Firefighter Training
S-130

NFES 1510

Instructor Guide

DECEMBER, 2003

CERTIFICATION STATEMENT

on behalf of the

NATIONAL WILDFIRE COORDINATING GROUP

The following training material attains the standards prescribed for courses developed under the interagency curriculum established and coordinated by the National Wildfire Coordinating Group. The instruction is certified for interagency use and is known as:

Firefighter Training, S-130
Certified at Level I

This product is part of an established NWCG curriculum. It meets the COURSE DEVELOPMENT AND FORMAT STANDARDS – Sixth Edition, 2003 and has received a technical review and a professional edit.

Member NWCG and Training Working Team Liaison

Date 12/22/03

Chairperson, Training Working Team

Date 12/17/03

Description of the Performance Based System

The NWCG Wildland and Prescribed Fire Qualifications System is a "performance-based" qualifications system. In this system, the primary criterion for qualification is individual performance as observed by an evaluator using approved standards. This system differs from previous wildland fire qualifications systems which have been "training based." Training based systems use the completion of training courses or a passing score on an examination as a primary criteria for qualification.

A performance-based system has two advantages over a training based system:

- Qualification is based upon real performance, as measured on the job, versus perceived performance, as measured by an examination or classroom activities.

- Personnel who have learned skills from sources outside wildland fire suppression, such as agency specific training programs or training and work in prescribed fire, structural fire, law enforcement, search and rescue, etc., may not be required to complete specific courses in order to qualify in a wildfire position.

1. The components of the wildland fire qualifications system are as follows:

   a. Position Task Books (PTB) contain all critical tasks which are required to perform the job. PTBs have been designed in a format which will allow documentation of a trainee's ability to perform each task. Successful completion of all tasks required of the position, as determined by an evaluator, will be the basis for recommending certification.

      IMPORTANT NOTE: Training requirements include completion of all required training courses prior to obtaining a PTB. Use of the suggested training courses or job aids is recommended to prepare the employee to perform in the position.

   b. Training courses and job aids provide the specific skills and knowledge required to perform tasks as prescribed in the PTB.

   c. Agency Certification is issued in the form of an incident qualification card certifying that the individual is qualified to perform in a specified position.

2. Responsibilities

   The local office is responsible for selecting trainees, proper use of task books, and certification of trainees, see appendix A of the NWCG Wildland and Prescribed Fire Qualification System Guide, PMS 310-1, for further information.

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Sponsored for NWCG publication by the NWCG Training Working Team

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Comments regarding the content of this publication should be directed to:
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Additional copies of this publication may be ordered from National Interagency Fire Center, ATTN: Great Basin Cache Supply Office, 3833 South Development Avenue, Boise, Idaho 83705. Order NFES 1510.

PREFACE

Firefighter Training, S-130, is required training for qualification as a Firefighter 2 (FFT2) under the Wildland and Prescribed Fire Qualification System Guide, PMS 310-1.

The original Firefighter, S-130 course was developed in 1981 by an Interagency team and revised in 1994. The 2003 version updates that course and was developed by an interagency team composed of:

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INTRODUCTION

This course, Firefighter Training, S-130 and Introduction to Wildland Fire Behavior, S-190, are required training for all personnel prior to certification as a Firefighter (FFT2) under the Wildland and Prescribed Fire Qualification System Guide, PMS 310-1. An adapted version of L-180, Human Factors on the Fireline, has been included as part of this course. This entry-level course for all new firefighters can also be used as a refresher course for returning firefighters.

The purpose of this course is to train new firefighters in basic firefighting skills. Firefighters who successfully complete this course and the Work Capacity Test will be qualified to suppress wildland fires WHILE UNDER CLOSE SUPERVISION.

Students that successfully complete S-130 should also be given credit and a certificate for completing L-180 Human Factors on the Fireline.

This course has been designed to be presented by qualified instructors at any location.

I. INSTRUCTOR PREREQUISITES

The lead instructor must be qualified at Single Resource Boss level. Unit instructors must be qualified at the Firefighter level. All instructors are encouraged to have completed the Facilitative Instructor, M-410 course or an equivalent 32-hour instructor training course.

II. STUDENT PREREQUISITES

Introduction to Wildland Fire Behavior, S-190, is the only prerequisite to this course and **must** have been successfully completed prior to taking the Firefighter Training, S-130 course. Students should have completed an agency orientation prior to taking this course (see Unit 0A, IV.).

III. COURSE PRESENTATION

The Firefighter Training, S-130 course has been designed so that each unit/ lesson can be presented in the field, maximizing actual hands-on training.

A. Unit/Lesson Format

The format for each unit/lesson is designed to provide the instructor with all necessary material; references to consult, new terms introduced in the unit/lesson, and illustrations and/or other graphics.

