DATE OF INCIDENT:	TIME OF INCIDENT:	MAKE:	MODEL:
LOCATION OF INCIDENT:	LOCATION OF VEHICLE INVESTIGATION:	YEAR:	COLOR:
STOLEN? [ ] YES [ ] NO	ALARM SYSTEM? [ ] YES [ ] NO	LICENSE:	EXPIRATION:
KEYS ACCOUNTED FOR? [ ] YES [ ] NO	IGNITION SECURITY SYSTEM? [ ] YES [ ] NO	DATE OF MANUFACTURE:	
OWNER'S NAME:	CONTACT NUMBER:	ADDRESS:	
INSURANCE COMPANY:	CONTACT NUMBER:	AGENT'S NAME:	CLAIM NUMBER:
LAW ENFORCEMENT AGENCY:	CONTACT NUMBER:	OFFICER IN CHARGE:	INCIDENT NUMBER:
FIRE AGENCY:	CONTACT NUMBER:	OFFICER IN CHARGE:	INCIDENT NUMBER:

#### EXTERIOR CONDITION EXAMINATION

<b>GREATEST AREA OF DAMAGE</b>
--------------------------------

TIRES	TREAD DEPTH	LUGS	WHEELS
LEFT FRONT:		[ ] On [ ] Missing	[ ] OEM [ ] A/M* [ ] Missing
LEFT REAR:		[ ] On [ ] Missing	[ ] OEM [ ] A/M [ ] Missing
RIGHT FRONT:		[ ] On [ ] Missing	[ ] OEM [ ] A/M [ ] Missing
RIGHT REAR:		[ ] On [ ] Missing	[ ] OEM [ ] A/M [ ] Missing
SPARE TIRE:		[ ] Missing	

WINDOWS	GLASS	WINDOWS
LEFT FRONT:	[ ] Broken [ ] Intact	[ ] Up [ ] Down
LEFT REAR:	[ ] Broken [ ] Intact	[ ] Up [ ] Down
RIGHT FRONT:	[ ] Broken [ ] Intact	[ ] Up [ ] Down
RIGHT REAR:	[ ] Broken [ ] Intact	[ ] Up [ ] Down
WINDSHIELD:	[ ] Broken [ ] Intact	
REAR WINDOW:	[ ] Broken [ ] Intact	
LIFT GATE:	[ ] Broken [ ] Intact	[ ] Up [ ] Down
SUN ROOF:	[ ] Broken [ ] Intact	

DOORS	DOOR	POSITION
LEFT FRONT:	[ ] Locked [ ] Unlocked	[ ] Open [ ] Closed
LEFT REAR:	[ ] Locked [ ] Unlocked	[ ] Open [ ] Closed
RIGHT FRONT:	[ ] Locked [ ] Unlocked	[ ] Open [ ] Closed
RIGHT REAR:	[ ] Locked [ ] Unlocked	[ ] Open [ ] Closed
LIFT GATE:	[ ] Locked [ ] Unlocked	[ ] Open [ ] Closed
SUN ROOF:		[ ] Open [ ] Closed



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination



Topic 16: Vehicle Fire Investigation

### Vehicle Field Notes

BODY PANEL						DAMAGE						PRIOR DAMAGE					
FRONT BUMPER:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
GRILL:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
LEFT FRONT FENDER:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
LEFT QUARTER PANEL:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
REAR BUMPER:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
RIGHT FRONT FENDER:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
RIGHT QUARTER PANEL:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
HOOD:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
ROOF:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
TRUNK:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
FUEL CAP:		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
INTERIOR				POSITION				DEFEATED									
STEERING COLUMN:		<input type="checkbox"/> In Place		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> No			
IGNITION SWITCH:		<input type="checkbox"/> In Place		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> No			
STEREO and SPEAKERS:		<input type="checkbox"/> In Place		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> No			
FRONT SEATS:		<input type="checkbox"/> In Place		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> No			
REAR SEATS:		<input type="checkbox"/> In Place		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> No			
ACCESSORIES:		<input type="checkbox"/> In Place		<input type="checkbox"/> Missing		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> No			
ENGINE COMPARTMENT																	
GREATEST FIRE DAMAGE AREA:				<input type="checkbox"/> L/F Quad		<input type="checkbox"/> L/R Quad		<input type="checkbox"/> R/F Quad		<input type="checkbox"/> R/R Quad		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
LEAST FIRE DAMAGE AREA:				<input type="checkbox"/> Below Oil Pan		<input type="checkbox"/> Above Oil Pan		<input type="checkbox"/> Top Area Intake Manifold		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> No			
BATTERY:		Present? <input type="checkbox"/> Yes <input type="checkbox"/> No		Burned? <input type="checkbox"/> Yes <input type="checkbox"/> No		Electrical Activity? <input type="checkbox"/> Yes <input type="checkbox"/> No		Volt Test? <input type="checkbox"/> Yes <input type="checkbox"/> No		Test Results: _____ volts		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
ALTERNATOR:		Seized? <input type="checkbox"/> Yes <input type="checkbox"/> No		B+ Conductor: <input type="checkbox"/> Intact <input type="checkbox"/> TRH** <input type="checkbox"/> Arc		Location: <input type="checkbox"/> Left <input type="checkbox"/> Right <input type="checkbox"/> Front <input type="checkbox"/> Rear		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
STARTER:		Present? <input type="checkbox"/> Yes <input type="checkbox"/> No		B+ Conductor: <input type="checkbox"/> Intact <input type="checkbox"/> TRH <input type="checkbox"/> Arc		Location: <input type="checkbox"/> Left <input type="checkbox"/> Right <input type="checkbox"/> Front <input type="checkbox"/> Rear		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
POWER DISTRIBUTION CTR:		Burned? <input type="checkbox"/> Yes <input type="checkbox"/> No		B+ Conductor: <input type="checkbox"/> Intact <input type="checkbox"/> TRH <input type="checkbox"/> Arc		Location: <input type="checkbox"/> L/R <input type="checkbox"/> L/F <input type="checkbox"/> R/R <input type="checkbox"/> R/F		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
				Fuse Panel Diagram Attached? <input type="checkbox"/> Yes <input type="checkbox"/> No													
POWER STEERING RESERVOIR:		Burned? <input type="checkbox"/> Yes <input type="checkbox"/> No		Mechanical Line Damage? <input type="checkbox"/> Yes <input type="checkbox"/> No		Location: <input type="checkbox"/> Left <input type="checkbox"/> Right <input type="checkbox"/> Front <input type="checkbox"/> Rear		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
POWER STEERING LINE:		<input type="checkbox"/> Rubber <input type="checkbox"/> Steel Braid															
ENGINE OIL:		Full? <input type="checkbox"/> Yes <input type="checkbox"/> No		Sample Taken? <input type="checkbox"/> Yes <input type="checkbox"/> No		Water Present? <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
TRANSMISSION FLUID:		Present? <input type="checkbox"/> Yes <input type="checkbox"/> No		Sample Taken? <input type="checkbox"/> Yes <input type="checkbox"/> No		Internal Burn Odor? <input type="checkbox"/> Yes <input type="checkbox"/> No		Dipstick Position: <input type="checkbox"/> Seated <input type="checkbox"/> Extended		Dipstick Burn Pattern Present? <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Yes		<input type="checkbox"/> No			
FUEL LINES:		Connected? <input type="checkbox"/> Yes <input type="checkbox"/> No				Intact? <input type="checkbox"/> Yes <input type="checkbox"/> No											
FUEL TANK:		Present? <input type="checkbox"/> Yes <input type="checkbox"/> No				Burned? <input type="checkbox"/> Yes <input type="checkbox"/> No											
EXHAUST:		Burn Patterns? <input type="checkbox"/> Yes <input type="checkbox"/> No				Adjacent to Power Steering Line											
RADIATOR:		Burn Patterns? <input type="checkbox"/> Yes <input type="checkbox"/> No				Location: <input type="checkbox"/> Interior Side <input type="checkbox"/> Exterior Side											



# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination



Topic 16: Vehicle Fire Investigation

### Vehicle Field Notes

MASTER BRAKE CYLINDER:	Fire Damage? <input type="checkbox"/> Yes <input type="checkbox"/> No	Location: <input type="checkbox"/> L/R <input type="checkbox"/> L/F <input type="checkbox"/> R/R <input type="checkbox"/> R/F		
FORD SPEED CONTROL DEVICE SWITCH:	Recovered? <input type="checkbox"/> Yes <input type="checkbox"/> No			
	Driver's Side Front:	Driver's Side Rear:	Passenger's Side Front:	Passenger's Side Rear:
ROTORS:				
DRUMS:				
CALIBERS:				

#### AREA OF ORIGIN

POTENTIAL IGNITION SOURCES:	<input type="checkbox"/> Hot exhaust components. <input type="checkbox"/> Energized electrical activity. <input type="checkbox"/> Frictional heating. <input type="checkbox"/> Act or omission by unknown person(s) causing ignition with an open flame device to combustible materials in or around the vehicle. The use of an ignitable liquid cannot be eliminated as being used to accelerate this fire. <input type="checkbox"/> A shop type rag left in close proximity of hot exhaust component. <input type="checkbox"/> Rodents nesting in areas of the exhaust system. <input type="checkbox"/> Rodents chewing insulation from electrical conductors. <input type="checkbox"/> Loose or corroded electrical connection. <input type="checkbox"/> Careless smoking habits. <input type="checkbox"/> Internal mechanical failure of the engine. <input type="checkbox"/> Component failure.	
FIRST FUEL(S) CONSIDERED:	<input type="checkbox"/> Power steering fluid <input type="checkbox"/> ATF fluid <input type="checkbox"/> Engine oil <input type="checkbox"/> Gasoline <input type="checkbox"/> Diesel fuel <input type="checkbox"/> Combustible material (rag) <input type="checkbox"/> Combustible materials adjacent to the exterior of the vehicle <input type="checkbox"/> Insulation of electrical conductors <input type="checkbox"/> Paper, plastic, wood	
CAUSE:	Undetermined? <input type="checkbox"/> Yes <input type="checkbox"/> No	Further Examination Needed? <input type="checkbox"/> Yes <input type="checkbox"/> No

#### ENGINE EVALUATION

RECENT REPAIRS?:	<input type="checkbox"/> Yes <input type="checkbox"/> No    If Yes, where was work completed? _____ Technician's Name: _____					
TIMING CHAIN or BELT:	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Bad					
COMPRESSION TEST:	PSI Results:    Cyl #1: _____    Cyl #3: _____    Cyl #5: _____    Cyl #7: _____    Cyl #9: _____ Cyl #2: _____    Cyl #4: _____    Cyl #6: _____    Cyl #8: _____    Cyl #10: _____					
CYLINDER HEAD GASKET:	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Bad    Bad Head: <input type="checkbox"/> Left <input type="checkbox"/> Right Between Cylinder # _____ and Cylinder # _____					
INTAKE VALVE <u>LEFT</u> HEAD:	Condition:	2 <input type="checkbox"/> Good <input type="checkbox"/> Bad	4 <input type="checkbox"/> Good <input type="checkbox"/> Bad	6 <input type="checkbox"/> Good <input type="checkbox"/> Bad	8 <input type="checkbox"/> Good <input type="checkbox"/> Bad	10 <input type="checkbox"/> Good <input type="checkbox"/> Bad
EXHAUST VALVE <u>LEFT</u> HEAD:	Condition:	2 <input type="checkbox"/> Good <input type="checkbox"/> Bad	4 <input type="checkbox"/> Good <input type="checkbox"/> Bad	6 <input type="checkbox"/> Good <input type="checkbox"/> Bad	8 <input type="checkbox"/> Good <input type="checkbox"/> Bad	10 <input type="checkbox"/> Good <input type="checkbox"/> Bad
INTAKE VALVE <u>RIGHT</u> HEAD:	Condition:	1 <input type="checkbox"/> Good <input type="checkbox"/> Bad	3 <input type="checkbox"/> Good <input type="checkbox"/> Bad	5 <input type="checkbox"/> Good <input type="checkbox"/> Bad	7 <input type="checkbox"/> Good <input type="checkbox"/> Bad	9 <input type="checkbox"/> Good <input type="checkbox"/> Bad
EXHAUST VALVE <u>RIGHT</u> HEAD:	Condition:	1 <input type="checkbox"/> Good <input type="checkbox"/> Bad	3 <input type="checkbox"/> Good <input type="checkbox"/> Bad	5 <input type="checkbox"/> Good <input type="checkbox"/> Bad	7 <input type="checkbox"/> Good <input type="checkbox"/> Bad	9 <input type="checkbox"/> Good <input type="checkbox"/> Bad
PISTONS:	Condition:	1 <input type="checkbox"/> Good <input type="checkbox"/> Bad	3 <input type="checkbox"/> Good <input type="checkbox"/> Bad	5 <input type="checkbox"/> Good <input type="checkbox"/> Bad	7 <input type="checkbox"/> Good <input type="checkbox"/> Bad	9 <input type="checkbox"/> Good <input type="checkbox"/> Bad

# FIRE INVESTIGATION 1A

## Fire Origin and Cause Determination

Topic 16: Vehicle Fire Investigation

### Vehicle Field Notes

	Condition:	2 <input type="checkbox"/> Good <input type="checkbox"/> Bad	4 <input type="checkbox"/> Good <input type="checkbox"/> Bad	6 <input type="checkbox"/> Good <input type="checkbox"/> Bad	8 <input type="checkbox"/> Good <input type="checkbox"/> Bad	10 <input type="checkbox"/> Good <input type="checkbox"/> Bad
CONNECTING RODS:	Condition:	1 <input type="checkbox"/> Good <input type="checkbox"/> Bad	3 <input type="checkbox"/> Good <input type="checkbox"/> Bad	5 <input type="checkbox"/> Good <input type="checkbox"/> Bad	7 <input type="checkbox"/> Good <input type="checkbox"/> Bad	9 <input type="checkbox"/> Good <input type="checkbox"/> Bad
	Condition:	2 <input type="checkbox"/> Good <input type="checkbox"/> Bad	4 <input type="checkbox"/> Good <input type="checkbox"/> Bad	6 <input type="checkbox"/> Good <input type="checkbox"/> Bad	8 <input type="checkbox"/> Good <input type="checkbox"/> Bad	10 <input type="checkbox"/> Good <input type="checkbox"/> Bad
MAIN BEARINGS:	Condition:	1 <input type="checkbox"/> Good <input type="checkbox"/> Bad	2 <input type="checkbox"/> Good <input type="checkbox"/> Bad	3 <input type="checkbox"/> Good <input type="checkbox"/> Bad	4 <input type="checkbox"/> Good <input type="checkbox"/> Bad	5 <input type="checkbox"/> Good <input type="checkbox"/> Bad
OIL PUMP:	PSI:					
FUEL PUMP:	PSI:					
CAMSHAFT:	Condition: <input type="checkbox"/> Good <input type="checkbox"/> Bad					
FUEL INJECTORS:	Condition:	1 <input type="checkbox"/> Good <input type="checkbox"/> Bad	3 <input type="checkbox"/> Good <input type="checkbox"/> Bad	5 <input type="checkbox"/> Good <input type="checkbox"/> Bad	7 <input type="checkbox"/> Good <input type="checkbox"/> Bad	9 <input type="checkbox"/> Good <input type="checkbox"/> Bad
	Condition:	2 <input type="checkbox"/> Good <input type="checkbox"/> Bad	4 <input type="checkbox"/> Good <input type="checkbox"/> Bad	6 <input type="checkbox"/> Good <input type="checkbox"/> Bad	8 <input type="checkbox"/> Good <input type="checkbox"/> Bad	10 <input type="checkbox"/> Good <input type="checkbox"/> Bad

