

FIRE PREVENTION 1B (BRIDGE)

Approved and Adopted by the
Office of State Fire Marshal



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



STUDENT SUPPLEMENT (Bridge)

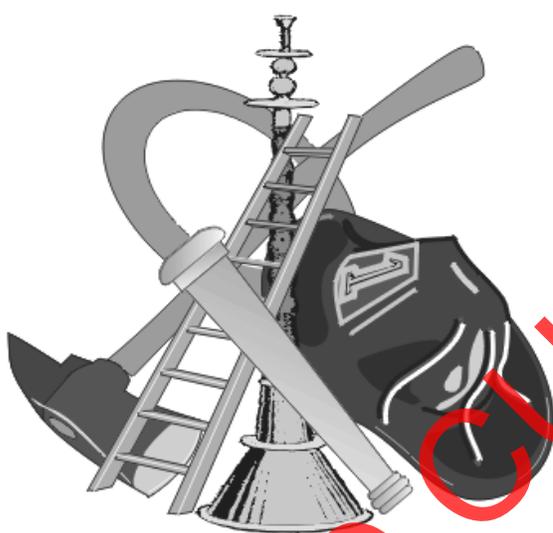
January 2009



FIRE PREVENTION 1B (BRIDGE)

INSPECTION OF FIRE PROTECTION SYSTEMS AND SPECIAL HAZARDS

S T U D E N T S U P P L E M E N T



Published by

STATE FIRE TRAINING

PO Box 944246

Sacramento, CA 94244-2460

January 2009

RETIRED CURRICULUM

TABLE OF CONTENTS

Mission Statement	i
California Fire Service Training and Education System.....	i
Acknowledgments	i
Course Outline	iii
Texts and References	v
Calendar of Events	vi
Topic 1-1: Orientation And Administration	1
My Progress Chart	1
Individual Activity 1-1-1: Fire Prevention Checkup	2
Topic 2-1: Flammable and Combustible Liquids Terms and Characteristics	5
Individual Activity 2-1-1: Introduction To Terms	5
Individual Activity 2-1-2: Flammable And Combustible Liquid Classifications	10
Topic 2-2: Acceptable Containers for Flammable and Combustible Liquids	12
Individual Activity 2-2-1: Allowable Containers	12
Topic 2-3: Introduction To Material Data Safety Sheets.....	14
Individual Activity 2-3-1: MSDS Information Search.....	14
Topic 2-4: Inside Storage of Flammable and Combustible Liquids.....	17
Topic 2-5: Outside Storage of Flammable and Combustible Liquids	18
Topic 2-6: Dispensing, Using, Mixing, and Handling Flammable and Combustible Liquids	19
Group Activity 2-6-1: Write 'Em Up!	19
Topic 2-7: Properties of Compressed, Cryogenic, and Liquefied Gases.....	30
Topic 2-8: Fire Hazards of Compressed and Liquefied Gases	31
Individual Activity 2-8-1: Hazardous Characteristics of Gases.....	31
Topic 2-9: Procedures for Inspecting Motor Vehicle Dispensing Stations	33
Topic 2-10: Procedures for Inspecting LPG Occupancies	34
Topic 2-11: Procedures for Inspecting Flammable Finish Application Occupancies	35
Topic 2-12: Methods for Controlling Ignition Sources and Explosive Atmospheres	36
Topic 3-1: Hazardous Materials Terms and Characteristics.....	37
Group Activity 3-1-1: Hazardous Materials Terms And Characteristics.....	37
Topic 3-2: Sources of Technical Information on Hazardous Materials	39
Topic 3-3: Regulating Hazardous Materials.....	40
Topic 3-4: Introduction to Hazardous Materials Management Plan	41
Topic 3-5: Storage and Transfer Practices of Compressed and Liquefied Gases.....	42
Topic 3-6: Hazards of Explosives and Fireworks.....	43
Topic 3-7: Storage of Hazardous Materials.....	44
Topic 3-8: NFPA 704 Identification Systems	45
Individual Activity 3-8-1: Developing NFPA 704 Placards.....	45
Topic 3-9: Classification by Hazard.....	56
Topic 3-10: Inspection of the Incidental Use, Handling, and Storage of Hazardous Materials	57
Individual Activity 3-10-1: Hazardous Materials Permit And Exempt Amounts.....	57

Topic 4-1: Portable Fire Extinguisher Classifications.....	64
Topic 4-2: Portable Fire Extinguisher Placement.....	65
Individual Activity 4-2-1: Extinguisher Placement.....	65
Topic 4-3: Procedures for Inspecting Portable Fire Extinguishers.....	67
Topic 5-1: Fixed Fire Protection Systems.....	68
Topic 5-2: Procedures for Inspecting Fixed Fire Protection Systems.....	69
Topic 5-3: Procedures for Inspecting Commercial Cooking Equipment.....	70
Individual Activity 5-3-1: Inspecting Fixed Fire Protection Systems.....	70
Topic 6-1: Detection and Alarm Systems Terms and Characteristics.....	73
Group Activity 6-1-1: Terminology Crossword.....	73
Topic 6-2: Fire Alarm System Components.....	76
Protecting Your Family from Fire.....	76
Smoke Detectors.....	78
Fire Alarm Systems.....	81
Escape Planning.....	82
Residential Sprinklers.....	83
Protect Your Family from Fire.....	84
Topic 6-3: Fire Alarm Signaling System Classifications.....	85
Topic 6-4: Procedures for Inspecting Fire Alarm Systems.....	86
Topic 6-5: CFC Requirements for Fire Alarm Systems.....	87
Topic 7-1: Water-Based Fire Protection Systems Terms and Characteristics.....	88
Topic 7-2: Water Supply Systems.....	89
Topic 7-3: Sprinkler System Benefits, Limitations, and Design.....	90
Individual Activity 7-3-1: Unit 7 Homework.....	90
Topic 7-4: Types of Sprinkler Systems.....	93
Individual Activity 7-4-1: Fire Sprinkler Systems.....	93
Topic 7-5: Sprinkler System Components.....	94
Individual Activity 7-5-1: Sprinkler System Components.....	94
Topic 7-6: Procedures for Inspecting Sprinkler Systems.....	96
Topic 7-7: Procedures for Conducting Tests on Wet-Pipe Sprinkler Systems.....	97
Topic 7-8: Procedures for Conducting Tests on Dry-Pipe Sprinkler Systems.....	98
Topic 7-9: Characteristics of Standpipe Systems.....	99
Individual Activity 7-9-1: Standpipe Required Systems.....	99
Topic 7-10: Procedures for Inspecting Standpipe Systems.....	101

REMOVED CURRICULUM

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

The State Fire Training Curriculum Development Division 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) approved this guide. This guide is appropriate for fire service personnel and for personnel in related occupations that are pursuing State Fire Training certification.

Ruben Grijalva Director of CAL FIRE	
Kate Dargan State Fire Marshal	Tonya Hoover Assistant State Fire Marshal
Mike Richwine Chief, State Fire Training	Ron Coleman Chair, STEAC

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

Alicia Hamilton Fire Service Training Specialist III	Monica Miller Office Technician
--	---

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 individuals who served as principal developers for this document.

Howard Cooke Sacramento Fire Department
Keith Marshall Burlingame Fire Department (Retired)
Robert Marshall Gilroy Fire Department
Rocque Yballa Central County Fire Department

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

Course Outline

Course Objectives: To prepare the student to...

- a) Identify the classification, properties, labeling, incidental storage, handling, and use of flammable and combustible liquids and gases.
- b) Identify the classification, properties, labeling, incidental storage, handling, and use of hazardous materials, other than flammable and combustible liquids and gases.
- c) Determine the principles and operational readiness of portable fire extinguishers.
- d) Determine the principles and operational readiness of special fixed fire suppression systems.
- e) Determine the principles and operational readiness of detection and alarm systems.
- f) Determine the principles and operational readiness of sprinkler systems and fire pumps.
- g) Determine the principles and operational readiness of standpipe systems.

Course Content:	40:00
Unit 1: Introduction To Fire Prevention 1B	
1-1 Orientation And Administration	2:30
Unit 2: Flammable And Combustible Liquids And Gases	
2-1 Flammable And Combustible Liquids Terms And Characteristics	1:00
2-2 Acceptable Containers For Flammable And Combustible Liquids	0:30
2-3 Introduction To Material Safety Data Sheets	0:30
2-4 Inside Storage Of Flammable And Combustible Liquids	1:00
2-5 Outside Storage Of Flammable And Combustible Liquids	1:00
2-6 Dispensing, Using, Mixing, And Handling Flammable And Combustible Liquids	1:30
2-7 Properties Of Compressed, Cryogenic, And Liquefied Gases	1:00
2-8 Fire Hazards Of Compressed And Liquefied Gases	1:00
2-9 Procedures For Inspecting Motor Vehicle Dispensing Stations	0:30
2-10 Procedures For Inspecting LPG Occupancies	0:30
2-11 Procedures For Inspecting Flammable Finish Application Occupancies	1:00
2-12 Methods For Controlling Ignition Sources And Explosive Atmospheres	1:00
Unit 3: Hazardous Materials And Explosives	
3-1 Hazardous Materials Terms And Characteristics	1:00
3-2 Sources Of Technical Information On Hazardous Materials	0:30
3-3 Regulating Hazardous Materials	0:30
3-4 Introduction To Hazardous Materials Management Plan (HMMP)	0:15
3-5 Storage And Transfer Practices Of Compressed And Liquefied Gases	1:00

3-6	Hazards Of Explosives And Fireworks	0:30
3-7	Storage Of Hazardous Materials.....	1:00
3-8	NFPA 704 Identification Systems	0:45
3-9	Classification By Hazard	0:30
3-10	Inspection Of The Incidental Use, Handling, And Storage Of Hazardous Materials	1:00
Unit 4: Portable Fire Extinguishers		
4-1	Portable Fire Extinguisher Classifications.....	1:00
4-2	Portable Fire Extinguisher Placement	0:30
4-3	Procedures For Inspecting Portable Fire Extinguishers.....	0:30
Unit 5: Special Fixed Fire Suppression Systems		
5-1	Fixed Fire Protection Systems	1:00
5-2	Procedures For Inspecting Fixed Fire Protection Systems.....	1:00
5-3	Procedures For Inspecting Commercial Cooking Equipment	0:30
Unit 6: Detection And Alarm Systems		
6-1	Detection And Alarm Systems Terms And Characteristics	0:30
6-2	Fire Alarm System Components.....	0:45
6-3	Fire Alarm Signaling System Classifications.....	0:30
6-4	Procedures For Inspecting Fire Alarm Systems	0:30
6-5	CFC Requirements For Fire Alarm Systems.....	0:15
Unit 7: Water-Based Fire Protection Systems		
7-1	Water-Based Fire Protection Systems Terms And Characteristics	1:00
7-2	Water Supply Systems.....	0:30
7-3	Sprinkler Systems Benefits, Limitations, and Design	0:30
7-4	Types of Sprinkler Systems	1:00
7-5	Sprinkler System Components	1:00
7-6	Procedures For Inspecting Sprinkler Systems	1:00
7-7	Procedures For Conducting Tests On Wet-Pipe Sprinkler Systems.....	0:30
7-8	Procedures For Conducting Tests On Dry-Pipe Sprinkler Systems	0:30
7-9	Characteristics Of Standpipe Systems	1:00
7-10	Procedures For Inspecting Standpipe Systems	1:00
Unit Tests.....		3:00
Review and Certification Exam.....		2:00

Texts and References

- "BLEVE" video, National Fire Protection Association (NFPA)
- Barclays Official California Code of Regulations Title 19, West Group
- California Building Code, California Building Standards Commission (CBSC), 2007 Edition
- California Fire Code, CBSC, 2007 Edition
- California Health and Safety Code, Current Edition
- Code of Federal Regulations, National Archives and Records Administration
- Designs of Water-Based Fire Protection Systems, Robert M. Gagnon, 1997 Edition
- Emergency Response Guidebook, Department of Transportation (DOT), 2008 Edition
- Fire Inspection and Code Enforcement, International Fire Service Training Association (IFSTA), Sixth Edition
- Fire Protection Handbook, NFPA, 20th Edition
- Hazardous Materials Guide for First Responders, Federal Emergency Management Association (FEMA)/United States Fire Administration (USFA)
- Hazardous Materials Regulations, Response, and Site Operations, Delmar, 1999 Edition
- National Fire Alarm® Handbook (NFPA 72), NFPA, 2007 Edition, California amended
- NFPA 10: Standard on Portable Fire Extinguishers, NFPA, 2005 Edition
- NFPA 13: Standard on the Installation of Sprinkler Systems, NFPA, 2002 Edition
- NFPA 14: Standard on the Installation of Standpipe, Private Hydrant, and Hose Systems, NFPA, 2003 Edition
- NFPA 20: Standard on the Installation of Stationary Pumps for Fire Protection, NFPA, 2003 Edition
- NFPA 24: Standard on the Installation of Private Fire Service Mains and Their Appurtenances, NFPA, 2002 Edition
- NFPA 30A: Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA, 2003 Edition
- NFPA 58: Liquefied Petroleum Gas Code, NFPA, 2008 Edition
- NFPA 495: Explosive Materials Code, NFPA, 2006 Edition
- NFPA 704: Standard System for the Identification of the Hazards of Materials for Emergency Response, NFPA, 2001 Edition
- Private Fire Protection and Detection, IFSTA, Second Edition

Calendar of Events

DAY	TOPIC	TITLE	TIME	ACTIVITY	EVALUATION
Day 1	1-1	Orientation And Administration	2:30	1-1-1	
	2-1	Flammable And Combustible Liquids Terms And Characteristics	1:00	2-1-1 2-1-2	
	2-2	Acceptable Containers For Flammable And Combustible Liquids	0:30	2-2-1	
	2-3	Introduction To Material Safety Data Sheets	0:30	2-3-1	
	2-4	Inside Storage Of Flammable And Combustible Liquids	1:00		
	2-5	Outside Storage Of Flammable And Combustible Liquids	1:00		
	2-6	Dispensing, Using, Mixing, And Handling Flammable And Combustible Liquids	1:30	2-6-1	
		Day 1 Total	8:00		
Day 2			1:00		Test #1
	2-7	Properties Of Compressed, Cryogenic, And Liquefied Gases	1:00		
	2-8	Fire Hazards Of Compressed And Liquefied Gases	1:00	2-8-1	
	2-9	Inspecting Motor Vehicle Dispensing Stations	0:30		
	2-10	Inspecting LPG Occupancies	0:30		
	2-11	Inspecting Flammable Finish Application Occupancies	1:00		
	2-12	Methods For Controlling Ignition Sources And Explosive Atmospheres	1:00		
	3-1	Hazardous Materials Terms And Characteristics	1:00	3-1-1	
	3-2	Sources Of Technical Information On Hazardous Materials	0:30		
	3-3	Regulating Hazardous Materials	0:30		
		Day 2 Total	8:00		
Day 3	3-4	Introduction To Hazardous Materials Management Plan (HMMP)	0:15		
	3-5	Storage And Transfer Practices Of Compressed And Liquefied Gases	1:00		
	3-6	Hazards Of Explosives And Fireworks	0:30		
	3-7	Storage Of Hazardous Materials	1:00		
	3-8	NFPA 704 Identification Systems	0:45	3-8-1	
	3-9	Classification By Hazard	0:30		

FIRE PREVENTION 1B (BRIDGE)

Inspection Of Fire Protection Systems And Special Hazards

Calendar Of Events

DAY	TOPIC	TITLE	TIME	ACTIVITY	EVALUATION
	3-10	Inspection Of The Incidental Use, Handling, And Storage Of Hazardous Materials	1:00	3-10-1	Test #2
			1:00		
	4-1	Portable Fire Extinguisher Classifications	1:00		
	4-2	Portable Fire Extinguisher Placement	0:30	4-2-1	
	4-3	Inspecting Portable Fire Extinguishers	0:30		
		Day 3 Total		8:00	
Day 4	5-1	Fixed Fire Protection Systems	1:00		Test #3
	5-2	Inspecting Fixed Fire Protection Systems	1:00		
	5-3	Inspecting Commercial Cooking Equipment	0:30	5-3-1	
	6-1	Detection And Alarm Systems Terms And Characteristics	0:30	6-1-1	
	6-2	Fire Alarm System Components	0:45		
	6-3	Fire Alarm Signaling System Classifications	0:30		
	6-4	Inspecting Fire Alarm Systems	0:30		
	6-5	CFC Requirements For Fire Alarm Systems	0:15		
			1:00		
	7-1	Water-Based Fire And Protection Systems Terms And Conditions	1:00		
	7-2	Water Supply Systems	0:30		
	7-3	Sprinkler System Benefits, Limitations, And Design	0:30	7-3-1 Homework	
		Day 4 Total		8:00	
	Day 5	7-4	Types Of Sprinkler Systems	1:00	
7-5		Sprinkler System Components	1:00	7-5-1	
7-6		Inspecting Sprinkler Systems	1:00		
7-7		Conducting Tests On Wet-Pipe Sprinkler Systems	0:30		
7-8		Conducting Tests On Dry-Pipe Sprinkler Systems	0:30		
7-9		Characteristics Of Standpipe Systems	1:00	7-9-1	
7-10		Inspecting Standpipe Systems	1:00		
		Review And Certification Exam	2:00		
	Day 5 Total		8:00		

RETIRED CURRICULUM

Topic 1-1: Orientation And Administration

My Progress Chart

FIRE PREVENTION 1B	BEGINNING DATE:		
	ENDING DATE:		
ACTIVITIES	COMPLETED	EVALUATED ITEMS	POINTS
Activity 1-1-1		Test 1	
Activity 2-1-1		Test 2	
Activity 2-1-2		Test 3	
Activity 2-2-1			
Activity 2-3-1		Day 1 Attendance	
Activity 2-6-1		Day 2 Attendance	
Activity 2-8-1		Day 3 Attendance	
Activity 3-1-1		Day 4 Attendance	
Activity 3-8-1		Day 5 Attendance	
Activity 3-10-1			
Activity 4-2-1			
Activity 5-3-1			
Activity 6-1-1			
Activity 7-3-1			
Activity 7-4-1			
Activity 7-5-1			
Activity 7-9-1		PASS/FAIL	

Individual Activity 1-1-1: Fire Prevention Checkup

Time Frame: 2:00

Materials Needed:

- California Fire Code, CBSC, 2007 Edition
- Pen or pencil

Introduction: This activity provides you the opportunity to assess your apperceptive base and retention of material presented in Fire Prevention 1A.