B. Fireline Handbook and Incident Response Pocket Guide

A current Fireline Handbook and an Incident Response Pocket Guide should be ordered for each student. These publications are referenced throughout the course. They are referenced in the “Aids and Cues” column in the instructor outline and will be noted as, FHB or IRPG, followed by the section referenced; for example, FHB (Initial Attack chapter) or IRPG (Green-Operational). The Fireline Handbook and the Incident Response Pocket Guide are referenced to provide the student with a tool that can be easily accessed in the field. You are encouraged to refer to these guides whenever possible to enhance the presentation and training.

C. Audiovisual Aids

There are five videotapes that require classroom presentation; see Appendix A for ordering information. All other videos listed in Appendix A are for optional use in the presentation of the course. The intent of this design is to encourage field presentation as much as possible. **At the beginning of each unit and/or lesson there are lists of audiovisual items that may enhance the presentation, if classroom facilities are available**.

D. Handouts

Handouts have been incorporated into the student workbook to aid in presentations. It is up to the instructors to determine if it is necessary to provide a binder to the students to hold any additional material the instructor may provide.

E. Electronic Presentation Thumbnails

Electronic presentations are included to enhance the presentation. They are listed in the "Aids and Cues" column in the detailed lesson outline. Appendix B contains the thumbnail of the electronic presentation slides (i.e., PowerPoint) by unit. All or part of these slides may be converted to overheads.

Some units are designed as field units; no electronic presentation slides are provided for those units.

F. Instructor Notes

THE INSTRUCTOR SHOULD READ THROUGH THE ENTIRE COURSE PRIOR TO PRESENTING THE TRAINING. Some units have special instructions for the instructor in **BOLD CAPS** that will enhance the effectiveness of the training. Reading through the course will provide the instructor with those special instructions as well as identify where the instructor can tailor the course to meet specific needs and procedures of the local area.

Before teaching this course, the instructor must determine which tools, procedures, and localities are to be included. It may not always be possible or economical to have all tools described, but it is encouraged to explain all tools mentioned in the course. (We recommend that, insofar as practical, tools and procedures used in places that are different from the Unit's be included in this training. A knowledge of these items will benefit the "total mobility" concept.) Once these are identified, the instructor must gather sufficient materials for the students to use for practical exercises.

IV. RISK MANAGEMENT AND SAFETY

To aid in the economic presentation of this course the first three units are scheduled to be presented on the same day as S-190. Day two of the S-130 presentation begins with a thorough examination of the safety requirements of fire suppression. This includes the 18 Watch Out Situations, Standard Firefighting Orders, principles of LCES (Lookouts, Communications, Escape Routes, and Safety Zones), fire shelters, and Human Factors on the Fireline (L-180). Instructors are encouraged to incorporate and reinforce the safety aspects of the Watch Out Situations, Standard Firefighting Orders, LCES, and Human Factors whenever possible in <u>all</u> units.

V. TIME ELEMENT

This course is composed of 19 units; 15 are required and four are optional for qualification as a Firefighter 2 (FFT2). The estimated times are broad because there are many variables involved including:

- Number of students.
- Location (classroom or field).
- Type of evaluations used.

- Travel time to and from field sites.
- Break times.
- Time needed to distribute tools and organize students into teams or crews.

The instructor determines which optional units will be taught. Time constraints and local operating procedures may affect the decision to teach optional units. See p. 7 for estimated times.

SAMPLE AGENDA

UNIT NUMBER	UNIT NAME	TIME NEEDED
DAY 1		
0A	Introduction - Logistics and Overview	15 minutes
0B	Introduction - Basic Terminology	15 minutes
1	Firefighter Preparedness	1 hour
2	ICS Overview	1 hour
3	Resource Types	½ hour
	TOTAL	**3 hours**
DAY 2		
4A	Watch Out Situations and Firefighting Orders	2 to 2½ hours
4B	LCES	1 hour
4C	Fire Shelter	2 hours
4D	Potential Hazards and Human Factors on the Fireline (L-180)	3 hours
	TOTAL	**8 to 8½ hours**
DAY 3		
5	Transportation Safety	1/2 hour
6	Hand Tools	3 1/2 hours
7	Firing Devices	1 hour
8	Use of Water	3 hours
	TOTAL	**8 hours**
DAY 4		
9	Suppression	1 to 1½ hours
10A	Patrolling	20 minutes
10B	Radio Communication	20 minutes
11	Mopup and Securing the Fireline	1½ to 2 hours
12	Fire Exercise	5½ hours
	TOTAL	**8 to 9 hours**
DAY 5		
13	Hazardous Material Awareness	2 hours
14	Wildland/Urban Interface Safety	1 hour
	TOTAL	**3 hours**
OPTIONAL UNITS		
15	Pump Operations	1 hour
16	Map Reading and Use of the Compass	2 hours
17	Wildland Fire Investigation	½ hour
18	Cultural Resources	½ hour

VI. COURSE OBJECTIVES

There are two sets of objectives for this package: Overall course objectives can be found in Unit 0A, Introduction - Logistics and Overview. Instructional Objectives for each unit/lesson can be found at the beginning of those units/lessons of instruction.