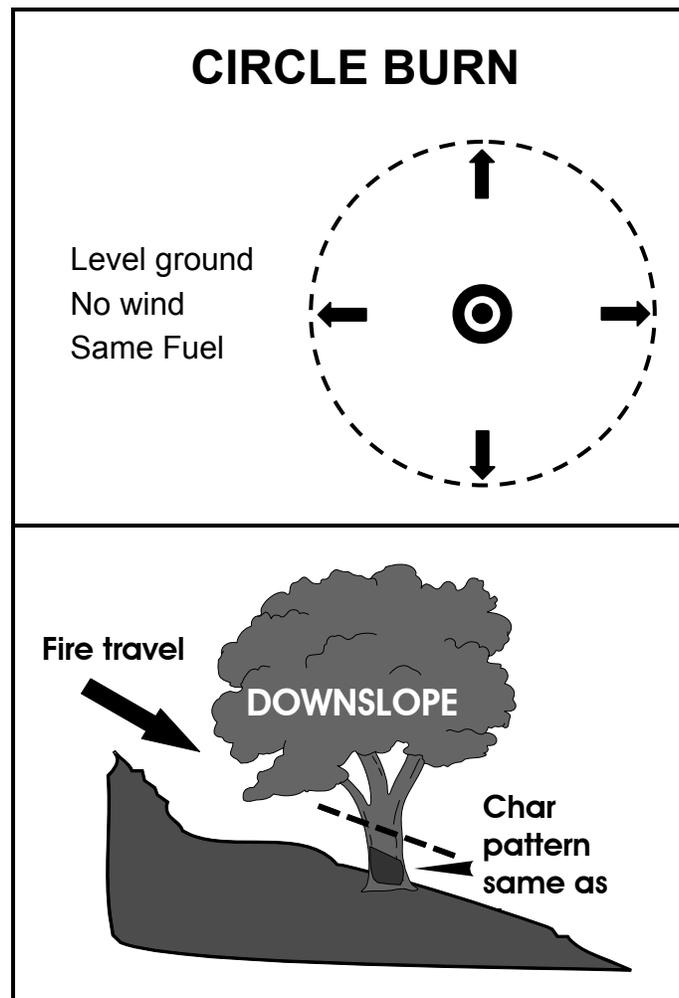
## Topic 17: Wildland Fire Investigation

Student information for this topic can also be found in [NFPA 921: Guide to Fire & Explosion Investigations](#), NFPA, 2008 Edition, Chapter 26: Wildfire Investigations, Pages 921-223 through 921-234, Sections 26.1-26.10, and Annex A, Page 921-263.

A fire burning on level ground, in the absence of wind, and in similar fuels will burn in a circle pattern. Air will be drawn into the fire from all directions creating a "backing fire" around the perimeter. The origin will be located in the center of the circle burn pattern. However, if any of these conditions change the fire will begin to take on a shape determined by the slope, wind, barriers, or fuel change.

A fire moving downslope past a tree will develop a char pattern on the tree trunk parallel to the slope of the hillside.

NOTE: This pattern can be altered by a buildup of debris on the upslope side. However, the parallel char can still be observed upon close examination.



### Glossary of Wildland Fire Terminology

- 1-hour time lag fuels**.....Size= $\frac{1}{4}$ ". Most important for carrying surface fires. Their moisture content governs fire behavior.
- 10-hour time lag fuels**.....Size= $\frac{1}{4}$ "-1" in diameter. Small branches and woody stems.
- 100-hour time lag fuels**.....Size=1"-3" in diameter. Larger downed woody debris.
- 1000-hour time lag fuels**...Size= $>3$ " in diameter. Large downed branches, logs, and tree stumps. Burn only under prolonged, dry conditions or when sufficiently preheated by adjacent fuels.
- Burning index** .....A number related to the contribution that fire behavior makes to the amount or effort needed to contain a fire in a particular fuel type within a rating area.
- Compare and contrast**.....Investigative technique that involves comparing same sized indicators within a category at separate locations, looking for either differences or similarities in appearance, based on their damage differential.
- Competent ignition source**.....The source of heat that kindles a wildfire. It may be in the form of a mechanical or electrical spark, glowing ember, open flame, chemical reaction, or friction.
- Curling indicators**.....Green leaves on succulent, uncured vegetation will bend and curl inwards towards the heat source. Microscale indicator, often associated with backing areas. A wide variety of plant species may show this indicator.
- Damage differential** .....Underlying principle behind interpretation of all indicators. Change that occurs to an object after its interaction with the fire, dependent upon the type of object, length of exposure, and intensity of heat. Contrasting damage differential.
- Fine dead fuel moisture** ....Dead fuel moisture in fuels ranges from about 2% to 30%. Fine dead fuel moisture fluctuates considerably over time due to environmental factors.

- Foliage freeze indicators...** Small branches, needles, and leaves on green vegetation take on a windswept appearance and "freeze" in that position. Vegetation may remain green in appearance or look scorched and blackened, depending on intensity of the fire. Appearance may range from a dramatic, windswept look to only slight drooping, depending upon the amount of heat exposure and intensity of the wind, which may be associated with the directional vector of the indicator.
- Fuel models.....** Primary carrier of fire based on the type of fuel model present. Thirteen fuel models associated with fire behavior are subdivided into the Grass, Shrub, Timber Litter, and Logging Slash groups.
- Heavy ignition source .....** An object that will tend to settle or burrow under the surface of the materials first ignited (weight or temperature), such as welding slag, exhaust particles, large metal fragments, etc.
- Lateral fire .....** Fire progression associated with the flanks of the fire. Tends to spread outward at a 45°-90° angle from the main direction of spread. Fire behavior will generally fall somewhere in between that exhibited by the advancing and backing areas.
- Lightweight ignition source .....** An object that will tend to rest on the surface of the materials first ignited (match, cigarette butt, and flat metal fragments).
- Macroscale indicators .....** Large, single indicators or overall patterns that are readily visible from a distance. Most often associated with areas of higher intensity burning. Most commonly used to define advancing fire areas.
- Microscale indicators.....** Small, individual indicators and patterns that are not easily observable. They will become increasingly critical the closer you get to the origin. They also become less noticeable.
- Pattern clusters.....** Areas within the burn characterized by multiple indicators that exhibit consistent directional values. Most reliable with a variety of indicator categories.
- Probability of ignition .....** A rating of the probability that a glowing firebrand will cause a fire, providing it lands on receptive fuels and the fuels are dry enough to support ignition. Determined by fuel shading, fine dead fuel moisture, and the dry bulb temperature.