Directions:

1. Using the CFC, complete the following pretest.
2. You have 1 hour to complete this activity.
3. Be prepared to discuss your answers with the class.

SECTION I

Using information taken from Section 202, identify the group assignments for the following occupancies:

Type Of Occupancy	Group Classification
1. Restaurant with occupant load of 299	_____
2. Daycare center for 30 children, ages 5 or older	_____
3. State prison	_____
4. Restaurant with an occupant load of 32	_____
5. Service station	_____
6. Condominium	_____
7. Fiberglass shop where flammable liquids are used	_____
8. College classroom with 49 occupants	_____
9. 15-story office building	_____
10. 150,000 square foot retail store	_____

SECTION II

Using information taken from Table 1015.1 for Column 1 and Table 1004.1.1 for Column 2, determine the minimum egress requirement and occupant load factor for the following occupancies:

	Minimum Of 2 Means Of Egress When Occupant Load Is At Least	Occupant Load Factor
11. Assembly area concentrated use (without fixed seats)	_____	_____
12. Classroom	_____	_____
13. Dance floor	_____	_____
14. Day care	_____	_____
15. Hotels and apartments	_____	_____
16. Offices	_____	_____
17. Skating rink	_____	_____
18. Stores/retail sales room	_____	_____
19. Kitchen/restaurant	_____	_____
20. Yoga room	_____	_____

SECTION III

Using the information taken from Part I, answer the following questions and include the code section where you found the answer.

21. Who is responsible for enforcement of the California Fire Code?

22. Can the Fire Chief prevent a family from occupying their home after a fire has occurred there?

23. When a jurisdiction adopts the fire code, do they automatically adopt the Appendix as well?

24. What sort of crime is a person guilty of when they violate provisions of the California Fire Code?

25. Would a permit be required to ripen fruit or crops?

Using the information taken from Part II, answer the following questions and include the code section where you found the answer.

26. Is a tent an air supported structure?

27. Is a duplex considered an apartment house?

28. Can a "means of egress" include an area outside the building?

29. Does "liquid" mean flammable liquid, combustible liquid, or both?

30. Is newsprint stacked on pallets considered high-pile storage if it is stacked 14 feet high?

Topic 2-1: Flammable and Combustible Liquids Terms and Characteristics

Student information for this topic can be found in the California Fire Code, CBSC, 2007 Edition, Chapters 2, 27, 34, and 43 and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 10.

Individual Activity 2-1-1: Introduction To Terms

Time Frame: 0:30

Materials Needed:

- California Fire Code, CBSC, 2007 Edition, Chapters 2, 27, 34, and 43
- Pen or pencil

Introduction: This lesson introduces numerous terms that will be used throughout the unit. This activity provides you the opportunity to develop competency in using CFC 2007 to identify or define commodities or terminology necessary to correctly interpret code sections.

Directions:

1. Using CFC Chapters 2, 27, 34, and 43, fill in the missing information for each of the following terms.
2. You have 15 minutes to complete this activity.
3. Be prepared to discuss your answers with the class.

SECTION I

1. Boiling point
 - (a) The temperature when the vapor pressure produced by the liquid equals the _____ pressure.
2. Closed container
 - (a) A container sealed by a _____ or other device that will not allow the escape of liquid, vapor, or dust under ordinary conditions of use and handling.
3. Closed system use
 - (a) The use of a liquid hazardous material in a closed system or vessel that will not emit _____ during normal operations.
4. Container
 - (a) A vessel of _____ gallons or less capacity used for transporting or storing flammable and combustible liquids.
5. Dispensing
 - (a) The _____ or transferring of a material from a container, tank, or similar vessel where vapors, dusts, fumes, mists, or gases could be liberated to the atmosphere.
6. Fire point
 - (a) The _____ temperature of a liquid in an open container at which it will sustain burning for 5 seconds.
 - (b) Not used in the classification of flammable or combustible liquids.
7. Flash point
 - (a) The minimum temperature at which a liquid produces _____ in sufficient quantities to ignite (flash) when a test flame is applied.

8. Liquid

- (a) A material that has a melting point which is less than or equal to 68°F and a _____ that is greater than 68°F at 14.7 psia.

9. Liquid storage room

- (a) A room classified as a Group H, Division 3 occupancy used for the storage of _____ or _____ liquids.
- (b) In excess of the amounts allowed in common areas.
- (c) Has a myriad of fire and life safety requirements as set forth in CFC Section 7902.5.11.

10. Mixing

- (a) The combining, blending, or bringing together within the same container, tank, or vessel flammable or combustible liquids whereby _____ vapors could escape to the atmosphere.

11. Open system use

- (a) The use of a liquid hazardous material in a system or vessel that is continuously open to the atmosphere during normal operations and will liberate _____.

12. Portable tank

- (a) Any packaging over _____ gallon capacity and designed to be movable with mechanical means.

13. Safety can

- (a) An approved closed container, of not more than _____ gallons capacity, having a spring-closing lid and spout cover.

14. Storage

- (a) The keeping, retention, or leaving of flammable or combustible liquids in closed _____, tanks, or similar vessels.

15. Unstable (reactive) liquid

- (a) A chemical that will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shock, pressure, or _____.
- (b) Also, when the product is exposed to the _____ during normal operations.

SECTION II: FLAMMABLE LIQUIDS

16. Defined as a liquid with a flash point below _____ °F.

17. As flash points are usually _____ than ambient air temperatures, Class I liquids will always produce enough vapors to ignite.

18. DOT classification requires Class I liquids to be labeled _____.

19. Class I-A liquids

- (a) Flash point below _____ °F.
- (b) Boiling point below _____ °F.

20. Class I-B liquids

- (a) Flash point below _____ °F.
- (b) Boiling point at or above _____ °F.

21. Class I-C liquids

- (a) Flash point at or above _____ °F and below _____ °F.
- (b) _____ point is not considered in classifying Class I-C liquids.

SECTION III: COMBUSTIBLE LIQUIDS

22. Liquids with a flash point at or above _____°F.

23. Class II

(a) Flash point at or above _____°F and below _____°F.

(b) Require a moderate amount of heat to produce enough vapors to burn.

24. Class III-A liquids

(a) Flash point at or above _____°F and below _____°F.

25. Class III-B liquids

(a) Flash point at or above _____°F.

RETIRED CURRICULUM

Individual Activity 2-1-2: Flammable And Combustible Liquid Classifications

Time Frame: 0:30

Materials Needed:

- California Fire Code, CBSC, 2007 Edition, Chapter 34
- Pen or pencil

Introduction: This activity provides you the opportunity to classify flammable and combustible liquids in accordance with the CFC.

Directions:

1. Using CFC Chapter 34, classify the flammable and combustible liquids below.
2. You have 15 minutes to complete this activity.
3. Be prepared to discuss your answers with the class.

RETIRED CURRICULUM

Class

Flammable And Combustible Liquid

1. Acetone, flash point: -4°F, boiling point: 133°F
2. Isopropyl alcohol, flash point: 53°F, boiling point: 181°F
3. Jet A fuel, flash point: 110-150°F, boiling point: 400°-550°F
4. Jet B fuel, flash point: -10°-30°F, no information on boiling point
5. Blanket and roller wash, flash point: 100°F
6. Polyisocyanate activator, flash point: between 20°-73°F, boiling range: 168°-347°F
7. Epi-Cure 855, flash point: >200°F, boiling point: high boiling
8. Shell turbo oil, viscosity grade 32, flash point: 385°F
9. Benzene, flash point: 12°F, boiling point: 176°F
10. Texaco charcoal lighter fluid, flash point: 105°F
11. Kerosene burner fuel, flash point: 100°F, boiling range: 175°-300°F
12. Lacquer thinner, <20°F*
13. Dow brake fluid, flash point: 170°F
14. Diesel fuel oil No. 2-D, flash point: 125°F, boiling point: 340°-676°F
15. Gasoline, flash point: -45°F, boiling point: 100°-400°F

Topic 2-2: Acceptable Containers for Flammable and Combustible Liquids

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 10.

Individual Activity 2-2-1: Allowable Containers

Time Frame: 0:20

Materials Needed:

- California Fire Code, CBSC, 2007 Edition, Chapters 2, 27, 34
- NFPA 30: Flammable and Combustible Liquids Code, 2003 Edition, Table 6.2.3
- Pen or pencil

Introduction: This activity provides you opportunity to read and interpret requirements regarding containers used for the incidental storage of flammable and combustible liquids.

Directions:

1. Using CFC Chapters 2, 27, 34 and NFPA 30 Table 6.2.3, fill in the information in the chart below.
2. When the chart is completed, use that information and the CFC to answer questions 1-5.
3. You have 10 minutes to complete this activity.
4. Be prepared to discuss your answers with the class.

FLAMMABLE AND COMBUSTIBLE LIQUID WORKSHEET		Flash Point	Boiling Point	Safety Can	Approved Plastic	Polyethylene	Nonsafety Cans-Metal	Nonsafety Cans-Glass
		MIN-MAX TEMPS		MAXIMUM ALLOWABLE SIZES (LITERS)				
Flammable Liquids	Class I-A							
	Class I-B							
	Class I-C							
Combustible Liquids	Class II							
	Class III-A							
	Class III-B							

Type	Flammable Liquids			Combustible Liquids	
	Class IA	Class IB	Class IC	Class II	Class III
Glass	0.5 L (1.05 pt)	1 L (1.05 qt)	5 L (1.3 gal)	5 L (1.3 gal)	20 L (5.3 gal)
Metal (other than drums) or approved plastic	5 L (1.3 gal)	20 L (5.3 gal)	20 L (5.3 gal)	20 L (5.3 gal)	20 L (5.3 gal)
Safety cans	10 L (2.6 gal)	20 L (5.3 gal)	20 L (5.3 gal)	20 L (5.3 gal)	20 L (5.3 gal)
Metal drum (e.g., UN 1A1 or 1A2)	450 L (119 gal)	450 L (119 gal)	450 L (119 gal)	450 L (119 gal)	450 L (119 gal)
Approved metal portable tanks and 1BCs	3000 L (793 gal)	3000 L (793 gal)	3000 L (793 gal)	3000 L (793 gal)	3000 L (793 gal)
Rigid plastic 1BCs (UN 31H1 or 31H2) and composite 1BCs with rigid inner receptacle (UN31HZ1)	NP	NP	NP	3000 L (793 gal)	3000 L (793 gal)
Composite 1BCs with flexible inner receptacle (UN31HZ2) and flexible 1BCs (UN13H, UN13L, and UN13M)	NP	NP	NP	NP	NP
Bag-in Box Nonbulk	NP	NP	NP	NP	NP
Polyethylene UN1H1 or as authorized by DOT exemption	5 L (1.3 gal)	20 L (5.3 gal) [†]	20 L (5.3 gal) [†]	450 L (119 gal) [†]	450 L (119 gal) [†]
Fiber drum NMFC or UFC Type 2A; Types 3A, 3B-H, or 3B-L; or Type 4A	NP	NP	NP	450 L (119 gal)	450 L (119 gal)

NP = Not Permitted
[†] For Class 1B and 1C water-miscible liquids, the maximum allowable size of plastic container is 230 L (60 gal) if stored and protected in accordance with Table 6.8.2(g).

1. Regular unleaded gasoline (FP -40°F/BP 85°F) is being stored in a 20 Liter gas can. The gas can is approved and listed by UL. Is this a code violation?

Yes No

2. You find 20 liters of MEK (Ethyl Methyl Ketone: FP -16°F/BP 186°F) stored in a metal container. Is this a code violation?

Yes No

3. While inspecting a lab, you find 20 Liters of Ethyl Ether (FP -49°F/BP 95°F) in a safety can. Is this a code violation?

Yes No

4. You find Isopropyl Alcohol (FP 54°F/BP 180°F) in a 1-liter glass jar. Is this a code violation?

Yes No

5. Acetone (FP -4°F/BP 133°F) is being used in a nail shop. It is stored at every workstation in a plastic 16 oz. nonlisted, nonapproved container. Is this a code violation?

Yes No

Topic 2-3: Introduction To Material Data Safety Sheets

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 10.

Individual Activity 2-3-1: MSDS Information Search

Time Frame: 0:15

Materials Needed:

- MSDS for commercial propane
- Pen or pencil

Introduction: This activity provides you opportunity to find the relevant information listed on the MSDS that can assist the inspector when determining the regulation requirements for materials stored.

Directions:

1. Using the sample MSDS on the following pages, find the information requested below.
2. You have 10 minutes to complete this activity.
3. Be prepared to discuss your answers with the class.

1. Chemical family _____
2. Boiling point _____
3. Flash point _____
4. Flammable limits _____
5. Company phone number _____
6. NFPA 704 reactivity rating _____
7. NFPA 704 health rating _____
8. Ignition temperature _____
9. Vapor density _____
10. First aid procedure for skin contact _____

MATERIAL SAFETY DATA SHEET EFFECTIVE JULY 1, 1993

AGENCY NAME	TRANSPORTATION	CHEMTREC NO.	GENERAL	SAFETY DEPT.
AGENCY ADDRESS	EMERGENCY NO:	(800) 424-9300	INFORMATION:	(201) 887-5300
AGENCY CITY/STATE				

DANGER! Extremely flammable liquefied gas under pressure. Keep away from heat, sparks, flame, and all other ignition sources. Vapor reduces oxygen available for breathing and may cause suffocation in confined spaces. Use only with adequate ventilation. Odor may not provide adequate warning of potentially hazardous concentrations. Vapor is heavier than air and may collect at low levels. Liquid may cause freeze burn similar to frostbite. Do not get liquid in eyes, on skin, or on clothing. Avoid prolonged breathing of vapor. Keep container valve closed when not in use.

SECTION I - IDENTIFICATION

PRODUCT: Commercial Propane
 CHEMICAL FAMILY: Paraffinic Hydrocarbon
 SYNONYMS: Liquefied Petroleum Gas; LP-Gas; LPG
 CHEMICAL FORMULA: C₃H₈

SECTION II - INGREDIENTS

MATERIAL	CAS NUMBER	PERCENT
ETHANE	74-84-0	0 -- 5.0
PROPANE	74-98-8	87.5 -- 100
PROPYLENE	115-07-1	0 -- 5.0
BUTANE	Various	0 -- 2.5
ETHYL MERCAPTAN	75-08-01	

SECTION III - HEALTH INFORMATION

INHALATION: Asphyxiant in high concentrations due to dilution of available oxygen. At excessive vapor concentrations, this product has anesthetic, asphyxiating properties and may cause sleepiness. At levels above 100,000 ppm (i.e. 10%), propane is mildly irritating to the respiratory tract and may result in dizziness, headache, drowsiness, nausea, shortness of breath, lack of muscular coordination, excessive salivation, disorientation, vomiting, and excitation. In extreme cases, convulsions, unconsciousness, and death may occur because of asphyxiation. Persons with chronic respiratory disease should avoid exposure.

INGESTION: Liquid may cause freeze burn similar to frostbite. Ingestion not expected to occur in normal use.

EYE CONTACT: Liquid may cause freeze burn similar to frostbite.

SKIN CONTACT: Liquid may cause freeze burn similar to frostbite.

OTHER: Product is not listed by IARC, NTP, or OSHA as a potential carcinogen. Propane and some of the minor components have been reported to be cardiac sensitizers in experiments

SECTION IV - OCCUPATIONAL EXPOSURE LIMITS

MATERIAL	PEL/TWA	TLV/TWA
ETHANE	Not Established	Simple Asphyxiant
PROPANE	1000 ppm	Simple Asphyxiant
PROPYLENE	Not Established	Simple Asphyxiant
BUTANE	800 ppm	800 ppm
ETHYL MERCAPTAN	0.5 ppm	0.5 ppm

SECTION V - EMERGENCY AND FIRST AID PROCEDURE For Over Exposure By

INHALATION: Remove victim from further exposure and into fresh air. Provide oxygen if breathing is difficult. If victim is unconscious, get prompt medical attention.

INGESTION: If swallowed, get immediate medical attention.