**Transition zone** .....Area where the fire transitions from one direction to another (either backing, lateral, or advancing). Characterized by change in appearance of indicators. When change is from advancing, to flanking, to backing, within a confined area, it may be the specific origin.

**White ash indicators**.....Byproduct of complete combustion. More white ash will be created on the sides of objects exposed to greater amounts of heat and flame. Ash is often dispersed downwind and deposited on the windward sides of objects. Fuels facing the origin will appear lighter on the origin side, darker on the nonorigin side. Ash indicators can begin to quickly degrade and lose reliability after only a few hours or when exposed to moisture or high winds.

## Cigarettes as a Wildland Fire Cause

*By Paul Steensland*

### CIGARETTES AS A WILDLAND FIRE CAUSE

As a result of one of the more effective publicity campaigns ever waged, the average American citizen has been conditioned to believe that a cigarette carelessly discarded in the forest has the fire starting potential of a stick of dynamite attached to a five gallon can of gasoline. Up until recently, many wildland fire investigators routinely, (although likely erroneously), "determined" that smoking was the cause of a significant number of fires, which lent further credibility to this misconception. As referenced by Redsicker and O'Connor, cigarettes have "long been the scapegoat in cases where no other cause could be determined"<sup>(1)</sup>

While the message that cigarettes are highly dangerous firebrands may be acceptable as fire prevention propaganda, it is far from the reality, as both the personal experience of seasoned investigators and scientific research have concluded.

From the fire investigator's perspective, the continued propagation of this misinformation is problematic. Obviously, it would be unwise to inadvertently encourage people to carelessly discard unextinguished cigarettes, however, the public's widely held belief that cigarettes readily ignite wildland fires may result in defense counsel raising it as an alternative, and seemingly highly probable cause of the fire that is being litigated. The fact that old cigarette butts are not uncommon at or near many fire origin areas can further complicate the matter. This can be particularly troublesome when attempting to prove a "hot set" roadside arson case. Unless effectively rebutted, this defense claim could rise to the level of reasonable doubt in a criminal case or preponderance of evidence in a civil matter.

With the advent of NFPA 921's "scientific method" and the Supreme Court's decision in Kumho Tire v. Carmichael, a Daubert or similar analysis may be applied to the methodology and conclusions of the investigator. This may result in the investigator finding themselves in a position of having to explain to a judge or jury precisely how and why they excluded a cigarette as a possible cause.

Fortunately, a substantial body of peer-reviewed, scientific research has been conducted on the subject. The knowledgeable investigator, who can cite the literature and apply the results of the research within the context of their hypothesis, may easily disprove allegations by opposing counsel when the existing factual circumstances warrant it.

Cigarettes can and do start wildfires, however, it is only within a very narrow range of environmental conditions and physical circumstances. For the investigator to objectively determine whether a cigarette might have started a fire, he or she must first have an understanding of all these facts.

To bring about ignition, three overall elements must be considered. According to Redsicker and O'Connor, all three must be present and each may be characterized by a greater or lesser degree of susceptibility. First, is the contact between the heat source, (the cigarette's glowing tip), and the potential fuel source. Second, is the receptiveness of the fuel source to ignite when so exposed. Third, is the propensity of the cigarette to ignite a fire when put in that position.<sup>(2)</sup>

These three elements form the overall context of a cigarette's ignition probability. Within that context, there are three areas the investigator must have knowledge of to be able to effectively

### CIGARETTES AS A WILDLAND FIRE CAUSE

assess the likelihood of a cigarette's ignition. They are 1) the physical characteristics of the cigarette itself, 2) environmental factors, and 3) physical placement factors. Each of these areas is discussed in detail below.

The elements below are relevant only to non-fire standard compliant cigarettes (FSC), at this time. With many states enacting laws requiring cigarettes to be manufactured to these standards, further research needs to be done to test their fire-starting capabilities in an outdoor environment. A very informal field flammability test was conducted under moderate fire weather conditions. Three cigarettes were positioned at ground level with the tips oriented into an approximate 2-3 mph wind. Temperature was measured at 90 and relative humidity was approximately 15%-20%. Two of the three cigarettes extinguished at the first band. The third cigarette burned past the bands, finally self-extinguishing at the filter. A noticeable reduction in burning rate and heat output occurred at each band, but it burned normally in between the bands. Whether or not this cigarette could have been capable of igniting a fire is unknown. The standard is that the cigarettes must function effectively at a rate of 90% or higher, so this one example, of a failure to self-extinguish, could be simply that. Further extensive research is needed to test the fire-starting capability of FSC cigarettes under a variety of outdoor conditions.

#### Physical Characteristics of Cigarettes as a Fire Cause

Most cigarettes consist of an inner core of tobacco and tobacco filler and a variety of chemical additives that assist in keeping the tobacco smoldering. This inner core is wrapped in a thin layer of paper. Most filtered cigarettes use a white or black cellulon fiber material, either alone or in combination with other materials, such as granulated charcoal. Some filter cigarettes use a compartmented polyethylene filter, folded tissue, plastic shell over cellulon or an inner plastic tube.<sup>(3)</sup> Most cigarettes fall within a weight range of approximately two-thirds of a gram to slightly over one gram and measure between 45 and 90 millimeters (not including the filter).

Studies have shown that ignited cigarettes burn with a significant variation in temperature, depending upon the brand. Because cigarettes burn with glowing combustion rather than open flame, the heat release rate and temperature are relatively low. Interior, or core temperatures typically range from 1316°F-1541°F and exterior temperatures may vary from 679°F-1196°F, with a mean average of 877°F.<sup>(4)</sup> Other studies have reported similar conclusions, putting the exterior temperature range between 572°F-1200°F.

This variation of heat values between brands is a result of factors such as packing density, chemical additives, moisture content, type of tobacco and cut, ash thickness, and other variables. This can result in some brands of cigarettes being more likely to kindle fires than others. Environmental factors such as wind speed, wind direction, and relative humidity will also influence the exterior temperature under field conditions. As wildland fuels will support glowing combustion at an approximate temperature range of between 450°F-700°F, dependent upon the fuel types and other circumstances, the investigator can draw an overall conclusion that a cigarette is only marginally capable of igniting a fire, based on combustion temperature alone. As DeHaan notes, direct contact between the cigarette and the host fueled is a necessity.<sup>(5)</sup> Ford and others have observed that this contact must be a minimum of one-third of the cigarette's surface area.<sup>(6)</sup> This is difficult to attain for five reasons.

First, as classified by Ford, a cigarette is a "lightweight igniter."<sup>(7)</sup> This means that when the

### CIGARETTES AS A WILDLAND FIRE CAUSE

cigarette is discarded, it will tend to rest on top of the host fuel bed, rather than burrow or settle into it, as heavier ignition sources do. Second, due to the cylindrical profile, only a small percentage of the smoldering area will be in contact with the host fuel. Ignition will occur primarily due to radiant and conductive heat transfer, as the convective heat will be dispersed upwards and away from the fuel bed. Third, studies have determined that a cigarette shrinks approximately 20% as it burns. The shrinkage is in both length and diameter. This results in the glowing tip lifting off and away from the fuel, further reducing its ability to transfer heat.

The fourth factor is that the formation of ash around the glowing inner core also limits heat transfer, due to the insulating characteristics of the ash. As the thickness and composition of ash varies between brands, cigarettes with a higher ash content are less likely to kindle a fire than other brands.<sup>(8)</sup>

The final restrictive factor is the linear progression of the combustion. Based on research into cigarette burning times, most cigarettes burn at a rate of 6mm-8mm, (1/4"-1/3"), per minute, for a total burn time of about 13-15 minutes for a full length cigarette.<sup>(9)</sup> (Since most people discard a cigarette that has been at least partially smoked, the total potential exposure time is usually much less.) As the cigarette burns linearly, the time that the glowing tip exposes a specific point in the fuel bed to heat that is at or in excess of its ignition temperature, is limited to between approximately 60-120 seconds, depending upon the brand and other variables.<sup>(10)</sup> With the limited contact at relatively low exterior temperatures, the probability of ignition is unlikely. When environmental factors are considered, the ignition potential can become even more restricted.

#### Environmental Factors That Limit Ignition

In addition to direct contact by 30% of the cigarette's surface, several environmental factors appear to be important when considering a cigarette as a possible ignition source. Generally speaking, the two critical factors are the host fuel bed and the weather conditions at the time the cigarette was discarded.

As determined in a variety of studies, the nature and composition of the host fuel bed will influence the probability of ignition to a significant degree. In general, light, finely particulated fuels with a high surface area-to-volume ratio are much more likely to support glowing combustion, leading to open flame, than other types of fuels. Punky logs, grass chaff, sawdust, dry peat, duff and fine leaf and needle litter fit this classification. Denser and larger fuels, such as limbs, twigs, and bark are much more difficult to ignite, as the cigarette is usually incapable of raising them to their ignition temperature.

The vertical arrangement of the fuel also appears to be a factor. Where the material is loosely arranged, (such as grass chaff or uncompacted duff), and the cigarette can sink or burrow into it, the likelihood of ignition increases. Fuel moisture must also be considered. Fine dead fuels, (one hour time lag fuels), are prone to rapid drying following exposure to moisture in the form of precipitation, fog or dew. Heavier fuels are slower to react to drying trends and as such, generally register higher levels of moisture content. This greater moisture content requires a higher exposure to heat to dispel it before ignition temperature can be attained. When environmental conditions exist that increase the fuel moisture in fine fuels, ignition may be significantly retarded or entirely precluded. As a general rule of thumb, fuel moistures must be at or below a level of 14%-15% percent before a cigarette will be capable of supporting glowing

### CIGARETTES AS A WILDLAND FIRE CAUSE

combustion in the host fuel.<sup>(11)</sup>

Weather conditions appear to have the most important influence on the probability of ignition. Assuming the cigarette is discarded into a suitable fuel bed, ambient temperature, wind speed, wind direction, and relative humidity all have an inter-related effect.

The first critical component is ambient temperature. In one study, it was determined that relatively high air temperatures were required to support ignition. On the average, a temperature of 80°F or higher seemed to be most conducive to ignition, although this should not be relied upon as an absolute.<sup>(12)</sup> Higher air temperatures translate to higher ground-surface temperatures, which in turn raise the temperature of the fuel and decrease fuel moisture levels. An increase in fuel temperatures means that less expenditure of heat over a shorter period of time is required to raise the fuel to its ignition temperature. For this reason, origins that are in heavily shaded and substantially cooler locations must be viewed with some degree of skepticism if other conditions are also marginal.

Wind speed and direction have been demonstrated to play a material role in cigarette-caused ignitions. Under laboratory conditions, a wind speed of 3 mph has been suggested as an ideal speed to support ignition. Winds under this velocity tended to diminish the oxygen flow to the glowing tip, resulting in lower temperatures and, in some cases, appeared to contribute to self-extinguishment. Wind speeds greater than 3 mph may tend to disperse heat away from the fuel source, especially if the tip is facing away from the wind. Wind direction, in relation to the tip appeared to also play a consequential part in the likelihood of ignition. A tip orientation that faced directly into the wind was most favorable for creating ignition, due to the preheating effect. Furthermore, it was shown that tip orientation of 180 degrees away from the prevailing wind resulted in a statistically significant decrease in ignition probability, with the cigarettes in the test group actually self-extinguishing 23.4% of the time. As tip orientation increases past 45 degrees, the probability of ignition begins to decrease. Thus, knowing wind direction and speed at the time the cigarette was discarded can be a consideration for the investigator.<sup>(13)</sup>

Of all the weather related factors, none appear to be as crucial as relative humidity, (RH). Relative humidity is simply the amount of moisture in the air, measured in a relative percentage of how much the air mass can hold at a given temperature. It is expressed in percentage points and can be quickly determined on-scene with a sling psychrometer or digital measuring device. As relative humidity can vary from location to location, depending upon micro-climatic conditions, (such as shaded creek bottoms, compared to a nearby south-facing, open slope), taking this reading at the fire's origin as close to the time of probable ignition as is possible, can be fundamental in assisting with determination of the fire's cause. When taking RH and other related weather readings, be sure to take them in a location that is outside the burn, but is as similar as possible to the origin area in terms of fuel type and arrangement, elevation, solar exposure, aspect, time-of-day and other conditions that may affect the readings. (Ensure that all instructions associated with the use of the psychrometer or digital weather instrument are followed precisely.)

Several studies have conclusively established that relative humidities in excess of 22% will preclude a cigarette from igniting wildland fuels. The studies show that the likelihood of a cigarette starting a fire diminish accordingly with an increase in humidity. A RH reading above 22% can be considered as a no-start range. Readings below 18% can be considered as a

### CIGARETTES AS A WILDLAND FIRE CAUSE

range of possible ignition. Readings in the overlap zone between 18% and 22% may be considered as possible, but very unlikely.<sup>(14) (15)</sup>

There are probably some rare exceptions to this rule, wherein other factors must be considered. A condition that could result in a small variation to this rule is when the humidity is rising, following a period of critically dry weather. The lag time in surface fuel moisture recovery could increase the threshold slightly, *i.e.*, the RH reads higher but the fuel has not had time to react to the increase in air moisture. (For this reason, some investigators use a RH level of 25% as the absolute rule.) In these situations, other factors such as high temperatures, physical placement, wind speed and direction and cigarette brand must also be considered. (A falling RH could create converse circumstances, with the RH reading lower than 22%, but with fine dead fuel moistures at a level that would not theoretically support ignition due to this same time-lag phenomenon.)

An additional factor is the known or potential rate of error of humidity measuring instruments. Both the sling psychrometer and the new generation electronic hygrographs have a potential error rate of plus-or-minus three percent. This would be another reason to consider 25% as the cut-off point for potential starts.

There are some occasions where a temporary micro-climate can exist at ground level that is substantially different than the readings taken nearby and several feet above the surface. Temperature variants of as much as 40 degrees have been documented. These temporary and short duration microclimates could produce environmental conditions within the appropriate range for ignition.

Finally, while the research is silent on this issue, there is some anecdotal evidence that cigarettes that have been forcibly pushed (ground out) into very finely particulated fuels (such as duff or powdered peat), have started fires at humidities of 30% or greater. This is an area that deserves further investigation.

Absent these circumstances, cigarettes as a cause can be routinely excluded when RH levels exceed 22% at the origin, at the probable time of ignition, and considered improbable at RH levels between 18% and 22%. The probability of ignition will increase accordingly as the RH reading decreases below 18%.