EYE CONTACT: For contact with liquid, flush immediately with water. Obtain immediate medical attention.

SKIN CONTACT: If freeze burn occurs, remove contaminated clothes, shoes and jewelry. Immerse burned area in warm (not hot) water. Keep immersed. Get prompt attention.

SECTION VI - PHYSICAL DATA

BOILING POINT: -44°F
MELTING POINT: N/A
VAPOR PRESSURE: 196 psig @ 100°F
SPECIFIC GRAVITY (H₂O = 1): 0.504
VAPOR DENSITY (AIR = 1): 1.50
SOLUBILITY IN WATER: Slight, 0.1 to 1.0%
APPEARANCE AND ODOR: Colorless, odorless in natural form

ODORANT WARNING

Odorant is added to aid in detection of leaks. One common odorant is ethyl mercaptan, CAS No. 75-08-1. Odorant has a foul, skunk like odor. The odorant is effective in most instances, but not everyone can smell the odor. The ability of people to detect odors varies widely. Also, certain chemical reactions with material in the propane system can reduce the propane odor level. No odorant will be 100% effective in all circumstances. If odor level appears to be weak, notify propane supplier immediately.

SECTION VII - FIRE AND EXPLOSION HAZARDS

FLASH POINT AND METHOD USED: -156°F
IGNITION TEMPERATURE IN AIR: 920°F – 1,120°F
FLAMMABLE LIMITS IN AIR, % BY VOLUME: Lower: 2.2% Upper: 9.6%
NFPA RATING (Under Fire Conditions. Does not apply to exposure hazards other than during fire):
HEALTH: 1 Slighting toxic
FIRE: 4 Extremely flammable
REACTIVITY: 0 Stable

FIRE FIGHTING PROCEDURES:

Eliminate sources of ignition. Evacuate area. Notify fire department. Allow only trained, properly protected personnel in area. Shut off source of gas, if possible. Allow fire to burn itself out after gas flow is shut off. If gas flow cannot be shut off, do not extinguish fire. Allow fire to burn itself out using high volume water supply to cool heat exposed pressure containers and nearby equipment. Approach a flame-enveloped container from the side, never the head ends. Use extreme caution when applying water to a container that has been exposed to heat or flame for more than a short time. For uncontrollable fires and when flame is impinging on container, withdraw all personnel and evacuate vicinity immediately.

USUAL FIRE & EXPLOSION HAZARDS:

Fire fighters should wear self-contained breathing apparatus in the positive pressure mode with a full facepiece when there is a possibility of exposure to smoke, fumes or hazardous decomposition

Topic 2-4: Inside Storage of Flammable and Combustible Liquids

Student information for this topic is also found in the California Fire Code, CBSC, 2001 Edition, Article 79 and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 10.

RETIRED CURRICULUM

Topic 2-5: Outside Storage of Flammable and Combustible Liquids

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 34 and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 10.

RETIRED CURRICULUM

Topic 2-6: Dispensing, Using, Mixing, and Handling Flammable and Combustible Liquids

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 34 and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 10.

Group Activity 2-6-1: Write 'Em Up!

Time Frame: 0:30

Materials Needed:

- California Fire Code, CBSC, 2007 Edition, Chapter 34
- Paper
- Pen or pencil

Introduction: This activity provides you the opportunity to apply CFC Chapter 34 to a factual situation in a common scenario.

Directions:

1. Working in groups, read the scenario.
2. Answer the questions for each hint and list them on a separate sheet of paper.
3. Using the answers from the hints, determine at least three violations.
4. Find the code section in CFC Chapter 34 that prohibits the activities and record them.
5. List the corrective action(s) necessary for each violation.
6. You have 20 minutes to complete this activity.
7. Be prepared to discuss your findings with the class.

SHERWIN-WILLIAMS --R7K211 ACRYLIC ENAMEL REDUCER MATERIAL SAFETY DATA SHEET

NSN: 801000F024427

Manufacturer's CAGE: 54636

Part No. Indicator: A

Part Number/Trade Name: R7K211 ACRYLIC ENAMEL REDUCER

GENERAL INFORMATION

Company's Name: SHERWIN-WILLIAMS CO

Company's Street: 101 PROSPECT AVE N W

Company's City: CLEVELAND

Company's State: OH

Company's Country: US

Company's Zip Code: 44115-1042

Company's Emerg Ph #: (216) 566-2917

Company's Info Ph #: (216) 566-2902

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 002

Status: SE

Date MSDS Prepared: 01APR91

Safety Data Review Date: 12AUG92

Preparer's Company: SHERWIN-WILLIAMS CO

Preparer's St Or P. O. Box: 101 PROSPECT AVE N W

Preparer's City: CLEVELAND

Preparer's State: OH

Preparer's Zip Code: 44115-1042

MSDS Serial Number: BNXPQ

INGREDIENTS/IDENTITY INFORMATION

Proprietary: NO

Ingredient: WEIGHT PER GALLON IN POUNDS: 6.74

Ingredient Sequence Number: 01

NIOSH (RTECS) Number: 9999999WG

Proprietary: NO

Ingredient: TOTAL VOC LESS WATER & EXEMPT SOLVENTS: 6.74

Ingredient Sequence Number: 02

NIOSH (RTECS) Number: 9999999VO

Proprietary: NO

Ingredient: LIGHT ALIPHATIC NAPHTHA, VM & P NAPHTHA *92/2*

Ingredient Sequence Number: 03

Percent: 26%

NIOSH (RTECS) Number: 1002250AN

CAS Number: 64742-89-8

OSHA PEL: 300 PPM

ACGIH TLV: 300 PPM

Proprietary: NO

Ingredient: TOLUENE

Ingredient Sequence Number: 04

Percent: 47%

NIOSH (RTECS) Number: XS5250000

CAS Number: 108-88-3

OSHA PEL: 200 PPM/150 STEL

ACGIH TLV: 50 PPM; 9293

Other Recommended Limit: 375 MG/CUM

Proprietary: NO
Ingredient: XYLENE, DIMETHYLBENZENE, XYLOL
Ingredient Sequence Number: 05
Percent: 6%
NIOSH (RTECS) Number: ZE2100000
CAS Number: 1330-20-7
OSHA PEL: 100 PPM
ACGIH TLV: 100 PPM, SKIN
Other Recommended Limit: 100 PPM

Proprietary: NO
Ingredient: SOLVENT NAPHTHA, PETROLEUM, LIGHT AROMATIC, HIGH FLASH AROMATIC NAPHTHA
Ingredient Sequence Number: 06
Percent: 3%
NIOSH (RTECS) Number: WF3400000
CAS Number: 64742-95-6

Proprietary: NO
Ingredient: SOLVENT NAPHTHA, HEAVY AROMATIC NAPHTHA
Ingredient Sequence Number: 07
Percent: 3%
NIOSH (RTECS) Number: WF3100000
CAS Number: 64742-94-5

Proprietary: NO
Ingredient: ACETONE; DIMETHYL KETONE
Ingredient Sequence Number: 08
Percent: 15%
NIOSH (RTECS) Number: AL3150000
CAS Number: 67-64-1
OSHA PEL: 1000PPM
ACGIH TLV: 750PPM/1000STEL;9293

PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: 130F
Vapor Density (Air=1): >AIR
Specific Gravity: 0.79-0.87
Evaporation Rate And Ref: SLOWER THAN ETHER
Percent Volatiles By Volume: 100%

FIRE AND EXPLOSION HAZARD DATA

Flash Point: 9F
Lower Explosive Limit: 0.7%
Upper Explosive Limit: 6.7%
Extinguishing Media: CO₂, DRY CHEMICAL & FOAM
Special Fire Fighting Proc: USE SELF-CONTAINED BREATHING APPARATUS. WATER SPRAY MAY BE INEFFECTIVE. IF WATER IS USED, FOG NOZZLES ARE PREFERABLE. USE WATER USED TO COOL CLOSED CONTAINERS.
Unusual Fire And Expl Hazrds: KEEP CONTAINERS TIGHTLY CLOSED. CLOSED CONTAINERS MAY BUILD-UP PRESSURE, EXPLODE OR AUTOIGNITE WHEN EXPOSED TO EXTREME HEAT. FLAMMABLE.

REACTIVITY DATA

Stability: YES
Cond To Avoid (stability): HEAT, ELECTRICAL EQUIPMENT, SPARKS, OPEN FLAME, PILOT LIGHTS & OTHER IGNITION SOURCES
Hazardous Decomp Products: CO₂, CO
Hazardous Poly Occur: NO

HEALTH HAZARD DATA

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES

SHERWIN-WILLIAMS -- B54B11 BLACK, INDUSTRIAL PAINT MATERIAL SAFETY DATA SHEET

ACGIH TLV: 3.5 MG/M3; 9394

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO

Ingredient: VOLATILE ORGANIC COMPOUNDS = 3.89 LBS/GAL

Ingredient Sequence Number: 04

Percent: 3.89LB/

NIOSH (RTECS) Number: 9999999VO

OSHA PEL: NOT ESTABLISHED

ACGIH TLV: NOT ESTABLISHED

Other Recommended Limit: NONE RECOMMENDED

PHYSICAL/CHEMICAL CHARACTERISTICS

Appearance And Odor: BLACK PAINT

Boiling Point: 284F,140C

Vapor Density (Air=1): >AIR

Specific Gravity: 0.96-1.14

Evaporation Rate And Ref: SLOWER THAN ETHER

Percent Volatiles By Volume: >40

FIRE AND EXPLOSION HAZARD DATA

Flash Point: 101F,38C

Flash Point Method: PMCC

Lower Explosive Limit: 1.0%

Upper Explosive Limit: 6.0

Extinguishing Media: CO2, DRY CHEMICAL, FOAM

Special Fire Fighting Proc: FIRE FIGHTERS SHOULD WEAR PROTECTIVE CLOTHING AND SELF-CONTAINED BREATHING APPARATUS.

Unusual Fire And Expl Hazrds: KEEP CONTAINERS TIGHTLY CLOSED. ISOLATE FROM HEAT, ELECTRICAL EQUIPMENT, SPARKS, & OPEN FLAME. APPLICATION TO HOT SURFACES REQUIRES SPECIAL PRECAUTIONS.

REACTIVITY DATA

Stability: YES

Cond To Avoid (Stability): KEEP AWAY FROM HEAT, SPARKS, OPEN FLAME, ELECTRICAL EQUIPMENT, & HOT SURFACES.

Materials To Avoid: STRONG OXIDIZING AGENTS.

Hazardous Decomp Products: CARBON MONOXIDE AND DIOXIDE, AND METAL OXIDES

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NONE

HEALTH HAZARD DATA

Route Of Entry -Inhalation: YES

Route Of Entry -Skin: YES

Route Of Entry -Ingestion: YES

Health Haz Acute And Chronic: ACUTE-IRRITATION OF EYES, SKIN & RESPIRATORY SYSTEM. MAY CAUSE NERVOUS SYSTEM DEPRESSION. EXTREME EXPOSURE MAY RESULT IN UNCONSCIOUSNESS AND POSSIBLY IN DEATH. CHRONIC-MAY CAUSE DAMAGE TO LIVER, KIDNEY, BLOOD FORMING AND REPRODUCTIVE SYSTEM.

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: RATS EXPOSED TO TITANIUM DIOXIDE DUST 250 MG/M3 DEVELOPED CANCER.

Signs/Symptoms Of Overexp: HEADACHE, DIZZINESS, NAUSEA/LOSS OF REDNESS/ITCHING/BURNING SENSATION. REPEATED/PROLONGED OVEREXPOSURE TO SOLVENTS CAUSES PERMANENT BRAIN/NERVOUS SYSTEM DAMAGE/ADVERSE AFFECTS TO THE LIVER, URINARY, & REPRODUCTIVE SYSTEMS.

Med Cond Aggravated By Exp: ALLERGIC SKIN REACTION

Emergency/First Aid Proc: INHALATION: REMOVE TO FRESH AIR, PROVIDE CPR/

STERLING LACQUER MFG --U-2707; SLOW RETARDER -LACQUER RETARDER MATERIAL SAFETY DATA SHEET

NSN: 801000DO04796

Manufacturer's CAGE: 60003

Part No. Indicator: A Part Number/Trade Name: U-2707; SLOW RETARDER

GENERAL INFORMATION

Item Name: LACQUER RETARDER

Company's Name: STERLING LACQUER MFG. CO. INC.

Company's Street: 3150 BRANNON AVE.

Company's City: ST. LOUIS

Company's State: MO

Company's Country: US

Company's Zip Code: 63139

Company's Emerg Ph #: 314-776-4450

Company's Info Ph #: 314-776-4450

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SE

Date MSDS Prepared: 01JUN93

Safety Data Review Date: 22APR96

Supply Item Manager: CX

MSDS Preparer's Name: P.D.MOORE

MSDS Serial Number: BYTGY

Specification Number: NONE

Spec Type, Grade, Class: NONE

Hazard Characteristic Code: F4

Unit Of Issue: NK

Unit Of Issue Container Qty: UNKNOWN

Type Of Container: UNKNOWN

Net Unit Weight: UNKNOWN

INGREDIENTS/IDENTITY INFORMATION

Proprietary: NO

Ingredient: PROPYLENE GLYCOL MONOMETHYL ETHER ACETATE

Ingredient Sequence Number: 01

Percent: 3.7

NIOSH (RTECS) Number: A18295000

CAS Number: 108-65-6

OSHA PEL: NOT ESTABLISHED.

ACGIH TLV: NOT ESTABLISHED.

Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO

Ingredient: VOLATILE ORGANIC CONTENT=967 G/L

Ingredient Sequence Number: 02

NIOSH (RTECS) Number: 9999999VO

CAS Number: UNKNOWN

OSHA PEL: NOT ESTABLISHED

ACGIH TLV: NOT ESTABLISHED

Other Recommended Limit: NONE RECOMMENDED

PHYSICAL/CHEMICAL CHARACTERISTICS

Appearance And Odor: LIQUID; CLAR; SOLVENT ODOR.

Boiling Point: 302F, 150C

Vapor Density (Air=1): >1

Specific Gravity: 1

Decomposition Temperature: UNKNOWN

Evaporation Rate And Ref:

PRODUCT DESCRIPTION:

Sherwin-Williams® Paint Gun Cleaner is a powerful, non-hazardous paint and coating remover that is completely biodegradable and worker friendly. The cleaner is safe for use on most: substrates including: steel, aluminum, chrome, alloys, composites and paint brushes. Cleans paint from spray equipment, and is an effective dip tank solution, this cleaner is also excellent for concrete, removing grease, tar and other stains from garage floors.

TECHNICAL DATA:

Weight Solids:	12% (dissolved solids)
Volume Solids:	4% (dissolved)
VOC	215g/l(1.793lbs/gal)
Shelf Life:	1 year
Mixing Ratio:	Use at packaged consistency
Flash Point:	>80°C (>176F)
Freeze Hazard:	0C (32F)
Boiling Point	~100°C (212F)
Viscosity (cPs)	5-154 (5-15 cPs)

APPLICATION:

Spray Gun Equipment

1. Fill paint reservoir with Gun Cleaner.
2. Immediately spray cleaner through equipment into an appropriate receptacle until gun is cleaned and empty.
3. Thoroughly rinse/purge equipment and lines with thinner/solvent to remove any cleaner residue.

Dip Tank Solution

1. Fully submerge all parts to be cleaned. Use an appropriate container such as a high density polyethylene (HDPE) container. The original 5 gallon pail or 1 gallon bucket works well.
2. Let parts soak. Check repeatedly, 2 hours maximum.
3. Once paint has softened, scrape off and wash thoroughly.

NOTES:

1. Use a sponge or soft brush to remove softened surface paint if needed.
2. Avoid lower temperatures. Optimum working temperature is 85-115°.
3. Gun Cleaner may be re-used/reconstituted many times.
4. To minimize evaporation close/reseal Gun Cleaner after use.