#### **Physical Placement Factors**

Inter-related to the nature of the fuel bed and the existing weather conditions, are the physical placement factors. As we have already seen, horizontal tip orientation in relation to the wind direction is significant. Based on a set of field experiments conducted by the author, vertical tip orientation in relation to the fuel bed may also be a factor requiring consideration. When a cigarette is discarded on a slope or into grass chaff or other similar loosely arranged materials, it appears that it is more likely to kindle a fire if it falls with the tip at a downward angle, as opposed to upwards or resting horizontally. With the cigarette suspended or angled downwards, more of the fuel surface may be exposed to conductive and convective heat transfer which in effect, preheats the fuel bed ahead of the glowing combustion of the tip.

A burrowing effect may also occur, trapping more heat in the proximity of the fuel bed. Conversely, if the tip is angled upward, less heat will transfer, making ignition less probable.

In the experiments, five fuel beds of cured annual rye grass were cut into average one-inch

## CIGARETTES AS A WILDLAND FIRE CAUSE

lengths to simulate late season chaff. After being oven dried for 15 minutes at 200°F and allowed to reacclimate for two hours, they were arranged at angles of fifteen degree intervals, starting with a control fuel bed at 0 degrees (flat), and ending with the last one positioned at a 60 degree angle. Two burning cigarettes were placed into each fuel bed, one with the tip pointing upslope and one with the tip pointing downslope. The cigarettes were arranged so that 50% of the glowing tip surface area was in contact with the host fuel and the fuel beds were oriented into the prevailing wind, (which was maintained at 3 mph by the use of fans.) The temperature was 94°F and the RH was in a declining pattern, although it stayed at 13% for the duration of the test.

The cigarettes positioned at 0 through 30 degrees failed to ignite the fuel bed. A small area of surface char under and immediately next to the smoldering tip resulted, but failed to transition into glowing combustion. The cigarettes that were oriented with their tips downslope on the fuel beds that were at 45 degrees and 60 degrees respectively both resulted in glowing combustion that transitioned to open flame. Surface charring next to the tip was observed on the cigarettes with their tips oriented upslope, but no glowing combustion occurred. The transition to open flame on the 45 degree slope occurred in 12 minutes, 21 seconds. The transition to open flame on the 60 degree slope took place in 7 minutes, 38 seconds.

A second test, duplicating the same slope arrangement as the first test was also conducted, however, the fuel used was cured pine needles and dry duff. The temperature was recorded at 91 degrees and the RH was 15%. Wind conditions were the same as in the first test. Fuel beds arranged from 0 to 30 degrees experienced only slight surface charring with no glowing combustion. The cigarettes oriented upslope on the 45 and 60 degree slopes produced similar surface charring, however, the downslope oriented cigarettes on the fuel beds positioned at 45 and 60 degrees produced glowing combustion that extended outward from the cigarette an average of  $\frac{1}{2}$  to  $\frac{3}{4}$  of an inch and approximately  $\frac{3}{4}$  inch downward into the fuel bed. These areas of glowing combustion failed to transition to open flame, however, and eventually self-extinguished. (Had the weather conditions been more optimal, it is likely that these would have produced open flame.)

A final test was also conducted. Three clumps of unmodified, cured annual rye grass were arranged in loose vertical bundles to simulate fuel beds of standing grass. A cigarette was placed into the center of each fuel bed. In fuel bed #1, the tip was arranged in a horizontal position. In fuel bed #2, the tip was placed pointing upward. The tip of the cigarette placed in fuel bed #3 was oriented downward. Surface temperatures were 91°F and the RH was 14.5%. Wind conditions were maintained at 0 mph. The cigarettes in fuel beds #1 and #2 produced only minor surface charring where the glowing tip actually made contact with individual grass stems. Glowing combustion was observed in fuel bed #3 at one minute and 52 seconds. This was followed by a transition to open flame at three minutes and 47 seconds.

These tests indicate ignition probability is higher when the tip is oriented downwards in vertically arranged fuels or downslope in horizontally arranged fuels. This can most likely be explained by the fact that more of the fuel surface may be exposed to preheating by convective heat transfer. A burrowing effect may also occur, trapping more heat in closer proximity to the fuel bed. Conversely, if the tip is oriented upwards or upslope, less heat will transfer, making ignition less probable. Therefore, the investigator should evaluate the tip orientation in relation to the fuel or

### CIGARETTES AS A WILDLAND FIRE CAUSE

slope.

#### **Roadside Cigarette Starts**

Cigarettes are a natural culprit to assign blame to for any fire that occurs along a roadside. Virtually everyone has seen a passing motorist thoughtlessly discard an unextinguished cigarette from their vehicle. Opposing counsel may attempt to capitalize on this fact when trying to establish an alternative fire cause. In addition to the previously discussed limiting factors, the investigator must also consider some basic aerial characteristics of a cigarette when attempting to determine the probability of a cigarette as an ignition source for a roadside fire.

As stated above, a cigarette is a lightweight object, weighing at most about a gram prior to being smoked. If one assumes that most discarded cigarettes are partially consumed, their weight becomes notably less. This light weight prevents the cigarette from obtaining any substantial momentum when ejected from a moving vehicle or thrown from a stationary position.

Although a cigarette is cylindrical in shape, which is an aerodynamically efficient form, it is not spin-stable. Once it is discarded, it will usually begin to rotate end-over-end, and/or yaw from side-to-side. These actions create air resistance, which will reduce its forward momentum. Additionally, a thrown cigarette's trajectory tends to be arc-like, which further limits its ability to travel any great horizontal distances.

A series of informal field tests conducted by the author yielded some interesting data regarding cigarette trajectories. Test conditions were not strictly controlled and more data should be gathered under more exacting and varied conditions; however, the preliminary results may be helpful to the investigator.

The first test involved throwing filtered cigarettes of three different lengths (full, half, and butt), from a stationary position in an attempt to determine maximum horizontal distance achievable under both calm and windy conditions. This maximum distance under calm conditions was 34' 2" (achieved with a full-length cigarette); however, the effect of a surface wind with a velocity averaging 7-10 mph was significant. When thrown with the wind, one full length cigarette achieved a maximum distance of 55'3". When thrown against the same wind, maximum distance attained was a mere 14'.

Cigarette length was also a controlling factor. Overall, the shorter the length, the less the distance. Under calm wind conditions, the average for ten attempts with a half-length cigarette was 25'8" and for ten butt length cigarettes the average was 21'1", with the maximum distance for each being 30' and 27'1" respectively. Keep in mind that this test involved throwing the cigarette as hard as possible. Under most circumstances, the majority of people will flip or throw a cigarette with substantially less velocity, which will result in much shorter horizontal trajectories.

As most suspected roadside cigarette-caused fires are presumed to have originated from a passing vehicle, the second evaluation examined maximum possible horizontal distances from a vehicle at various speeds. Anecdotal evidence has suggested that cigarettes discarded from passing vehicles are usually pulled into the slipstream and come to rest on the pavement, where the wake of a subsequent passing vehicle rolls them into vegetation at the road's edge. This test was designed to determine the effect of the vehicle's slipstream on horizontal

### CIGARETTES AS A WILDLAND FIRE CAUSE

trajectory. The test vehicle was a full-sized pickup with camper shell. A different vehicle profile may yield different results.

Tests were performed with the above-described lengths at speeds in 10 mph increments, ranging from 20 to 60 mph. Five attempts were made for each length at each speed increment. Again, cigarettes were thrown with as much velocity as possible within the restricted confines of the vehicle's cab. (The fact that the average person will drop or flip the cigarette, rather than throw it with any force, would probably further reduce the horizontal distances.) Overall, the tests disclosed that the vortex wake created by the vehicle significantly limited the maximum distances achievable when compared to the stationary test.

Vehicle speed proved to be a factor, as did the length of the cigarette. Similarities in results compared to the stationary test were seen in that the butt length cigarette travelled significantly shorter distances. The maximum distance recorded was 19'5" for a full length cigarette thrown from a vehicle at 20 mph. The maximum for a half-length cigarette was 13'9" at 20 mph and the butt length was 6'1", also at 20 mph. Generally, noticeable trajectory degradation occurred at speeds of 40 mph and higher, with the shorter lengths being most affected. Observations disclosed that the slipstream caught the cigarette and began turning its trajectory almost immediately. It also tended to pull the cigarette down to the pavement at the same time. This effect was most noticeable at the higher speeds and with the shorter lengths, but was observable at all speeds and for all lengths. In several cases at the higher speeds, the wake vortex actually pulled the cigarette butt back behind the vehicle, causing it to come to rest on the pavement, near the center line.

The third test was designed to determine the horizontal roll distance of a previously discarded cigarette following the passage of a subsequent vehicle. In this test, cigarettes were placed on a mark in the center of the road and a vehicle was driven over them at 60 mph. The air wake of the passing vehicle moved the cigarettes horizontally towards the road shoulder between 1'7" and 6'8", with an average distance of 3'2".

In addition to the other environmental factors discussed previously, the investigator should also consider the following areas when developing a hypothesis that involves a discarded cigarette as a possible cause of a roadside fire:

1. The direction and speed of the surface winds at the probable time the cigarette was discarded.
2. Distance from the point of origin to the edge of the travelled roadway.
3. Proximity of roadside vegetation to the edge of the travelled roadway.
4. Length of the cigarette remains found at or near the origin area.
5. Probable speed of vehicles driving past the origin area.
6. Presence of turnouts adjacent to or near the origin area.

The following general conclusions can be drawn from these field tests. In general, origins beyond 10 feet from the edge of the travelled roadway should be viewed skeptically and origins beyond 20 feet should be considered as highly unlikely to be the result of a cigarette discarded from a passing vehicle. A cigarette is more probable to end up on the road surface after initially being discarded, but may be rolled to the shoulder by the wake of any subsequent vehicles

### CIGARETTES AS A WILDLAND FIRE CAUSE

passing over or adjacent to it. Roadside starts from discarded cigarettes will most likely occur at the point the vegetation intersects the shoulder or pavement edge or within a few feet of the edge of the travelled roadway, rather than any substantial distance from the shoulder.

#### Investigative Considerations

There are several scenarios wherein the investigator must determine if a discarded cigarette is a reasonable cause of a fire. These circumstances arise when: 1) the investigator finds a cigarette butt at or near the point of origin and believes it may be the cause; 2) a cigarette is located at or near the origin, however the investigator has evidence of another cause and must determine which is the most probable; 3) no cigarette butt is located and the investigator has evidence of another cause, but still feels the need to consider a cigarette as a potential reasonable cause.

Under all three scenarios, the first step is to ensure that an accurate identification of the precise point of origin has been established through the use of burn patterns. If the investigator has correctly identified the point of origin, a strong *prima facie* case can be made that the physical remains of any ignition source recovered at this location are evidence of the fire's cause.

If a cigarette butt is recovered from this precise location as described in scenario #1 above, then the next step is to examine the probability that it caused the fire by gathering as much data as possible regarding weather conditions, nature of the fuel bed and physical placement of the cigarette. If all of these factors fit within the probable ignition parameters, and there is no evidence of another reasonable cause, the investigator can then conclude that the cigarette was the ignition source.

Unfortunately, it is not always possible to identify a precise point of origin under every circumstance. Indicators may be lacking or the area may have been compromised by suppression efforts. The best the investigator may be able to do is locate a general or specific area of origin that may encompass a substantial amount of the fire ground. When the remains of a cigarette butt are located within that general or specific area of origin and there is evidence of another possible cause as described in scenario #2, then the investigator must determine if the cigarette was the actual cause.

The first step is to carefully examine the remains in an attempt to discover if the cigarette was freshly discarded or has been there for a time prior to the fire. If the butt was freshly discarded and was unextinguished, it should show signs of progressive linear burning. The tip of the ash column will likely be rounded or pointed in appearance and the remainder of the column will be evenly charred. The bottom of the remains that were in contact with the ground surface may have a strip of incompletely consumed paper that is stained yellow or brown from nicotine tars, particularly if part of the remains is resting partially on rock or mineral soil.<sup>(16)</sup>

Cigarettes discarded some time prior to the fire will often exhibit a different appearance. Older butts that have been exposed to the elements for a period of time may show signs of aging and a lack of progressive burning. The remains may appear to be partially disintegrated or decomposed prior to burning. If the butt was relatively intact when the fire burned over it, the ash column may exhibit an "exploded" appearance, with the paper split open along its length and the tobacco ash pushed outward as result of rapid and intense burning. The bottom portion of the cigarette may also not be as consistently consumed as the top and sides. If the butt was

### CIGARETTES AS A WILDLAND FIRE CAUSE

completely extinguished by stubbing out, prior to being discarded, the ash on the end may have a squared-off appearance. The remainder of the ash column may appear bent and mangled.

Regardless of the conclusions based on the above observations, the investigator should then determine if the environmental conditions were conducive to ignition. If the investigator has arrived at the fire in close proximity to when it first started, he or she should have taken weather readings with a portable weather kit. If the arrival was not timely, first on-scene suppression personnel routinely take weather observations. If the investigator arrives at the fire well after it was first ignited and finds that no weather observations were recorded by suppression personnel, it may be possible to reconstruct the most probable conditions with the assistance of a fire behavior analyst or fire weather specialist. By taking triangulated data from nearby RAWs or other weather stations, and observations at the scene, these specialists may be able to estimate the localized weather conditions that existed at the time of ignition. If the investigator believes that he or she will need these services, they should request them immediately, as timeliness will help ensure a higher degree of accuracy.

If the environmental conditions fall within the established ignition parameters, the investigator will have to develop additional data related to the other probable ignition source in order to include or exclude it as a probable cause.

Scenario #3, wherein the investigator may wish to eliminate a discarded cigarette as a probable cause even though no remains have been located, requires a similar approach as described above. By documenting and analyzing the environmental conditions, one can often eliminate a discarded cigarette as an alternative ignition source.

#### Forensic Evaluations

Starts in punky logs or very deep duff that consume completely do not often yield physical evidence in the form of burned remnants of the cigarette. Cigarette remains are fragile, and as the log or duff burns, the ash collapses inward and settles, destroying the evidence, if it has not already been completely consumed.

Starts in grass chaff, shallow duff, or leaf litter, however, often leave sufficient remains that will be readily identifiable. Whenever the investigator locates the remains of a cigarette at a fire's origin, it should always be collected as potential evidence. Collecting the cigarette remains without damaging or destroying it can be a challenge, due to its fragility. Outdated investigative manuals have recommended spraying the remains with lacquer or a similar fixative. This should never be done, under any circumstances, as it contaminates the evidence, compromising subsequent forensic examination.

In order to ensure the most pristine possible condition, the investigator should collect the evidence in a manner that does not inflict damage. Prior to collection, the investigator must document its condition with written notes, measurements of its precise location and an adequate number of close-up photographs. Once this has been completed, the collection may proceed.