Material Safety Data Sheet

Western Automotive Finishes
101 Prospect Ave. N.W.
Cleveland, OH 44115

Emergency telephone number
Information telephone number
Date of preparation

(216) 566-2917
(216) 566-2902
August 2, 1999

©1999, Western Automotive Finishes

HI-GLO® Synthetic Enamel Mixing Colors

W800/W4

CAS No.	Hazardous Ingredients (percent by weight)	TLV	PEL	OSHA PEL	TLV	PEL	OSHA PEL	Vapor Pressure (mm Hg)	W860 Green	W862 Permanent Green	W880 Basecoat Five	W882 Brit. White Pearl	W883 Brit. Bronze Pearl	W884 Brit. Blue Pearl	W885 Mica	W886 Carbazole Violet	W887 Deep Maroon	W890 Drier	W895 Polymeric Clear	P E R C E N T B Y W E I G H T
64742-89-8	V. M. & P. Naphtha.	300	<400>	300	PPM	12.0	19	18	22							13	14		16	
64742-88-7	Mineral Spirits.	100	100	100	PPM	2.0	29	29	28	8	8	2	2	2	2	6	6	93	31	
108-88-3	\$ Toluene.	50	100	100	PPM (skin)	22.0	6	6	6	8	2	2	2	2	5	5	5		6	
100-41-4	\$ Ethylbenzene	100	100	100	PPM	7.1				46	31	31	31	31	31	1				
1330-20-7	\$ Xylene.	100	100	100	PPM	5.9														
108-67-8	\$ 1,3,5-Trimethylbenzene	25	25	25	PPM	10.0										1				
95-63-6	1,2,4-Trimethylbenzene	25	25	25	PPM	2.0				1	1	1	1	1	1	2				
123-86-4	n-Butyl Acetate.	150	150	150	PPM	10.0	4	4	4	21						4	4		3	
97-85-8	Isobutyl Isobutyrate.	Not Established				3.2														
136-52-7	Cobalt 2-Ethylhexanoate.	Not Established																		
Unknown	Coated Mica.	3	3	3	Mg/M3 as Dust						20	20	20	20	20				1	
	\$ Manganese Compound [% Manganese]																			2 [0.2]
	\$ Cobalt Compound. [% Cobalt]																			1 [0.2]
	Weight per Gallon (lbs.)						7.49	7.52	7.45	7.52	9.29	9.33	9.33	9.37	9.30	7.53	7.68	6.51	7.45	
	VOC (Volatile Organic Compounds) Total - lbs./gal.						4.39	4.37	4.48	6.35	4.01	4.02	4.05	4.01	4.01	4.40	4.25	6.09	4.35	
	VOC Less Water & Federally Exempt Solvents - lbs./gal.						4.39	4.37	4.48	6.35	4.01	4.02	4.05	4.01	4.01	4.40	4.25	6.09	4.35	
	Photochemically Reactive						No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	
	Flash Point (°F)						72	72	72	77	45	45	45	45	40	72	72	105	72	
	DOL Storage Category						1B	1B	1B	1C	1B	1B	1B	1B	1B	1F	1B	2	1B	
	Flammability Classification (Flammable - Combustible)						Flam.	Flam.	Flam.	Flam.	Flam.	Flam.	Flam.	Flam.	Flam.	Flam.	Flam.	Comb.	Flam.	
	HMS (NFPA) Rating (health - flammability - reactivity)						2-3-0	2-3-0	2-3-0	2-3-0	2-3-0	2-3-0	2-3-0	2-3-0	2-3-0	2-3-0	2-3-0	2*-2-0	2-3-0	
	PAINT-SAFE® Personal Protection						J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	J3	

\$ Ingredient subject to the reporting requirements of the Superfund Amendments and Reauthorization Act (SARA) Section 313, 40 CFR 372.65 C

→→→ MSDS Text Page Follows →→→

W-27

SECTION 3 - PHYSICAL DATA

PRODUCT WEIGHT	See TABLE	EVAPORATION RATE	Slower than Ether
SPECIFIC GRAVITY	0.89-1.25	VAPOR DENSITY	Heavier than Air
BOILING RANGE	222-395°F	MELTING POINT	N.A.
VOLATILE VOLUME	55-95%	SOLUBILITY IN WATER	N.A.

SECTION 4 - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION	FLASH POINT	See TABLE	LEL 0.7 UEL 13.1
-----------------------------	-------------	-----------	------------------

See TABLE

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Keep containers tightly closed. Isolate from heat, electrical equipment, sparks, and open flame. Closed containers may explode when exposed to extreme heat. Application to hot surfaces requires special precautions. During emergency conditions, overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent.

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used. Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

SECTION 5 - HEALTH HAZARD DATA

ROUTES OF EXPOSURE

Exposure may be by INHALATION and/or SKIN or EYE contact, depending on conditions of use. To minimize exposure, follow recommendations for proper use, ventilation, and personal protective equipment.

ACUTE HEALTH HAZARDS

EFFECTS OF OVEREXPOSURE

Irritation of eyes, skin, and respiratory system. May cause nervous system depression. Extreme overexposure may result in unconsciousness and possibly death.

Certain colors contain Lead (See TABLE and PRODUCT LABEL). Acute occupational exposure to Lead is uncommon, but results in effects and symptoms similar to chronic overexposure described below.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Headache, dizziness, nausea, and loss of coordination are indications of excessive exposure to vapors or spray mists.

Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

EMERGENCY AND FIRST AID PROCEDURES

If INHALED: If affected, remove from exposure. Restore breathing. Keep warm and quiet.

If on SKIN: Wash affected area thoroughly with soap and water. Remove contaminated clothing and launder before re-use.

If in EYES: Flush eyes with large amounts of water for 15 minutes. Get medical attention.

If SWALLOWED: W880 & W890 => Never give anything by mouth to an unconscious person. DO NOT INDUCE VOMITING. Give conscious patient several glasses of water. Seek medical attention.

Other Products => Get medical attention.

CHRONIC HEALTH HAZARDS

Certain colors contain Lead and/or Chromates (See TABLE and PRODUCT LABEL).

Chronic overexposure to Lead may result in damage to the blood-forming nervous, urinary, and reproductive systems (including embryotoxic effects). Symptoms include abdominal discomfort or pain, constipation, loss of appetite, metallic taste, nausea, insomnia, nervous irritability, weakness, muscle and joint pains, headache, and dizziness.

Chromates are listed by IARC and NTP. Although studies have associated exposure to Chromium VI compounds with an increased risk of respiratory cancer, available evidence indicates that Lead Chromate (Chrome Yellow, Molybdate Orange) DOES NOT present this hazard.

Carbon Black is classified by IARC as possibly carcinogenic to humans (group 2B) based on experimental animal data, however, there is insufficient evidence in humans for its carcinogenicity.

Cobalt and cobalt compounds are classified by IARC as possibly carcinogenic to humans (group 2B) based on experimental animal data, however, there is inadequate evidence in humans for its carcinogenicity.

Prolonged overexposure to solvent ingredients in listed products, except W890, may cause adverse effects to the liver, urinary, blood forming, cardiovascular and reproductive systems. Prolonged overexposure to solvent ingredients in W890 may cause adverse effects to the liver and urinary systems.

Rats exposed to titanium dioxide dust at 250 mg./m³ developed lung cancer, however, such exposure levels are not attainable in the workplace.

Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

SECTION 6 - REACTIVITY DATA

STABILITY -- Stable

INCOMPATIBILITY

Metallics contain Aluminum. Contamination with Water, Acids, or Alkalis can cause evolution of hydrogen, which may result in dangerously increased pressures in closed containers.

CONDITIONS TO AVOID

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire, Carbon Dioxide, Carbon Monoxide, Oxides of Metals in Section 2.

HAZARDOUS POLYMERIZATION

Will Not Occur

SECTION 7 - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate and remove with inert absorbent.

WASTE DISPOSAL METHOD

Waste from these products may be hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261. Waste must be tested for ignitability to determine the applicable EPA hazardous waste number. Waste from products containing Lead or Chromium must also be tested for extractability.

Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State, and Local regulations regarding pollution.

SECTION 8 - PROTECTION INFORMATION

PRECAUTIONS TO BE TAKEN IN USE

Certain colors contain Lead (See TABLE and PRODUCT LABEL). Before initial use of Lead-containing colors, consult OSHA's standard for occupational Exposure to Lead (29 CFR 1910.1025).

Use only with adequate ventilation. Avoid breathing vapor and spray mist. Avoid contact with skin and eyes. Wash hands after using.

These products may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) that may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg./m³ (total dust), 3 mg./m³ (respirable fraction), OSHA PEL 15 mg./m³ (total dust), 5 mg./m³ (respirable fraction).

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding, wirebrushing, abrading, burning, or welding the dried film, wear a particulate respirator approved by NIOSH/MSHA for protection against non-volatile materials in Section 2.

PROTECTIVE GLOVES

Wear gloves that are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

SECTION 9 - PRECAUTIONS

DCL STORAGE CATEGORY -- See TABLE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Keep away from heat, sparks, and open flame. During use and until all vapors are gone: Keep area ventilated - Do not smoke - Extinguish all flames, pilot lights, and heaters - Turn off stoves, electric tools and appliances, and any other sources of ignition.

Consult NFPA Code. Use approved Bonding and Grounding procedures.

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

OTHER PRECAUTIONS

Certain colors contain Lead and/or Cadmium (See TABLE and PRODUCT LABEL). Do not apply Lead-containing colors on toys and other children's articles, furniture, or any interior surface of a dwelling or facility which may be occupied or used by children. Do not

apply on any exterior surface of dwelling units, such as windowsills, porches, stairs, or railings to which children may be commonly exposed.

Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal.

SECTION 10 - OTHER REGULATORY INFORMATION

CALIFORNIA PROPOSITION 65

WARNING: These products, except W890, contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

TSCA CERTIFICATION

All chemicals in these products are listed, or are exempt from listing, on the TSCA Inventory.

The above information pertains to these products as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.

RETIRED CURRICULUM

Topic 2-7: Properties of Compressed, Cryogenic, and Liquefied Gases

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 11.

RETIRED CURRICULUM

Topic 2-8: Fire Hazards of Compressed and Liquefied Gases

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapters 10 and 11.

Individual Activity 2-8-1: Hazardous Characteristics of Gases

Time Frame: 0:20

Materials Needed:

- Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapters 10 and 11
- Pen or pencil

Introduction: This activity provides you the opportunity to increase your ability to understand and explain the basic physical characteristics of compressed and liquefied gases.

Directions:

1. Fill in the blanks below to describe the characteristics of compressed and liquefied gases.
2. You have 15 minutes to complete this activity.
3. Be prepared to discuss your answers with the class.

1. What gas is propane compared to when determining the vapor density of propane?

2. Write "less than one, one, or greater than one" next to each gas below to indicate the relative density of the gases.

Ethyl ether: _____ Acetone: _____

Methane: _____ Propane: _____

3. Name four heat sources that can cause a flammable gas to ignite.

(1) _____

(2) _____

(3) _____

(4) _____

4. What does the acronym BLEVE stand for?

5. Name three causes of container failure.

(1) _____

(2) _____

(3) _____

Topic 2-9: Procedures for Inspecting Motor Vehicle Dispensing Stations

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 22.

RETIRED CURRICULUM

Topic 2-10: Procedures for Inspecting LPG Occupancies

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 38.

RETIRED CURRICULUM

Topic 2-11: Procedures for Inspecting Flammable Finish Application Occupancies

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 15.

RETIRED CURRICULUM

Topic 2-12: Methods for Controlling Ignition Sources and Explosive Atmospheres

Student information for this topic can be found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapters 3 and 10.

RETIRED CURRICULUM

Topic 3-1: Hazardous Materials Terms and Characteristics

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapters 2, 13, 27, 29, 31, 37, 39, 40, 41, 43, and Appendix E and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapters 10 and 11.

Group Activity 3-1-1: Hazardous Materials Terms And Characteristics

Time Frame: 0:30

Materials Needed:

- California Fire Code, CBSC, 2007 Edition
- Pen or pencil

Introduction: This activity provides you the opportunity to understand the definitions, terms, and characteristics of hazardous materials.

Directions:

1. Working in pairs and using the CFC, answer the following questions.
2. You have 15 minutes to complete this activity.
3. Be prepared to discuss your answers with the class.

1. Which class of oxidizer has a "primary hazard of slightly increasing the burning rate but does not cause spontaneous ignition"?

2. Which section of the CFC provides the definition for a highly toxic material?

3. Which class of unstable (reactive) materials is found to be normally stable, but loses stability at elevated temperatures and pressure?

4. Which section of the CFC provides the definition for an outdoor control area?

5. Which class of organic peroxide poses the least hazard?

6. Which section of the CFC provides the definition for a corrosive?

7. Which physical state is not included in the classes of oxidizers?

8. Which section of the CFC provides a general definition for hazardous materials?

Topic 3-2: Sources of Technical Information on Hazardous Materials

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapters 10 and 11.

RETIRED CURRICULUM

Topic 3-3: Regulating Hazardous Materials

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 27 and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapters 10 and 11.

RETIRED CURRICULUM

Topic 3-4: Introduction to Hazardous Materials Management Plan

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 27 and Appendix H.

RETIRED CURRICULUM

Topic 3-5: Storage and Transfer Practices of Compressed and Liquefied Gases

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 11.

RETIRED CURRICULUM

Topic 3-6: Hazards of Explosives and Fireworks

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 33 and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 11.

RETIRED CURRICULUM

Topic 3-7: Storage of Hazardous Materials

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 27 and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapters 10 and 11.

RETIRED CURRICULUM

Topic 3-8: NFPA 704 Identification Systems

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 27 and Appendix F, and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 10.

Individual Activity 3-8-1: Developing NFPA 704 Placards

Time Frame: 0:30

Materials Needed:

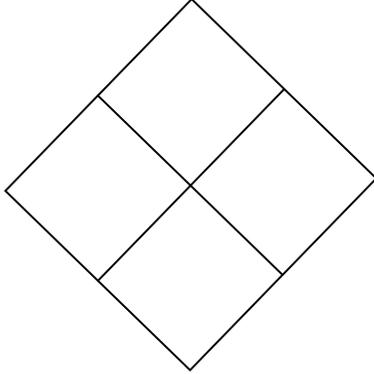
- California Fire Code, CBSC, 2007 Edition, Chapters 27 and Appendix F
- Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 10
- Material Safety Data Sheets for Benzoyl Peroxide, Sodium Hydroxide, Arsine, Calcium Carbide, and Ammonia (included)
- Pen or pencil

Introduction: This activity provides the students the opportunity to determine the appropriate designations for an NFPA 704 placard.

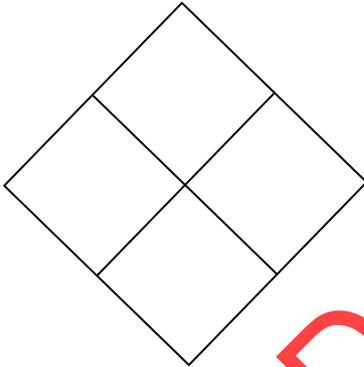
Directions:

1. Review CFC Appendix F.
2. Using the information given to you in each question, fill in the appropriate ratings for the NFPA placards.
3. You have 20 minutes to complete this activity.
4. Be prepared to discuss your answers with the class.

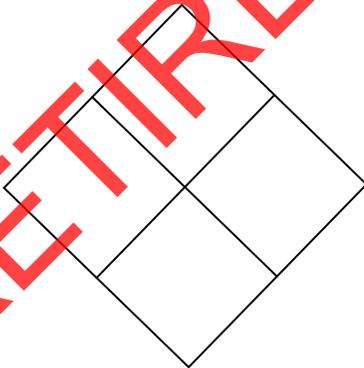
-
1. A building containing a flammable solid.



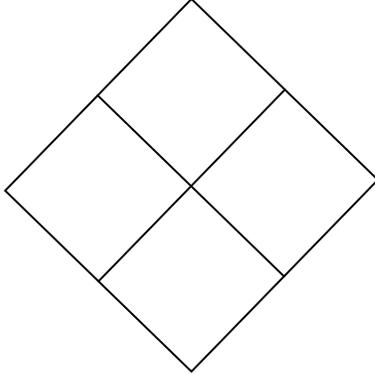
2. A structure with a toxic substance.



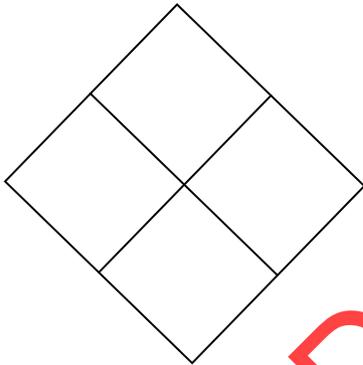
3. A hospital outbuilding containing liquid oxygen.



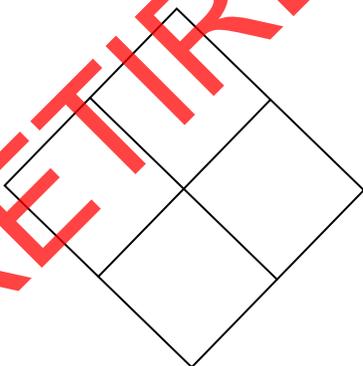
4. A shed containing a water reactive 3 material.



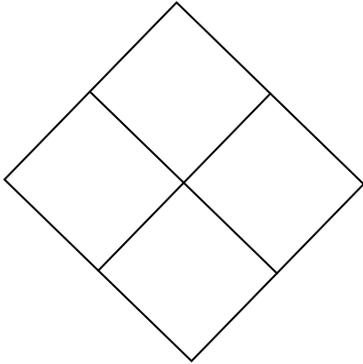
5. A warehouse containing a Class IIIA and a Class IA liquid.



6. A repair garage containing Class II liquids, Class IC liquids, and an oxy-acetylene welding torch.

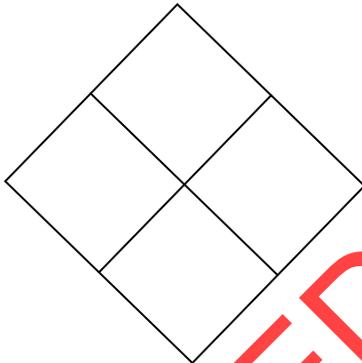


7. A chemical warehouse containing an organic peroxide II, a corrosive, a flammable cryogenic, and a water reactive 3.

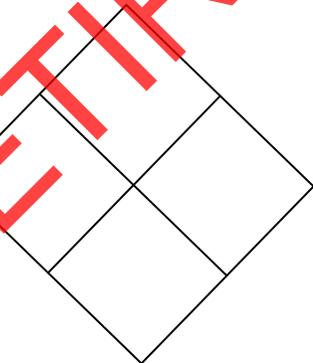


For questions 8 and 9, use the attached MSDS for Benzoyl Peroxide (Wet).

8. Building A contains wet benzoyl peroxide, sodium hydroxide, and arsine.



9. Building B contains calcium carbide and ammonia.



Material Safety Data Sheet

Benzoyl Peroxide (Wet)

ACC# 02782

Section 1 - Chemical Product and Company Identification

MSDS Name: Benzoyl Peroxide (Wet)
 Catalog Numbers: AC211780000, AC211780010, AC211780050, AC211780100, AC211781000, 8274-1LB, NC9747998
 Synonyms: Dibenzoyl peroxide; benzoic acid peroxide; benzoyl superoxide
 Company Identification: Fisher Scientific, 1 Reagent Lane, Fair Lawn, NJ 07410
 For information, call: 201-796-7100
 Emergency Number: 201-796-7100
 CHEMTREC assistance, call: 800-424-9300
 International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	HTNECS/ELINCS
94-36-0	Benzoyl peroxide	67-75	202-327-6
7732-18-5	Water	25-33	231-791-2

Section 3 - Hazards Identification

Emergency Overview

Appearance: white powder.

Danger! Risk of explosion by shock, friction, fire or other sources of ignition. Organic peroxide. Heat or contamination may cause hazardous decomposition. Peroxides and decomposition products are flammable and can ignite with explosive force if confined. Strong oxidizer. Contact with other material may cause a fire. Mutagen. Causes eye and skin irritation. May cause respiratory and digestive tract irritation. May cause sensitization by skin contact.

Target Organs: Eyes, skin.

Potential Health Effects

Eye: Causes eye irritation. Causes redness and pain.

Skin: Causes skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May be harmful if absorbed through the skin.

Ingestion: May cause irritation of the digestive tract. May be harmful if swallowed. May cause human systemic effects by ingestion: hallucinations, distorted perceptions, nausea or vomiting and kidney, ureter and bladder changes.

Inhalation: May cause respiratory tract irritation. May be harmful if inhaled.

Decomposition products are toxic, and inhalation of these products can produce life threatening health effects.

Chronic: Laboratory experiments have resulted in mutagenic effects.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

Skin: Get medical aid. Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion: Never give anything by mouth to an unconscious person. Get medical aid immediately. Do NOT induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Will burn if involved in a fire. This material poses an explosion hazard when dry. This material is an explosion hazard when exposed to heat, mechanical shock, friction or when agitated.

Extinguishing Media: Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or chemical foam. Do NOT use halogenated agents.

Flash Point: Not applicable.

Autoignition Temperature: 380 deg C (716 deg F)

Explosion Limits, Lower: Not available.

Upper: Not available.

NFPA Rating: (Estimated) Health: 2; Flammability: 4; Instability: 4; Special Hazard: OX

Material Safety Data Sheet

Product No. 19539 Sodium Hydroxide

Issue Date (03-03-03)

Review Date (09-29-03)

Product and Company Identification

Product Name: Sodium Hydroxide

Synonym: Caustic soda, lye, sodium hydrate.

CAS#	Percent	OSHA PEL mg/m3	ACGIH TLV mg/m3	NTP	IARC	OSHA Regulated
1310-73-2	100	2	2	No	No	No

Hazard Identification

Emergency Overview

Appearance: White deliquescent pellets, flakes or granules with no odor.

Immediate effects: Danger! Poison! Causes severe respiratory tract, eye and skin burns. May be fatal if swallowed. Harmful if inhaled. Cause damage to the following organs: Respiratory tract, skin, eye lens of cornea.

Potential Health Effects

Primary Routes of Entry: Absorbed through skin, eye contact, inhalation, ingestion.

Signs and Symptoms of Overexposure: Causes severe burns on contact with any body tissue. Vapor is irritating to the eyes and respiratory passages.

Eyes: Extremely hazardous in case of eye contact (corrosive). Causes severe eye burns.

Skin: Extremely hazardous in case of skin contact (corrosive). Skin contact produces severe burns. Hazardous in case of skin contact (permeator).

Ingestion: Extremely hazardous in case of ingestion. May be fatal if swallowed.

Inhalation: Extremely hazardous in case of inhalation (lung corrosive). Hazardous in case of inhalation.

Chronic Exposure: Extremely toxic and corrosive.

Chemical Listed As Carcinogen Or Potential Carcinogen: No.

See Toxicological Information

Physical and Chemical Properties

Appearance and Physical State: White solid (flakes, pellets or granular)

Odor (threshold): Odorless

Specific Gravity (H2O=1): 2.13

Vapor Pressure (mm Hg): NA

Vapor Density (air=1): NA

Percent Volatile by Volume: NA

Evaporation Rate (butyl acetate=1): NA

Boiling Point: 1390.04°C (2534.1°F)

Freezing point 1 melting point: 318.38°C (605.1°F)

pH: ND

Solubility in Water: Soluble

Molecular Weight: 40.00 g/mole

Transportation Information

US DOT Information: Proper shipping name: Sodium Hydroxide, solid

Hazard Class: 8
Packaging group: II
UN Number: UN1823
Limitations: RQ: 1000 lbs (453.6 Kg)

IATA: Proper shipping name: Sodium Hydroxide, solid

Hazard Class: 8
Packing group: II
UN Number: UN1823
Limitations: ND
Domestic shipments only: ND

IMO: Proper shipping name: Sodium Hydroxide, solid

Class: 8
UN Number: UN1823
Packing group: II
EMS: ND
MFAG: ND
Marine Pollutant: No
Canadian TDG: ND

Section 16: Other Information

Label Information: Toxic, Corrosive
European Risk and Safety Phrases: R35-Cause severe burns.
European symbols needed: ND
Canadian WHMIS Symbols: ND
NFPA Hazard Rating: Health: 3; Fire: 0; Reactivity: 1
(0=least, 1=Slight, 2=Moderate, 3=High, 4=Extreme)

Abbreviations used in this document

NE= Not Established
NA= Not Applicable
NIF= No Information Found
ND= No Data

Material Safety Data Sheet

Product Name: Arsine

Route of Entry:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	No	Yes

Health Effects:

Exposure Limits	Irritant	Sensitization
Yes	Yes	No
Teratogen	Reproductive Hazard	Mutagen
No	No	No
Synergistic Effects: None Reported		

Carcinogenicity: NTP: No IARC: Yes OSHA: No

Eye Effects: No adverse effects anticipated.

Skin Effects: Dermatitis is associated with exposure to other arsenic compounds but not necessarily arsine.

Ingestion Effects: Ingestion is unlikely.

Inhalation Effects:

The symptoms of inhalation of this mixture are not well known. However, ARSINE IS AN EXTREMELY TOXIC GAS that destroys red blood cells and can cause widespread organ injury. Inhalation may cause headache, delirium, nausea, vomiting, general malaise, tightness in the chest, and pain in the abdomen and loins. Arsine may discolor urine to red or a darkened color, and the skin to a bronze or jaundiced color. Symptoms may not occur until several hours after exposure.

Arsine is listed by the International Agency for Research on Cancer as a Group 1 Carcinogen (see Arsenic and Certain Arsenic Compounds).

NFPA HAZARD CODES HMIS HAZARD CODES RATINGS SYSTEM

NFPA Hazard Codes	HMIS Hazard Codes	Ratings System
Health: 4	Health: 4	0 = No Hazard
Flammability: 4	Flammability: 4	1 = Slight Hazard
Reactivity: 0	Reactivity: 0	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

4. First Aid Measures

Eyes: Flush contaminated eye(s) with copious quantities of water. Part eyelids to assure complete flushing. Continue for a minimum of 30 minutes. See a physician for follow up treatment as soon as possible.

Skin: Flush affected area with copious quantities of water. Remove affected clothing as rapidly as possible.

Material Safety Data Sheet
Calcium Carbide

Section 1: Chemical Product and Company Identification

Product Name: Calcium carbide
 Catalog Codes: SLC3934
 CAS#: 75-20-7
 RTECS: EV9400000
 TSCA: TSCA 8(b) inventory: Calcium carbide
 CI#: Not available.
 Synonym: Calcium acetylide
 Chemical Formula: CaC₂

Contact Information: Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396
 US Sales: 1-800-901-7247
 International Sales: 1-281-441-4400
 Order Online: ScienceLab.com
 CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300
 International CHEMTREC, call: 1-703-527-3887
 For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Name	CAS #	% by Weight
Calcium carbide	75-20-7	100
Toxicological Data on Ingredients: Calcium carbide LD50: Not available. LC50: Not available.		

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), or eye contact (irritant).

Potential Chronic Health Effects:

Carcinogenic Effects: Not available.

Mutagenic Effects: Not available.

Teratogenic Effects: Not available.

Developmental Toxicity: Not available.

The substance is toxic to lungs, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: No known effect on eye contact, rinse with water for a few minutes.

NFPA Hazard Codes	HMIS Hazard Codes	Ratings System
Health: 1	Health: 1	0 = No Hazard
Flammability: 4	Flammability: 4	1 = Slight Hazard
Reactivity: 2	Reactivity: 2	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

Material Safety Data Sheet
Ammonia

Route of Entry:

Skin Contact	Skin Absorption	Eye Contact	Inhalation	Ingestion
Yes	No	Yes	Yes	No

Health Effects:

Exposure Limits	Irritant	Sensitization
Yes	Yes	No
Teratogen	Reproductive Hazard	Mutagen
No	No	Yes
Synergistic Effects: None Reported		

Carcinogenicity: NTP: No IARC: No OSHA: No

Eye Effects: Mild concentrations of product will cause conjunctivitis. Contact with higher concentrations of product will cause swelling of the eyes and lesions with a possible loss of vision.

Skin Effects: Mild concentrations of product will cause dermatitis or conjunctivitis. Contact with higher concentrations of product will cause caustic-like dermal burns and inflammation. Toxic level exposure may cause skin lesions resulting in early necrosis and scarring.

Ingestion Effects: Since product is a gas at room temperature, ingestion is unlikely.

Inhalation Effects:

Corrosive and irritating to the upper respiratory system and all mucous type tissue. Depending on the concentration inhaled, it may cause burning sensations, coughing, wheezing, shortness of breath, headache, nausea, with eventual collapse.

Inhalation of excessive amounts affects the upper airway (larynx and bronchi) by causing caustic-like burning resulting in edema and chemical pneumonitis. If it enters the deep lung, pulmonary edema will result. Pulmonary edema and chemical pneumonitis are potentially fatal conditions.

NFPA Hazard Codes	HMIS Hazard Codes	Ratings System
Health: 3	Health: 3	0 = No Hazard
Flammability: 1	Flammability: 1	1 = Slight Hazard
Reactivity: 0	Reactivity: 0	2 = Moderate Hazard
		3 = Serious Hazard
		4 = Severe Hazard

Topic 3-9: Classification by Hazard

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Section 2701.2 and Appendix E.

RETIRED CURRICULUM

Topic 3-10: Inspection of the Incidental Use, Handling, and Storage of Hazardous Materials

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapters 27 and 34, and Appendices Chapter 1 and E, and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 11.

Individual Activity 3-10-1: Hazardous Materials Permit And Maximum Allowable Quantities

Time Frame: 1:00

Materials Needed:

- MSDS for calcium hypochlorite
- California Fire Code, CBSC, 2007 Edition, Appendix Chapters 27 and 34, Appendices Chapter 1 and E
- Pen or pencil

Introduction: This activity provides you the opportunity to determine permit and maximum allowable quantities of hazardous materials.

Directions:

1. Using the CFC and MSDS answer the following questions.
2. You have 40 minutes to complete this activity.
3. Be prepared to discuss your answers with the class.

	<u>Permit Amount</u> CFC AC1, 105.6.20	<u>Maximum Allowable</u> <u>Quantity</u> Tables 2703.1.1(1) through 2703.1.1(4)
1. Chloric Acid (liquid), Class 3 oxidizer, stored outdoors	_____	_____
2. Sulfur, flammable solid, indoor storage/sprinklered building	_____	_____
3. Potassium hydroxide (solid), toxic material, indoor storage	_____	_____
4. Nitric acid (liquid), corrosive, outdoor storage	_____	_____
5. Vinyl acetate (liquid), unstable materials, Class 2, indoor use, nonsprinklered building	_____	_____
6. White phosphorous (solid), pyrophoric, use-closed system, nonsprinklered building	_____	_____
7. What is the main ingredient listed on the MSDS?	_____	_____
8. What is the percentage by weight of the main ingredient?	_____	_____
9. What is the DOT hazard class?	_____	_____

10. What is the physical state?

11. What is the hazard category according to the CFC?

12. What is the permit amount for calcium hypochlorite?

13. What is the exempt amount for calcium hypochlorite used in an open system, outdoors?

14. What is the exempt amount for calcium hypochlorite stored in a sprinklered building?

15. What is the exempt amount for calcium hypochlorite used in an open system in a nonsprinklered building?

Material Safety Data Sheet

Omega Chemistries

7623 North 67th Avenue, Suite 301
Glendale AZ 85301

PRODUCT NAME: PPG CALCIUM HYPOCHLORITE TABLETS
 DATE: 05/20/96
 EDITION: 003
 TRADE NAME: CALCIUM HYPOCHLORITE TABLETS
 CHEM NAME/SYN: PPG 3" CALCIUM HYPOCHLORITE TABLETS, CAL HYPO
 CHEMICAL FAMILY: HYPOCHLORITE
 FORMULA: CA(OCL)2
 CAS NUMBER: 007778-54-3
 U.S. DOT SHIPPING NAME: CALCIUM HYPOCHLORITE, HYDRATED
 U.S. DOT HAZARD CLASS: 5.1 (OXIDIZER)
 SUBSIDIARY RISK: N/A
 I.D. NUMBER: UN2880
 PACKING GROUP: II
 REPORTABLE QUANTITY: 10 LBS/4.5 KG
 IMO DESCRIPTION: CALCIUM HYPOCHLORITE, HYDRATED, CLASS 5.1, UN2880,
 PACKING GROUP II, RQ.

SECTION 1 - PHYSICAL DATA

BOILING POINT @ 760 MM HG: DECOMPOSES @ 180°C
 VAPOR DENSITY (AIR=1): N/A
 SPECIFIC GRAVITY (H₂O=1): N/A
 PH OF SOLUTIONS: ALKALINE
 FREEZING/MELTING POINT: N/A
 SOLUBILITY (WEIGHT % IN WATER): 217 G/L @ 27°C
 BULK DENSITY: N/A
 VOLUME % VOLATILE: N/A
 VAPOR PRESSURE: N/A
 EVAPORATION RATE: N/A
 HEAT OF SOLUTION: SLIGHTLY EXOTHERMIC
 APPEARANCE AND ODOR: WHITE TABLETS WITH SLIGHT CHLORINE ODOR

SECTION 2 - INGREDIENTS

MATERIAL	PERCENT
CALCIUM HYPOCHLORITE (65% AVAILABLE CHLORINE)	65
INERT (INCLUDES 5.5 - 10% MOISTURE)	35

SECTION 3 - FIRE EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): NONE
 FLAMMABLE LIMITS IN AIR (% BY VOLUME) LEL: N/A UEL: N/A
 EXTINGUISHING MEDIA: WATER ONLY. SMOTHERING INEFFECTIVE. PRODUCT SUPPLIES OWN OXYGEN. SPECIAL
 FIRE FIGHTING PROCEDURES: FIRE FIGHTERS MUST WEAR NIOSH/MSHA APPROVED, PRESSURE DEMAND SELF-
 CONTAINED BREATHING APPARATUS WITH FULL FACE PIECE FOR POSSIBLE EXPOSURE TO HAZARDOUS GASES.
 UNUSUAL FIRE AND EXPLOSION HAZARDS: DECOMPOSES AT 180 C RELEASING OXYGEN GAS; CONTAINERS MAY
 RUPTURE.

SECTION 4 - HEALTH HAZARD DATA

TOXICITY DATA:

LC50 INHALATION: (RAT) NO MORTALITY @ 3.5 MG/L (1 HR)
 LD50 DERMAL: (RABBIT) >1000 MG/KG
 SKIN/EYE IRRITATION: SEE SECTION 5
 LD50 INGESTION: SEE SECTION 5
 FISH, LC50 (LETHAL CONCENTRATION): TLM 96 HR.: 10-1 PPM

CLASSIFICATION:

INHALATION:	IRRITATING
SKIN:	SLIGHTLY TOXIC
SKIN/EYE:	CORROSIVE
INGESTION:	SLIGHTLY TOXIC
AQUATIC:	HIGHLY TOXIC

SECTION 5 - EFFECTS OF OVEREXPOSURE

IS CHEMICAL LISTED AS A CARCINOGEN OR POTENTIAL CARCINOGEN?

NTP - NO IARC - NO OSHA - NO

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: NONE KNOWN

PERMISSIBLE EXPOSURE LIMITS: NONE ESTABLISHED BY OSHA OR ACGIH FOR THIS PRODUCT

PPG INTERNAL PERMISSIBLE EXPOSURE LIMIT (IPEL): 1 MG/CU.M., 8-HOUR TWA (TIME WEIGHTED AVERAGE); 2 MG/CU.M. STEL (SHORT-TERM EXPOSURE LIMIT).