While delicate, cigarette remains often are relatively intact if they have been undisturbed by wind or suppression efforts. The charred filter and ash column will remain resting on the charred residue of the host fuel bed of pine needles, grass, leaf litter, or duff. In these cases, the recommended procedure is to lift the cigarette and a portion of the underlying host fuel bed out

### CIGARETTES AS A WILDLAND FIRE CAUSE

intact. This can best be accomplished by cutting down into the duff and basal soil layer with a clean, sharp, flat-bladed trowel or similar tool. Work the tool under the fuel bed/soil layer until it is loosened. Slide a flat piece of clean, flexible sheet metal under the fuel bed and lift it out intact. Transfer the entire item, on top of the sheet metal into the evidence container. If the ground is very hard and dry, it may be necessary to soften it prior to lifting. This can be done by digging out a small trench around the area to be lifted and filling it with clean distilled water, after examining the area closely for the possible presence of liquid accelerants. Once the water soaks in, the moistened soil can be easily loosened and removed. If this is done carefully, the water will not soak into the charred debris, only the soil.

The evidence container should be a durable, hardsided box, padded with cotton under a layer of clean paper or tissue. The size should be large enough to accommodate the item, but small enough so that it does not slide around inside during transit. The box should be marked and sealed according to standard evidence procedures and hand-carried to the testing facility. Never attempt to mail cigarette remains due to their delicate nature. Clearly mark the outside of the container "Fire Evidence-Very Fragile."

A forensic evaluation can potentially provide a substantial amount of information, depending upon the skill of the examiner and the physical state of the remains. If the remains are relatively intact, lab examination may be able to determine the brand of the cigarette. This knowledge can then be compared to known research on burning temperatures and rates, as well as possibly linking the cigarette to a specific individual. According to Bourhill, some cigarette manufacturers print a manufacturing machine number for quality control purposes on the inside lip of the filter paper. Except under extremely rare circumstances, cigarettes from the same pack will have the same number. These numbers may yield additional information, depending upon the manufacturer.<sup>(17)</sup> An examination may also be able to corroborate an investigator's observations on whether or not the cigarette started the fire based upon its physical appearance.

If the filter is relatively undamaged, there may be a possibility that remaining saliva residue is sufficient to yield a positive result with current DNA testing.

#### **Cigarettes as Incendiary Device Components**

The investigator should always ensure that the cigarette remains are examined for any attachments that would indicate the cigarette was used as the fuse portion of an incendiary device. The majority of serial wildland arsonists use "hot sets," (match or lighter and available fuels), but when they do use a time delay device, cigarettes are commonly employed in this method, in conjunction with one or more matches or an entire matchbook. With burning times ranging up to 15 minutes, (depending upon where the match(es) are located in relation to the tip), the cigarette functions as a crude, although relatively reliable, time delay fuse. When the cigarette is inserted into an entire matchbook, the remnants of the matchbook are usually very evident. Even if the origin has been severely disturbed, a magnet search may yield the remaining staple from the matchbook. What will be less visible is when a single match, or several individual matches are affixed to the cigarette, or when match heads are placed inside the cylinder, between layers of tobacco.

Arsonists have used a variety of means to attach matches to a cigarette. These attachment components have commonly included glue, thread, string, rubber bands, tape, wire, and other similar materials. In many cases, the attachment is flammable and will be consumed, causing

### CIGARETTES AS A WILDLAND FIRE CAUSE

the match to fall away from the cigarette. In some cases, the match remains may be visible adjacent to the cigarette, but in other cases it may become concealed under ash and charred material. This is another good reason to collect the adjacent and underlying debris along with the cigarette.

Another method used by arsonists is inserting a match or matches through the body of the cigarette at a 90 degree angle, leaving only the match head exposed. These are usually wooden matches that may have had the wooden end sharpened to a point to facilitate insertion. The exposed wooden end may either be clipped off, or may burn off. If a single match is used, the cigarette will most often fall with the match head pointing downwards due to the added weight. If subjected to only casual examination, the investigator may not recognize the true nature and intent of the device.

Finally, a firesetter may remove part of the tobacco from the paper cylinder, insert several match heads, and then repack the cylinder with tobacco. When the burning tobacco reaches the match heads, ignition ensues. In these cases, the cigarette remains will exhibit an "exploded" appearance at the location of the match heads.

The area adjacent to and immediately surrounding the cigarette should also be examined for the presence of an attached weight. Because roadside arsonists have been known to fasten an assortment of items, including bolts, nuts, clothespins, washers, rocks, nails, etc., to the cigarette/match device to increase its effective distance when launched from the road, the presence of any of these or similar items near the cigarette butt should cause a marked increase in the investigator's suspicions. Because of their weight, these items are prone to settling under the ash and debris layer, so a careful inspection is necessary.

When conducting a forensic examination of a cigarette/match device, special attention should be paid to the materials used and the manner and method the device was assembled. This specific information may be of value at later stages in the investigation, particularly if a search warrant discovers the different components or unused, but assembled devices in the suspect's possession. This information may also be helpful in establishing a behavioral profile of the offender, as these specifics will at a minimum, form part of the offender's *modus operandi*, (*MO*) and may also constitute a "signature" unique to that suspect.

When dealing with a cigarette/matchbook device, the investigator should always note which side the burning tip is facing. Right-handed people tend to place the tip to the left side of the matchbook, when viewed with the cover opening facing up, and left-handed people place the tip to the right side. If matches have been pulled out from the book, the examination should note which side the matches were pulled from, as right-handed people tend to pull matches from the right side and left-handed from the left.

If a cigarette device is located at the fire's origin, it may be worth the effort to examine the area along the roadside, on both flanks of the fire for the presence of unignited devices. If the offender is selecting specific target areas, locations matching the target selection criteria should also be searched for unexpended devices. Because cigarettes can self-extinguish or may have the glowing tip knocked off when thrown, the recovery of an intact device could yield a bonanza of forensic information, including DNA, trace evidence and latent fingerprints.

The location of the device in relation to the road's edge may also provide a clue to the suspect's

### CIGARETTES AS A WILDLAND FIRE CAUSE

MO. Devices that are recovered at distances of less than 20 feet from the road's edge were probably launched from a passing vehicle. Devices recovered beyond this instance were probably thrown or placed from a position outside of the vehicle.

The use of a cigarette by itself as an incendiary device is possible, although it would be relatively difficult to prove. Because the cigarette alone is such an unreliable ignition source, few arsonists have been known to employ one by itself in such a manner.

#### Summary

Because of the narrow range of physical and environmental conditions that are supportive of ignition, we now know that cigarettes will only infrequently cause fires. The investigator is more likely to find him or herself in the position of having to prove that a cigarette did not cause a fire, rather than showing that it did. Having a thorough understanding of the scientific research and being able to apply this factual data within a field context can be crucial to reaching an objective conclusion that will hold up under examination.

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### Group Activity 17-1: What Do You See?

**Time Frame:** 0:15

**Materials Needed:**

- Slides of wildland fire scene with various burn indicators
- Pen or pencil
- Paper

**Introduction:** This activity provides you the opportunity to review wildland fire burn indicators and determine direction of travel.

**Directions:**

1. Review the slide.
2. Identify and record any specific indicators you find in each scene.
3. Determine and record the direction of fire spread.
4. You have approximately 1 minute per slide to complete this activity.
5. Be prepared to discuss your answers with the class.