ACUTE:

INHALATION: INHALATION OF CALCIUM HYPOCHLORITE DUST AND DEPOSITION OF PARTICLES IN THE RESPIRATORY TRACT CAN LEAD TO IRRITATION OF THE TISSUE AND CAUSE A VARIETY OF EFFECTS. THESE EFFECTS ARE DEPENDENT ON CONCENTRATION AND INCLUDE: UPPER RESPIRATORY TRACT IRRITATION, NASAL CONGESTION, COUGHING, SORE THROAT, LARYNGITIS, AND SHORTNESS OF BREATH. IN OPERATIONS WHERE THERE ARE HIGH CONCENTRATIONS OF RESPIRABLE PARTICULATES, PULMONARY EDEMA (FLUID IN THE LUNG) MAY BE PRODUCED. IF NOT TREATED IMMEDIATELY, PULMONARY EDEMA CAN BE LIFE THREATENING. SINCE THIS PRODUCT IS IN TABLET FORM, PARTICLES OF RESPIRABLE SIZE ARE NOT GENERALLY ENCOUNTERED.

EYE/SKIN: CALCIUM HYPOCHLORITE IS CORROSIVE TO THE EYES. CONTACT OF CALCIUM HYPOCHLORITE DUST WITH THE EYES, EVEN A MINUTE AMOUNT FOR A SHORT DURATION, CAN CAUSE SEVERE IRRITATION AND EVEN BLINDNESS. CONTACT WITH THE SKIN MAY CAUSE SEVERE IRRITATION, BURNS, OR TISSUE DESTRUCTION. IN STUDIES UTILIZING RABBITS, THE SKIN IRRITATION SCORE WAS 8/8 AND THE EYE IRRITATION SCORE WAS 98.5/110. THE CLASSIFICATION FOR BOTH OF THESE IS CORROSIVE.

INGESTION: CALCIUM HYPOCHLORITE, IF SWALLOWED, CAUSES SEVERE BURNS TO THE DIGESTIVE TRACT AND CAN BE FATAL.

CHRONIC:

GENOTOXICITY: CALCIUM HYPOCHLORITE PRODUCED POSITIVE RESPONSES IN IN-VITRO ASSAYS USING BACTERIAL SYSTEMS (THE AMES TEST) AND CHROMOSOMAL ABERRATIONS IN CHINESE HAMSTER FIBROBLASTS. IN A WHOLE ANIMAL EXPERIMENT (MOUSE MICRONUCLEUS TEST), EXPOSURES RANGING FROM 20 TO 160 MG/KG PRODUCED NO COMPOUND RELATED CHROMOSOMAL ABNORMALITIES.

CARCINOGENESIS: ALTHOUGH NO STUDY HAS BEEN CONDUCTED WITH CALCIUM HYPOCHLORITE, THE CARCINOGENIC POTENTIAL OF SODIUM HYPOCHLORITE WAS STUDIED IN F344 RATS. AFTER 104 WEEKS OF DRINKING WATER CONTAINING UP TO 2000 PPM SODIUM HYPOCHLORITE, THERE WAS NO EVIDENCE THAT THIS CHEMICAL PRODUCED ANY CARCINOGENIC RESPONSE. IN ADDITION, THIS EXPOSURE DID NOT RESULT IN ANY ADVERSE EFFECTS IN BLOOD, CLINICAL CHEMISTRY, OR OTHER TARGET ORGANS.

ONE OF THE MAJOR USES OF CALCIUM HYPOCHLORITE IS AS A SOURCE OF CHLORINE FOR WATER SANITIZATION IN DRINKING AND RECREATIONAL WATER. STUDIES HAVE BEEN CONDUCTED TO DETERMINE THE LONG-TERM EFFECTS OF CHLORINATED DRINKING WATER. SEVEN GENERATIONS OF RATS WERE GIVEN 100 PPM CHLORINE IN THEIR DRINKING WATER. NO DIFFERENCE IN FERTILITY, GROWTH, BLOOD PARAMETERS, OR SPECIFIC ORGAN TOXICITY WAS OBSERVED BETWEEN CONTROL AND EXPOSED ANIMALS. TWO SEPARATE ANIMAL STUDIES CONDUCTED BY DIFFERENT GOVERNMENT AGENCIES DETERMINED THAT THE CHLORINATION OF MUNICIPAL DRINKING WATER DID NOT RESULT IN TOXICITY TO THE DEVELOPING MOUSE FETUS.

SAFE HANDLING OF THIS MATERIAL ON A LONG-TERM BASIS SHOULD EMPHASIZE MINIMIZING REPEATED ACUTE EXPOSURES.

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION, PREFERABLY MOUTH-TO-MOUTH. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN.

EYE OR SKIN CONTACT: FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES, WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. FOR EYE CONTACT, GET IMMEDIATE MEDICAL ATTENTION. IF SKIN IRRITATION OCCURS, GET MEDICAL ATTENTION.

INGESTION: IF CONSCIOUS, DRINK LARGE QUANTITIES OF WATER AND ANY COMMON COOKING (VEGETABLE) OIL, IF AVAILABLE. DO NOT INDUCE VOMITING. TAKE IMMEDIATELY TO A HOSPITAL OR PHYSICIAN. IF UNCONSCIOUS, OR IN CONVULSIONS, TAKE IMMEDIATELY TO A HOSPITAL. DO NOT ATTEMPT TO INDUCE VOMITING OR GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

NOTES TO PHYSICIAN (INCLUDING ANTIDOTES): TREAT SYMPTOMATICALLY.

SECTION 6 - REACTIVITY DATA

STABILITY:	UNSTABLE
CONDITIONS TO AVOID:	CONTAMINATION OR EXCESSIVE HEAT ABOVE 177°C
HAZARDOUS POLYMERIZATION:	WILL NOT OCCUR
CONDITIONS TO AVOID:	NONE - WILL NOT POLYMERIZE
INCOMPATIBILITY (materials to avoid):	ACIDS, COMBUSTIBLE MATERIALS, ORGANICS, REDUCING AGENTS

HAZARDOUS DECOMPOSITION PRODUCTS: ACIDS OR AMMONIA CONTAMINATION WILL RELEASE TOXIC GASES. EXCESSIVE HEAT WILL CAUSE DECOMPOSITION RESULTING IN THE RELEASE OF OXYGEN AND CHLORINE GAS.

SECTION 7 - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS SPILLED OR RELEASED:

NOTE: USE EXTREME CAUTION IN HANDLING SPILLED MATERIAL. CONTAMINATION WITH ORGANIC OR COMBUSTIBLE MATERIAL MAY CAUSE FIRE OR VIOLENT DECOMPOSITION. IF FIRE OR DECOMPOSITION OCCURS IN AREA OF SPILL, IMMEDIATELY DOUSE WITH PLENTY OF WATER. OTHERWISE, SWEEP UP ALL VISIBLE MATERIAL USING A CLEAN, DRY SHOVEL AND BROOM AND DISSOLVE MATERIAL IN WATER. DISPOSE OF WASTE MATERIAL AS OUTLINED BELOW.

WASTE DISPOSAL METHOD: SPILLED MATERIAL THAT HAS BEEN SWEEPED UP AND DISSOLVED IN WATER SHOULD BE USED IMMEDIATELY IN THE NORMAL APPLICATION FOR WHICH CALCIUM HYPOCHLORITE IS BEING CONSUMED. IF THIS IS NOT POSSIBLE, CAREFULLY NEUTRALIZE DISSOLVED MATERIAL BY ADDING HYDROGEN PEROXIDE (ONE PINT OF 35% HYDROGEN PEROXIDE SOLUTION PER POUND OF CALCIUM HYPOCHLORITE TO BE NEUTRALIZED) THEN DILUTE THE NEUTRALIZED MATERIAL WITH PLENTY OF WATER AND FLUSH TO SEWER. NOTE: ONLY PROPERLY NEUTRALIZED MATERIAL SHOULD BE FLUSHED TO SEWER. UNNEUTRALIZED MATERIAL CAN CAUSE ENVIRONMENTAL DAMAGE TO RECEIVING WATER OR CAN INTERFERE WITH TREATMENT PLANT OPERATION. FOR ON-SITE NEUTRALIZATION, CAREFULLY AND SLOWLY POUR THE APPROPRIATE QUANTITY OF 35% HYDROGEN PEROXIDE SOLUTION OVER ALL SPILLED MATERIAL THEN FLUSH AREA WITH PLENTY OF WATER. COMMENTS: CARE MUST BE TAKEN WHEN USING OR DISPOSING OF CHEMICAL MATERIALS AND/OR THEIR CONTAINERS TO PREVENT ENVIRONMENTAL CONTAMINATION. IT IS YOUR DUTY TO DISPOSE OF THE CHEMICAL MATERIALS AND/OR THEIR CONTAINERS IN ACCORDANCE WITH THE CLEAN AIR ACT, THE CLEAN WATER ACT, THE RESOURCE CONSERVATION AND RECOVERY ACT, FIFRA, AS WELL AS ANY OTHER RELEVANT FEDERAL, STATE, OR LOCAL LAWS/REGULATIONS REGARDING DISPOSAL.

SECTION 8 - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: IF DUSTY CONDITIONS ARE ENCOUNTERED, USE NIOSH/MSHA APPROVED RESPIRATOR WITH ACID GAS CARTRIDGE AND DUST PREFILTER. THE RESPIRATOR USE LIMITATIONS SPECIFIED BY NIOSH/MSHA OR THE MANUFACTURER MUST BE OBSERVED. RESPIRATORY PROTECTION PROGRAMS MUST BE IN ACCORDANCE WITH 29 CFR 1910.134.

VENTILATION (TYPE):	NONE, UNLESS DUSTY CONDITIONS ARE ENCOUNTERED.
EYE PROTECTION:	CHEMICAL SAFETY GOGGLES
GLOVES:	NATURAL OR SYNTHETIC RUBBER

OTHER PROTECTIVE EQUIPMENT: BOOTS, APRONS, OR CHEMICAL SUITS SHOULD BE USED WHEN NECESSARY TO PREVENT SKIN CONTACT. PERSONAL PROTECTIVE CLOTHING AND USE OF EQUIPMENT MUST BE IN ACCORDANCE WITH 29 CFR 1910.132 (GENERAL REQUIREMENTS), .133 (EYE & FACE PROTECTION) AND .138 (HAND PROTECTION).

SECTION 9 - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN DURING HANDLING AND STORING:

DO NOT GET IN EYES, ON SKIN OR ON CLOTHING.

KEEP IN ORIGINAL CONTAINER IN A COOL, DRY PLACE.

KEEP CONTAINER CLOSED WHEN NOT IN USE.

KEEP AWAY FROM HEAT SOURCES, SPARKS, OPEN FLAMES AND LIGHTED TOBACCO PRODUCTS. USE ONLY A CLEAN, DRY SCOOP MADE OF METAL OR PLASTIC EACH TIME THIS PRODUCT IS TAKEN FROM CONTAINER.

DO NOT ADD THIS PRODUCT TO ANY DISPENSING DEVICE CONTAINING REMNANTS OF ANY OTHER PRODUCT. SUCH USE MAY CAUSE VIOLENT REACTION LEADING TO FIRE OR EXPLOSION. ADD THIS PRODUCT ONLY TO WATER.

MAY CAUSE FIRE OR EXPLOSION IF MIXED WITH OTHER CHEMICALS.

FIRE MAY RESULT IF CONTAMINATED WITH ACIDS OR EASILY COMBUSTIBLE MATERIAL SUCH AS OIL, KEROSENE, GASOLINE, PAINT PRODUCTS AND MOST OTHER ORGANIC MATERIALS.

WASH HANDS AFTER HANDLING.

DO NOT REUSE CONTAINER. RESIDUAL MATERIAL REMAINING IN EMPTY DRUM CAN REACT TO CAUSE FIRE. THOROUGHLY FLUSH EMPTY CONTAINER WITH WATER THEN DESTROY BY PLACING IN TRASH COLLECTION. DO NOT CONTAMINATE WATER, FOOD, OR FEED BY STORAGE OR DISPOSAL.

OTHER PRECAUTIONS:

KEEP OUT OF REACH OF CHILDREN.

STRONG OXIDIZER - FIRE MAY RESULT FROM CONTACT WITH HEAT, ACIDS, ORGANIC OR COMBUSTIBLE MATTER.

MAY BE FATAL OR HARMFUL IF SWALLOWED.

MAY CAUSE CHEMICAL BURNS.

IRRITATING TO NOSE AND THROAT - AVOID BREATHING DUST.

COMMENTS:

TSCA-CALCIUM HYPOCHLORITE IS ON THE TSCA INVENTORY UNDER CAS #7778-54-3. SARA TITLE III - A) 311/312 CATEGORIES - ACUTE AND REACTIVITY, B) NOT LISTED IN SECTION 313, C) NOT LISTED AS AN "EXTREMELY HAZARDOUS SUBSTANCE" IN SECTION 302.

CERCLA - LISTED IN TABLE 302.4 OF 40 CFR PART 302 AS A HAZARDOUS SUBSTANCE WITH A REPORTABLE QUANTITY OF 10 POUNDS. RELEASES TO AIR, LAND OR WATER WHICH EXCEED THE RQ MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER, 800-424-8802.

RCRA - WASTE CALCIUM HYPOCHLORITE AND CONTAMINATED SOILS/MATERIALS FROM SPILL CLEANUP ARE D001 HAZARDOUS WASTE AS PER 40 CFR 261.21(A)(4) AND MUST BE DISPOSED OF ACCORDINGLY UNDER RCRA.

FIFRA - CALCIUM HYPOCHLORITE IS REGISTERED WITH EPA AS A PESTICIDE (EPA REG. NO. 748-295). NSF - PPG CALCIUM HYPOCHLORITE IS CERTIFIED FOR MAXIMUM USE AT 46 MG/L UNDER ANSI/NSF STANDARD 60.

For Additional Information:

Contact: MSDS Coordinator - Omega chemistries.

During business hours, Pacific Time - 623-842-9304

NOTICE

Omega chemistries expressly disclaims all express or implied warranties of merchantability and fitness for a particular purpose, with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages. Do not use ingredient information and/or ingredient percentages in this MSDS as a product specification. For product specification information, refer to a Product Specification Sheet and/or a Certificate of Analysis. These can be obtained from your local Omega chemistries Sales Office.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Omega chemistries make no representations as to its accuracy or sufficiency. Conditions of use are beyond Omega chemistries control and therefore users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product, or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process.

Topic 4-1: Portable Fire Extinguisher Classifications

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSIA, Sixth Edition, Chapter 8.

RETIRED CURRICULUM

Topic 4-2: Portable Fire Extinguisher Placement

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 8.

Individual Activity 4-2-1: Extinguisher Placement

Time Frame: 0:15

Materials Needed:

- California Fire Code, CBSC, 2007 Edition, Section 906
- Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 8, Tables 8.1 and 8.2
- Pen or pencil

Introduction: This activity provides you the opportunity to determine fire extinguisher size and placement location.

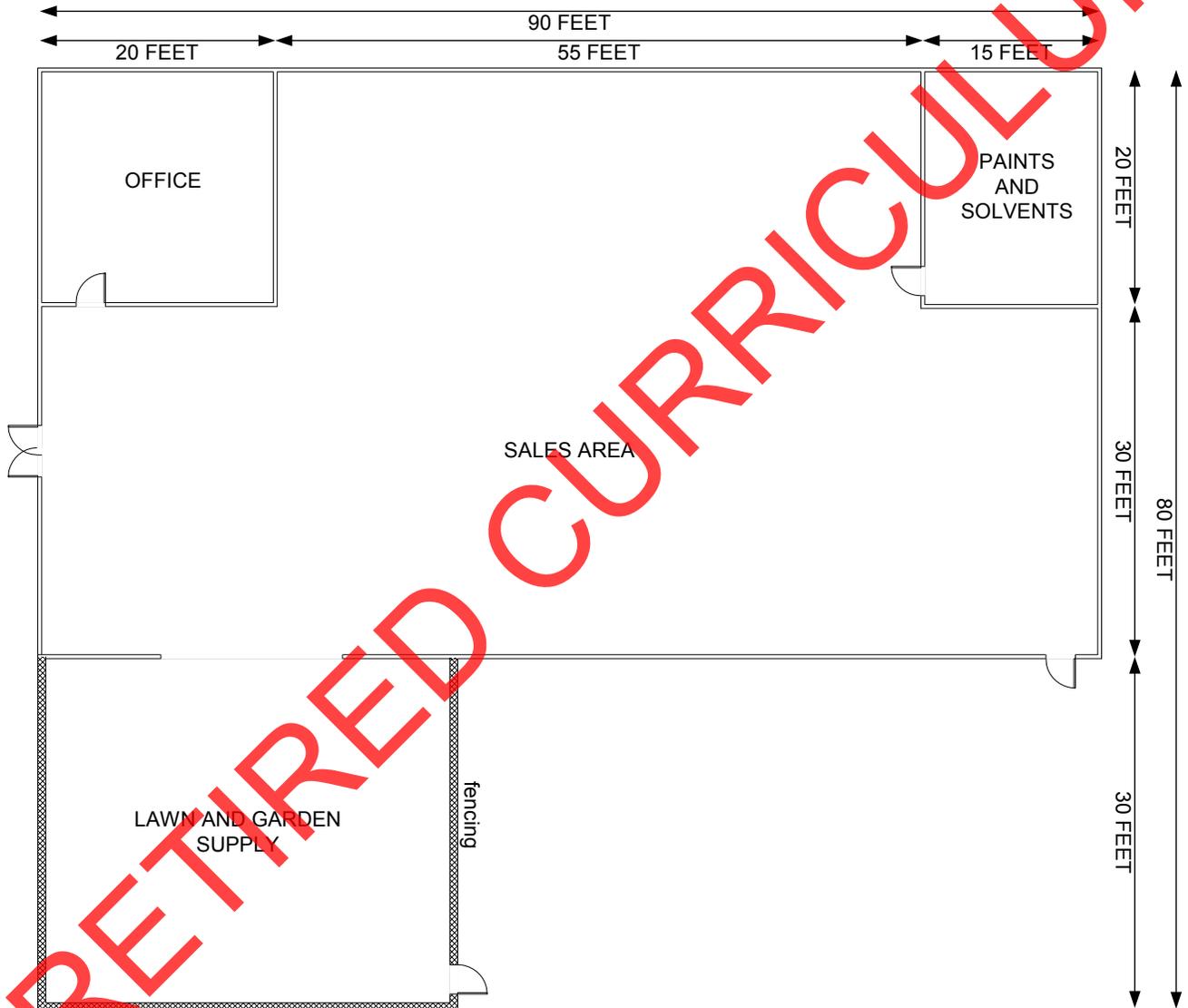
Directions:

1. Review Tables 8.1 and 8.2.
2. Use the floor plan the Close Hardware Company on the following page.
3. Identify the minimum number of extinguishers required.
4. Mark the location for the proper placement of the extinguisher(s).
5. You have 10 minutes to complete this activity.
6. Be prepared to discuss your answers with the class.

Note: **Table 8.1 has an error. Minimum rating for extra (high) hazard occupancy is 4-A, not 40A.**

EXTINGUISHER PLACEMENT EXERCISE

You are an inspector checking Close Hardware Company, a new business in town. Using information found in your IFSTA manual and the CFC, indicate on the floor plan below the type of extinguishers you will require and where they will be placed. Be prepared to explain your decision.



Topic 4-3: Procedures for Inspecting Portable Fire Extinguishers

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSIA, Sixth Edition, Chapter 8.

RETIRED CURRICULUM

Topic 5-1: Fixed Fire Protection Systems

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 8.

RETIRED CURRICULUM

Topic 5-3: Procedures for Inspecting Commercial Cooking Equipment

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapters 4 and 8.

Individual Activity 5-3-1: Inspecting Fixed Fire Protection Systems

Time Frame: 0:20

Materials Needed:

- Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapters 4 and 8
- California Fire Code, CBSC, 2007 Edition, Chapter 9
- Pen or pencil

Introduction: This activity provides you the opportunity to increase your knowledge of special fixed fire protection systems.

Directions:

1. Using the referenced resources, answer the questions below.
2. You have 15 minutes to complete this activity.
3. Be prepared to discuss your answers with the class.

1. List the appropriate NFPA standard used to design and install fixed fire protection systems.

Carbon dioxide	NFPA	_____
Dry chemical	NFPA	_____
Wet chemical	NFPA	_____
Clean agent	NFPA	_____
Foam	NFPA	_____

2. What is the criterion for determining when a gaseous extinguishing system, such as CO₂ or clean agent, must be replenished?

3. At what frequency must a pre-engineered system be service tested?

4. What section of the CFC regulates the cleaning of hoods and grease filters?

5. What two electrical devices must be shut-off when a hood extinguishing system operates?

(1) _____

(2) _____

6. What fire code section requires that a manual fire activation device (pull station) be provided at a hood extinguishing system?

7. A record of hood and duct cleaning shall be available at restaurants for fire department inspection. Name three items that must be included on this record.

(1)

(2)

(3)

RETIRED CURRICULUM

Topic 6-1: Detection and Alarm Systems Terms and Characteristics

Student information for this topic can be found in the California Fire Code, CBSC, 2007 Edition, Chapters 2 and 9, and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 8.

Group Activity 6-1-1: Terminology Crossword

Time Frame: 0:30

Materials Needed:

- California Fire Code, CBSC, 2007 Edition, Chapters 2 and 9
- Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 8
- Pen or pencil

Introduction: This activity provides you the opportunity to become familiar with the terms relating to detection and alarm systems.

Directions:

1. In your group, complete the crossword puzzle using the clues.
2. All possible answers to the clues are listed below the puzzle.
3. You have 20 minutes to complete this activity.
4. Be prepared to discuss your answers with the class.

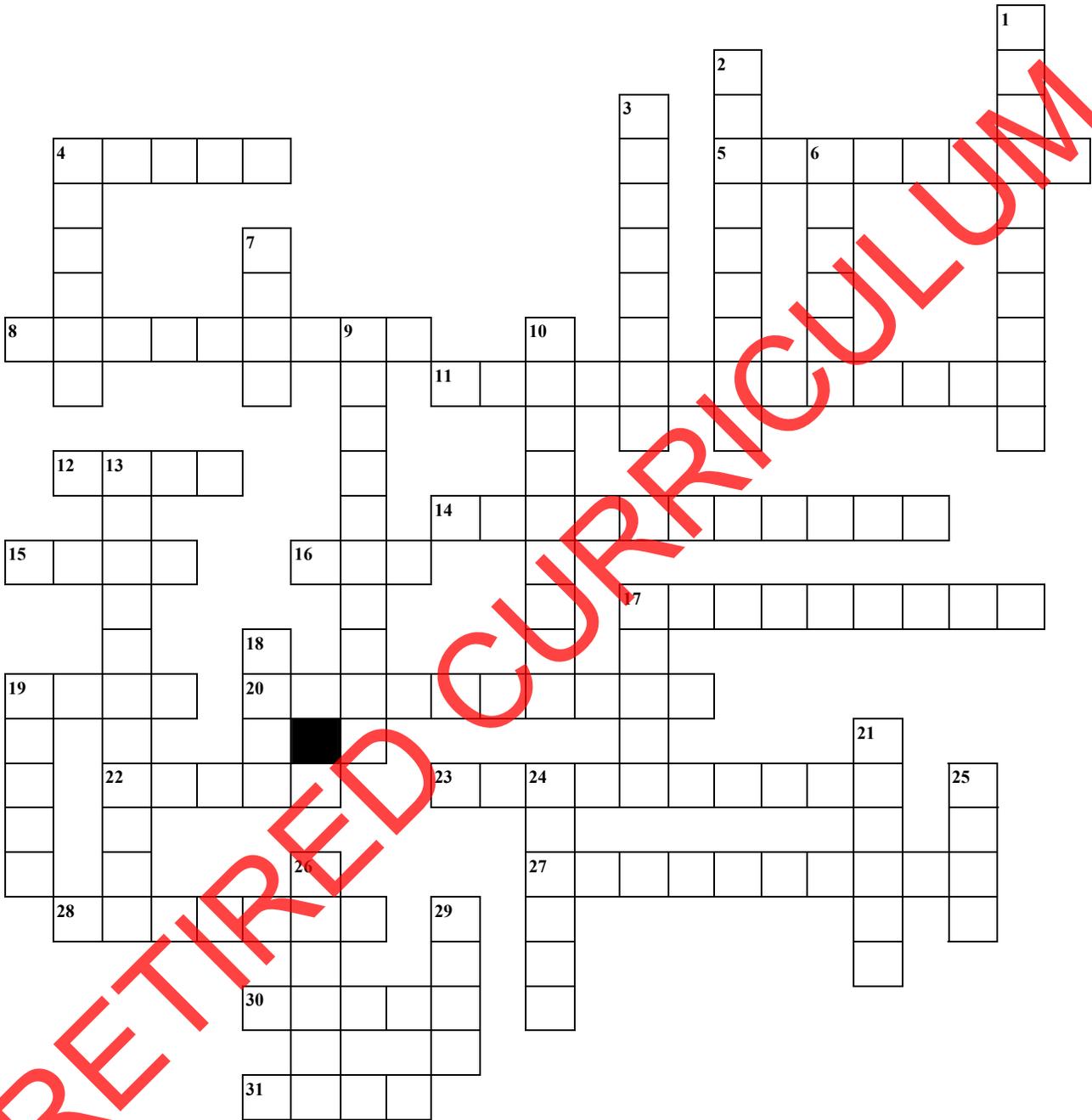
CLUES ACROSS

4. Signaling of information that a fire condition exists
5. Equipment that has passed tests by a technical organization
8. A fire alarm system that detects a fire and alerts the occupants
11. Smoke detector effective for smoldering fires
12. The "brains" of the alarm system (abbreviation)
14. A system that sends an alarm to a private fire brigade
15. A defined area for identifying alarm-initiating locations
16. Detectors that measure the oxygen content of a room
17. This device is equipment that produces an approved alarm signal
19. Fire alarm control panel (abbreviation)

20. Smoke detector effective for flaming fires
22. Any change, addition, or modification in construction or occupancy
23. A visual review of equipment and systems
27. Occurs twice a year
28. An operating mode that alerts employees only
30. This system can only be heard by the building occupants
31. The introduction of a stimulus to an initiating device

CLUES DOWN

1. A test performed after the installation of new equipment
2. Occurs four times a year
3. The outside of a building
4. An opening through two or more floor levels with a ceiling
6. An operating mode that alerts all occupants
7. Detectors that are the slowest to respond
9. This device sends information to the alarm control unit
10. A part of a fire alarm system
13. Equipment that indicates the zone of alarm
17. A detector designed to protect people when they are sleeping
18. "Bought" with detection and alarm systems
19. This detector comes in both the IR and UV varieties
21. Occurs once a year
24. A combination of compatible interconnected alarm devices
25. The action required to initiate an alarm from a fire alarm box
26. A common visual signaling device
29. A common audible signaling device



- ACCEPTANCE
- ALARM
- ALTER
- ANNUAL
- ANNUNCIATOR
- APPROVED
- ATRIUM
- AUTOMATIC
- BELL
- COMPONENT
- EXTERIOR
- FACP
- FACU
- FLAME
- GAS
- HEAT
- INITIATING
- INSPECTION
- IONIZATION
- LOCAL
- PHOTOELECTRIC
- PRIVATE
- PROPRIETARY
- PUBLIC
- PULL
- QUARTERLY
- SEMIANNUAL
- SIGNALING
- SMOKE
- STROBE
- SYSTEM
- TEST
- TIME
- ZONE

Topic 6-2: Fire Alarm System Components

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 8.

Protecting Your Family from Fire

Federal Emergency Management Agency (FEMA) and the United States Fire Administration (USFA)

Prepared with funding from the USFA with the participation of:

- National Smoke Detection Project
- Learn Not to Burn® Foundation
- National Fire Protection Association
- NFPA Technical Committee on Household Fire Warning

Fire in the Home

American homes suffer an unwanted fire every 10 seconds, and every 60 seconds they suffer a fire serious enough to call the fire department. Most importantly, every two and a half hours someone is killed in a home fire.

Protecting your family from fire requires advance planning for what to do if fire strikes. This includes the use of protective devices, usually smoke detectors, to provide early warning of fire, especially at night when you are most vulnerable. Nevertheless, depending on the size and layout of your home and the characteristics of your family, you may need to do more to assure their safety.

The Dangers of Fire in the Home

Most home fires occur in the kitchen while cooking, but are often extinguished with only minor damage since a person is generally present. The most dangerous fires occur at night while most people are asleep; usually starting from carelessly discarded smoking materials igniting upholstered furniture or mattresses. These fires break out in the first few hours after people go to bed in the rooms that they were in just before retiring. Heating appliances, including space heaters and fire places, also start fires at this time, igniting furniture or other combustibles left too close to the heater.

Most victims of fire succumb to the smoke and toxic gases and not to burns. Fires produce poisonous gases that can spread rapidly and far from the fire itself to claim victims who are asleep and not even aware of the fire. Even if they awaken, the effects of exposure to these gases can cloud their thinking and slow their reactions so that they cannot make their escape. This is why it is so crucial for you and your family to have sufficient warning so that you can all escape before your ability to think and move is impaired.

In addition, more than half of fatal fires in homes occur when people are asleep. Therefore, any fire protection system must be able to protect people who are asleep in their bedrooms when fire starts.

Furthermore, nearly half the people killed in home fires each year are either preschool children or adults 65-years-old or older. Add in people with physical, mental, or emotional handicaps and it is clear that home fire protection must be designed for people with limitations. That is why every fire safety program includes provisions for people with special needs.

Children and Fire

Children playing with matches or lighters is a leading cause of home fires and one in which the children and others present are often hurt. Children have a natural curiosity about fire and are tempted to play with matches or lighters left within their reach. In many cases, children who start fires have a history of fire setting. Many fire departments offer counseling programs for juveniles who set fires. If your child is setting fires, you should contact your local fire department for counseling before the situation gets out of hand and your child gets hurt. However, the most important thing is to keep all matches and lighters out of the sight and reach of children at all times. Store them up high, preferably in a locked cabinet.

Even though they have a natural curiosity about fire, children may become frightened and confused in a fire and hide rather than escape to safety, especially if they started the fire. Children are often found hiding in closets or under beds where they feel safe. Therefore, it is crucial for your child's safety that you hold fire drills in the home at least twice a year to let them practice the right things to do in an emergency.

Clothing fires are a significant cause of fire injuries to children (and to adults too). They set their clothes on fire by getting too close to heat sources, such as open fires or stoves, or when playing with matches or lighters. Here too, the best defense is a respect for fire and being trained in what to do if their clothes do catch fire. Their natural reaction is to run, which will make the situation worse. "STOP, DROP, and ROLL" is taught as the correct action and has saved many lives in clothing fires. The moment clothes start to burn, stop where you are, drop to the ground, and roll over and over with your hands covering your face to smother the flames.

Of course, young children should never be left alone in the home. Even if they do not play with fire, unattended children can accidentally start a fire by attempting to cook something or by using a heater or electrical appliance in the wrong way. All too often, tragic fires occur when young children are left unattended, for even short periods.

In the 1970s, the hazards of accidental ignition of sleepwear on young children were addressed through federal legislation. The Flammable Fabrics Act required that children's sleepwear (sizes 0-6X) be flame retardant. In a short time, this had a dramatic impact on deaths and injuries, reducing them by 95%.

Recently, an increase in injuries has been reported among children sleeping in garments classified as "daywear" such as tee shirts and jerseys. These garments look just like sleepwear but are not fire retardant. The only way to tell the difference is by careful examination of the garment label.

Therefore, parents should be careful to buy only fire retardant sleepwear for their children in sizes 0-6X in order to enjoy the fire safety benefits of these garments.

Fire and Older Adults

The risk of death from fire for Americans age 65 and over is two times greater than the risk for adults under 65, and hospital stays of more than 40 days are common for older burn victims. Thus, older people need to be especially careful with fire.

People can become victims of fire by falling asleep smoking, either in bed or in a favorite chair, especially after consuming alcohol or taking medication. Ashtrays emptied before smoldering materials are completely out also start a number of fires in homes of smokers. Cooking is a major cause of fire injuries among older persons when loose fitting clothing is ignited when the wearer reaches over a hot burner, when pot holders or towels are ignited if placed too close to a burner, or when the person slips and falls onto the stove.

Smoke Detectors

One of the most important fire safety devices for the home is the self-contained smoke detector. After becoming generally available in the early 1970s, home smoke detector sales grew rapidly and the price fell. At least one smoke detector can be found in 88% of the homes in the United States and are available for under \$10.

Several studies have concluded that if a person has a fire, smoke detectors cut their chances of dying in half. The smoke detectors currently in place have saved thousands of lives, but several problems exist. First, the 12% of homes without detectors have more than half of the fires; second, it is estimated that a third of the detectors in place are not working, often due to failure to replace a worn out battery; and third, many homes do not have as many smoke detectors as are needed to protect the occupants properly.

How Many Detectors Are Needed?

The primary job of your smoke detector is to protect you from fires while you are asleep. Therefore, your detectors should be located between any sleeping rooms and the rest of the house (outside bedrooms or sleeping areas). However, tests have showed that even this might not be enough.

In multi-story homes, fires on a floor level without a smoke detector can grow to dangerous conditions before sufficient smoke can rise in a stairway to set off a detector on the upper floor. Based on this observation, most codes require that additional smoke detectors be located on each floor level of the home.

A closed door provides protection from smoke on the other side, but will also prevent smoke from reaching a smoke detector. This is particularly a problem in bedrooms. If you sleep with your bedroom door closed, you should add a smoke detector in the bedroom, particularly if you smoke in the bedroom or there is a TV, air conditioner, or other major appliance in the bedroom that might start a fire. If you sleep with the bedroom door open, the detector in the hall outside will detect a fire in the bedroom or elsewhere.

There are a few places where a smoke detector should not be placed. These include kitchens and garages (cooking fumes and car exhaust are likely to set them off) and unheated attics and crawl spaces (where it can get too cold or hot for the electronics to work properly). Fires beginning in these areas are generally detected by the other smoke detectors in enough time to escape safely. If a detector is desired in these spaces, heat detectors are available which can be used.

Before you add detectors in locations like an attic or garage, make sure you will be able to hear those detectors in your living room or bedroom. A detector that cannot be heard in any of the principal occupied areas will have little life safety value.

What Kind of Smoke Detector Should I Get?

There are two types of home smoke detectors available -- the ion type and the photoelectric type. The ion type reacts faster to open flaming fires and is usually the least expensive. The photoelectric type reacts faster to smoldering fires and is less likely to react to cooking. Both types provide good protection and can be used without worry. If you need more than one detector, you might get one of each. There are also multiple ways to power smoke detectors. Most operate on a battery (usually 9 volt) that should be replaced at least once a year. When the battery needs changing, the smoke detector will begin to "chirp" every 20 seconds or so, and will persist for a month. To prevent this nuisance, pick a special day and give your detectors new batteries once a year. Some fire safety organizations promote "change your clocks, change your batteries" when the change is made back from daylight savings time each fall. Always make sure that you use the right battery. The required battery type is marked on the detector near where the battery goes.

Smoke detectors installed in a new house will be operated from the household electrical power and do not need battery replacement. These types all have a "power on" light to tell you that the detector has power. Fires do not generally affect the power until they get very large, so it is rare that such detectors fail to work due to a loss of power. Smoke detectors are available which run on house power but also have a battery in case the main power fails. Since the battery is not normally in use, such backup batteries will last about six years before they need replacing (the detector will "chirp" like the battery-powered ones).

How Should Smoke Detectors Be Installed?

Smoke detectors are normally installed on the ceiling or high on the wall, with the top of the detector not closer than 4 inches nor further than 12 inches from the ceiling. Detectors should be no closer than 3 feet from supply registers of forced air heating systems (that might blow on the detector preventing it from seeing smoke) and no closer than 3 feet from the door to a kitchen or a bathroom containing a shower (steam can set the detector off when the door is opened).

If a detector is mounted on an exterior wall or a ceiling below an unheated attic that is poorly insulated (the surface gets noticeably cold in the winter and warm in the summer), the temperature difference can prevent smoke from getting to the detector. Placing the detector on an inside wall avoids the problem in desert climates where evaporative coolers are being used. Mount smoke detectors on walls 12 inches below the ceiling because these coolers add moisture that can cause the

smoke to drop. Older adults may have difficulty reaching detectors on ceilings to change batteries. If house-powered detectors are impractical, wall mounting 12 inches down should be considered.

Will You Be Able to Hear Your Detectors?

The ultimate test for smoke detectors is their ability to wake you when you are asleep. This generally means that the nearest detector to the bedroom can be no further away than in the next room with the intervening door open.

House-powered detectors can be connected together (with a wire) so when one detector activates, all interconnected detectors go off. Many detectors in new homes have this feature. It means any detector in the home can awaken you in your bedroom if the nearest detector is not loud enough to do so.

For homes with battery-powered detectors, there are models that contain a radio transmitter that will activate a receiver placed in the bedroom. An advantage of this type is that when you go on vacation you can give the receiver to a neighbor who could call the fire department if a fire starts. Of course, these are a lot more expensive than the simple smoke detectors.

All battery-powered and most house-powered smoke detectors use a high-pitched electronic horn that is difficult for some people to hear. Test detectors before installation to make sure that all members of the household can hear them clearly.

People with hearing impairments can get smoke detectors with bright, flashing lights or vibrating signals. To awaken you, the light needs to be over the head of the bed and should be rated at least 110 candelas. Such bright lights must be powered from house power, so if it is battery operated, it is probably not bright enough to use in the bedroom.

Testing and Maintenance

Smoke detectors should be tested at least once a month. All smoke detectors have a test button that you push to check out the entire detector, including its sensitivity (how much smoke it takes to set it off). If the testing mechanism does not work properly, the detector should be replaced immediately. Never use open flame devices to test a detector.

Older adults and the physically impaired may have problems reaching their detectors to test them. There is one brand of smoke detector on which the test feature can be activated by shining a flashlight on it. Another brand has an automatic test that activates at the same time and day once a week. These models can be used where proper testing might not otherwise be done.

Smoke detectors need no maintenance other than changing their batteries (in those that have batteries) and an occasional vacuuming of dust or cobwebs. Every smoke detector comes with a homeowner booklet that describes how to use and take care of that particular detector. You should read that booklet and keep it in a safe place for future reference.

What If Your Detector "Acts Up?"

Smoke detectors are highly reliable but can sometimes be fooled by cooking or steam. If it alarms when there is no fire, it may need to be moved a few feet to a new position where it is not in the way

of cooking vapors or steam. It may also have insects in it, so you should take it down and vacuum it out. If it continues to act up, simply replace it with a new detector (they are too inexpensive to fool with).

How Long Should a Smoke Detector Last?

Smoke detectors have a useful life of about ten years. At that age, they should be replaced, even if they seem to be working. This will assure that the detector will be working when you need it.

Even though prices of today's smoke detectors are many times lower than you might have paid some years ago, the detectors themselves are generally more reliable. It is usually not worth keeping an old detector rather than buying a replacement.

Fire Alarm Systems

A home fire alarm system is usually part of a total security system providing burglary protection in addition to fire protection. Such a system supervises doors, windows, and spaces within the home for break-in and may provide monitoring services by dialing your telephone to report a fire or intrusion to a security office, where it will be reported to your local police or fire department. Due to their relatively high cost, these systems are generally found only in larger homes.

Components of a Fire Alarm System

These systems consist of a central control panel to which smoke and heat detectors are connected, along with bells or horns that are activated when the system triggers an alarm. Other sensors associated with the burglary functions connect to doors and windows or monitor rooms for motion or body heat. The control panel operates from house power but also usually contains an emergency battery that can operate the system for about 24 hours during a power outage.

The basic requirements for the number and locations of detectors are the same as with the self-contained detectors discussed previously. The difference is that a fire alarm system gives you more flexibility to locate additional detectors and additional bells or horns (or flashing lights, should a person in the household be hearing impaired).

Fire alarm systems that provide remote monitoring services can also be used to provide medical alert services. Here a person with health problems who lives alone carries a radio transmitter that can trigger the system in case they need assistance. Signals received at the monitoring station are identified by type (fire, burglary, medical alert) so that the proper response can be made.

Why Have a Residential Fire Alarm System?

The primary advantage of a home fire alarm system is increased reliability and the ability to place detectors and bells exactly where needed. However, the reason most people have them is that they wanted a burglar alarm system and the cost of adding fire alarm features to a residential burglary system is relatively small.

Another advantage is that they are the only way to obtain remote monitoring services. This becomes important in cases where family members may not be capable of escaping from a fire without assistance. For example, if you have an older or physically impaired person in your home and a fire

started when no one was home to assist that person, detectors alone might not be enough to assure their safety.

A feature of most monitoring services is the ability to keep special information on the residence which comes up on the computer monitor whenever an alarm is received from that home. If there is a disabled person in the home who needs special assistance, this fact will be known to the operator and can be passed along to the fire department when they are called.

Escape Planning

Smoke detectors can only warn of danger. You must then take action to escape. Unless you act quickly and effectively, the extra warning time provided by detectors could be wasted.

The best way to assure that your family will do the correct things in an emergency is to have an escape plan and practice it. The important factors in a home fire evacuation plan are:

Immediately Leave the Home

Do not waste any time saving property. Call the fire department (use 911 if available) from a neighbor's home. Take the safest exit route; but if you must escape through smoke, remember to crawl low.

Know Two Ways Out of Each Room

If the primary way is blocked by fire or smoke, you will need a second way out. This might be a window onto an adjacent roof or by using an escape ladder (tested and approved by a recognized testing laboratory). Practice escaping by both the primary and secondary routes to be sure that windows are not stuck and screens can be taken out quickly. Windows and doors with security bars need quick-release devices to allow them to be opened quickly in an emergency. Practice escaping in the dark.

Feel the Door

When you come to a closed door, use the back of your hand to feel the top of the door, the door knob, and the crack between the door and door frame to make sure that fire is not on the other side. If it feels hot, use your secondary escape route. Even if the door feels cool, open it carefully. Brace your shoulder against the door and open slowly. If heat and smoke come in, slam the door and make sure it is securely closed. Use your alternate escape route.

Have an Arranged Meeting Place

If you all meet under a specific tree or at the end of the driveway or front sidewalk, you will know that everyone has gotten out safely and no one will be hurt looking for someone who is already safe. Designate one person to go to a neighbor's home to phone the fire department.

Once Out, Stay Out

Never go back into a burning building for any reason. If someone is missing, tell the fire fighters. They are equipped to perform rescues safely.

Residential Sprinklers

Fire sprinklers have been used to protect commercial buildings for more than 100 years. More recently, a new type of sprinkler system has been developed for residences that offers an unprecedented level of fire safety for both lives and property.

How Do They Differ From Commercial Sprinklers?

The sprinklers that you have come to expect in hotels, offices, and other commercial buildings are there primarily to protect property and to protect people who are not in the immediate vicinity of the fire's point of origin. Sprinklers work by limiting the size and impact of the fire to a small area.

Sprinklers in commercial buildings use larger quantities of water because fires in these types of buildings can involve large fuel loads.

Sprinklers used in the home are a special type referred to as residential sprinklers. These sprinklers use a fast-acting element to allow the sprinkler to activate when the fire is still in its very early stages of development. No matter what type of building sprinklers are in, inadvertent operation of the sprinkler system is extremely unlikely. Smaller fuel loads coupled with activation when the fire is smaller allow these sprinklers to require much less water, so much so that the typical home's domestic water system is usually sufficient for such systems.

Why Are Sprinklers So Powerful?

The primary reason is that as soon as it activates, the sprinkler sprays water on the burning object and puts out or controls the fire. In fact, the sprinkler system not only stops the growth of the fire, it also acts directly on the potentially deadly effect of the fire, for example, by lowering the air temperature.

This means that a combination of sprinklers and smoke detectors can save most potential victims of home fires. The principal exceptions are victims who are very close to the fire when it begins, such as victims of clothing fires, explosions, or flash fires. For some potential victims, there is no substitute for prevention.

What About Water Damage?

Unlike fires you often see on TV and in the movies, in a real fire, only one or two sprinklers near the fire activate and discharge water. Residential sprinklers discharge water at a low rate, so your home will not be flooded. (Flooding is not a danger with sprinklers in commercial buildings either.) After the fire is out, the supply valve can be simply shut-off. Never do this yourself; always call the fire department and let the professionals determine when it is safe to shut-off the water.

Do You Need Smoke Detectors Too?

YES! Smoke detectors will tend to react first, providing extra time to escape. In some fires, sufficient smoke can be released to impair judgment or even threaten persons with preexisting medical problems before enough heat is released to set off the sprinkler. Also, smoke detectors provide early warning of fires that may start out of range of the sprinklers, such as within a wall

space. Therefore, it is important that smoke detectors be installed in all of the places discussed previously.

Protect Your Family from Fire

- Respect fire and teach children to respect it too.
- Install smoke detectors, either self-contained or as part of a system, outside bedrooms and on EVERY LEVEL OF THE HOME.
- Test and maintain your detectors as if your life depends on it. IT DOES!
- Make sure everyone can clearly hear the sound of the smoke detectors from their bedrooms.
- Make an escape plan with two ways out of every room and practice it.
- If there are family members who cannot escape unassisted, consider a residential sprinkler system.

Prepared by:
U. S. Department of Commerce
Technology Administration
National Institute of Standards and Technology
Building and Fire Research Laboratory
FA 130, February 1993

RETIRED CURRICULUM

Topic 6-3: Fire Alarm Signaling System Classifications

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSIA, Sixth Edition, Chapter 8.

RETIRED CURRICULUM

Topic 6-4: Procedures for Inspecting Fire Alarm Systems

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSIA, Sixth Edition, Chapter 8.

RETIRED CURRICULUM

Topic 6-5: CFC Requirements for Fire Alarm Systems

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 9.

RETIRED CURRICULUM

Topic 7-1: Water-Based Fire Protection Systems Terms and Characteristics

Student information for this topic is also found in the California Fire Code, CBSC, 2007 Edition, Chapter 9 and Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7.

RETIRED CURRICULUM

Topic 7-2: Water Supply Systems

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7.

RETIRED CURRICULUM

Topic 7-3: Sprinkler System Benefits, Limitations, and Design

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7.

Individual Activity 7-3-1: Unit 7 Homework

Time Frame: Homework

Materials Needed:

- California Fire Code, CBSC, 2007 Edition, Chapter 9
- Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7
- Pen or pencil

Introduction: This activity provides you the opportunity to become familiar with water-based fire protection systems.

Directions:

1. Using your textbooks, answer the following questions.
2. Be prepared to discuss your answers with the class.

1. According to the CFC, when must a fire sprinkler system be electronically monitored?

2. All control valves on fire protection equipment must be which type of valve?

3. List three things that must be checked when inspecting OS&Y valves.

(1)

(2)

(3)

4. How may a sprinkler in an area subjected to corrosive vapors be protected?

5. List two things an inspector should do before inspecting a fire sprinkler system.

(1)

(2)

6. How can a sprinkler head be protected from mechanical damage?

7. List three changes that may occur during the life of a building that would require the replacement of sprinkler heads with those of a different type or rating.

(1)

(2)

(3)

8. What should happen to sprinkler heads that are corroded, painted, or loaded with foreign material?

9. List three common reasons that fire sprinkler systems fail.

(1)

(2)

(3)

10. What is the minimum number of spare sprinkler heads that should be kept on site at any time?

11. List two things that should be checked when inspecting sprinkler piping and hangars.

(1)

(2)

12. According to the CFC, what is the minimum clearance (measured from the deflector) that must be maintained under sprinkler heads?

13. List three common objects that may block water distribution in a sprinkler system.

(1)

(2)

(3)

Topic 7-4: Types of Sprinkler Systems

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7.

Individual Activity 7-4-1: Fire Sprinkler Systems

Time Frame: 0:15

Materials Needed:

- Pen or pencil

Introduction: This activity provides you the opportunity to become familiar with the different types of fire sprinkler systems.

Directions:

1. Using your notes, answer the following questions.
2. You have 5 minutes to complete this activity.
3. Be prepared to discuss your answers with the class.

1. What are the four basic types of sprinkler systems?

(1)

(3)

(2)

(4)

2. What is the most reliable type of sprinkler system?

3. Which sprinkler system has air under pressure in its piping system?

4. Which sprinkler system uses open sprinklers?

5. Which sprinkler system is designed for life safety, not extinguishment?

Topic 7-5: Sprinkler System Components

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7.

Individual Activity 7-5-1: Sprinkler System Components

Time Frame: 0:20

Materials Needed:

- Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7
- Pen or pencil

Introduction: This activity provides you the opportunity to become familiar with the different types of sprinkler systems components.

Directions:

1. Using the information in Chapter 7 and your notes, answer the following questions.
2. You have 10 minutes to complete this activity.
3. Be prepared to discuss your answers with the class.

1. What are the three most common types of sprinkler heads?

(1) _____

(2) _____

(3) _____

2. What determines the temperature rating for a sprinkler head?

3. What are three commonly used release mechanisms used with sprinklers?

(1) _____

(2) _____

(3) _____

4. What is the temperature rating of an ordinary sprinkler head and what color code is used on the frame arms to identify this rating?

(1) _____

(2) _____

5. Match the following acronyms to their appropriate description.

- | | | |
|----------|-------|-------------------------------|
| (1) PIVA | _____ | Post indicator valve |
| (2) OS&Y | _____ | Fire department connection |
| (3) PIV | _____ | Post indicator valve assembly |
| (4) FDC | _____ | Outside screw and yoke |

Topic 7-6: Procedures for Inspecting Sprinkler Systems

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSIA, Sixth Edition, Chapter 7.

RETIRED CURRICULUM

Topic 7-7: Procedures for Conducting Tests on Wet-Pipe Sprinkler Systems

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7.

RETIRED CURRICULUM

Topic 7-8: Procedures for Conducting Tests on Dry-Pipe Sprinkler Systems

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7.

RETIRED CURRICULUM

Topic 7-9: Characteristics of Standpipe Systems

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7.

Individual Activity 7-9-1: Standpipe Required Systems

Time Frame: 0:20

Materials Needed:

- California Fire Code, CBSC, 2007 Edition, Section 905.3
- Pen or pencil

Introduction: This activity provides you the opportunity to become familiar with the standpipe requirements.

Directions:

1. Using the CFC Section 905.3, answer the following questions.
2. You have 10 minutes to complete this activity.
3. Be prepared to discuss your answers with the class.

1. What is the required class of standpipe in a fire-sprinklered Group A Occupancy that has an occupant load of 1250?

2. What class of standpipe is required in a fire-sprinklered high-rise building? Is there a hose requirement?

3. In fire-sprinklered buildings that require standpipes, can they be combined with the automatic fire sprinkler system?

4. What class of standpipe may be substituted in an open parking garage over 30 feet tall that is located in an area subject to freezing?

5. Are standpipes required in an open air seating space without enclosed spaces?



FIRE PREVENTION 1B

Inspection Of Fire Protection Systems And Special Hazards



Topic 7-10: Procedures For Inspecting Standpipe Systems

Topic 7-10: Procedures for Inspecting Standpipe Systems

Student information for this topic is also found in Fire Inspection and Code Enforcement, IFSTA, Sixth Edition, Chapter 7.

RETIRED CURRICULUM