VII. STUDENT EVALUATION METHODS

In order for students to receive credit for the Firefighter Training, S-130 course, all units not labeled Optional must be completed. This includes passing evaluations and examinations as identified in the units/lessons.

This course is designed to teach and evaluate student performance. Training should be given under conditions most nearly representing actual fire situations. A written guide for a simulated fire is provided in unit 12. Encourage students to practice control and mopup procedures.

The course makes extensive use of practical exercises, performance tests, instructor observation and oral testing. In order to maximize the hands-on instruction the student receives, the written unit/lesson tests are optional and are to be used for student evaluation at the instructors' discretion. All unit tests are included in the Student Workbook. Tests with answers are included in the Instructor Guide at the conclusion of each appropriate unit/lesson. The Final Exam is required.

Instructors are encouraged to use the best method or combination of methods to effectively evaluate student performance within given logistical and time constraints.

A comprehensive Final Evaluation for Each Student is included in Appendix D. This evaluation form consolidates the major tasks the student will need to perform to complete the course. Enclosing this document with the certificate of completion will provide valuable feedback to each student's supervisor.

VIII. APPENDICES

A. Course Ordering Information (Appendix A)

Provides a source list for all materials necessary to present this course. These materials are available through the National Fire Equipment System (NFES) Catalog Part 2: Publications.

B. Electronic Presentation (Appendix B)

Electronic presentations are in PowerPoint and can be ordered on a CD ROM. Thumbnails of the electronic presentation are included in this appendix for instructor reference.

C. Student Workbook (Appendix C)

A copy of the Student Workbook is contained in this appendix.

D. Course Evaluations (Appendix D)

The student copy of the final exam and the instructor's key are included in Appendix D. The instructor or course coordinator will have to make sufficient copies of the student final examination.

There is also a Student Final Course Evaluation that each student will need to complete. This form will assist the coordinator and instructors in gathering feedback regarding the training course. One copy will need to be made for each student.

The Training Course Evaluation is provided for the lead instructor and/or the course coordinator to fill out at the conclusion of course instruction. This evaluation provides information necessary for future course updates and improvements. Lead instructor or course coordinator should fill out this form and return it to the address indicated on the form.

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 0 - Introduction

LESSON: A - Logistics and Overview

TIME: 15 minutes

TRAINING AIDS: None

OBJECTIVE: Introduce the Firefighter Training course.

OUTLINE	AIDS & CUES
I. INTRODUCTION	0A-01-S130-EP
IF THE INFORMATION IN I. WAS COVERED WITH THE STUDENTS DURING S-190 IT DOES NOT NEED TO BE COVERED AGAIN.	
Introduction of students to instructor, peer group, and course.	
A. Instructor introduces self and cadre to students.	
B. Students introduce themselves.	
C. Administrative points	
• Transportation • Ground rules • Facilities • Meal schedules • Use of telephones • Other pertinent points of your local area • Cell phones and pagers turned off	

OUTLINE	AIDS & CUES
D. Identify unit topics, required performance levels and administrative concerns for the course.	
II. INTRODUCTION TO FIREFIGHTER TRAINING, S-130	
This course was developed by an interagency team composed of representatives from state and federal agencies.	
The only prerequisite to the Firefighter Training is the successful completion of Introduction to Wildland Fire Behavior, S-190. It is imperative that the new firefighter understand the basic concepts of fire behavior prior to venturing into the hostile environment of wildland firefighting.	
In order for new students to receive credit for this Firefighter Training, S-130 course, all modules/units not labeled Optional must be completed with a passing grade identified at the beginning of each unit/lesson. For refresher training, the lessons are designed to allow the instructor maximum flexibility to tailor the instructional material to local conditions and procedures.	
Students will be introduced to Safety in Unit 4, the principles of risk management. These components of the risk management process will be mentioned throughout the course and will be discussed in detail in this unit.	

OUTLINE	AIDS & CUES
PRESENT COURSE OBJECTIVES.	0A-02-S130-EP 0A-03-S130-EP SW p. 0A.2
• Explain what the LCES (Lookouts, Communications, Escape Routes, and Safety Zones) system is and how it relates to the Standard Firefighting Orders.	
• Construct fireline to required standards using various methods.	
• Strengthen, reinforce, and use holding actions on a fireline.	
• Extinguish the fire with or without the use of water.	
• Complete assigned tasks in a safe and efficient manner.	
• Given an assignment in a wildfire environment, describe factors in that environment which could impact safety.	
III. EVALUATION	SW p. 0A.2
Students will be evaluated by the following methods:	
• Performance testing • Oral/written quizzes • Instructor observation	

OUTLINE	AIDS & CUES
Some items will be evaluated on a “pass or fail” basis. Others will be evaluated on a percentage basis; for those, a score of 70% or higher is required. Evaluation methods will be explained to the students at the beginning of each unit/lesson, if applicable. IV. AGENCY ORIENTATION **THE STUDENTS SHOULD HAVE HAD AN AGENCY ORIENTATION PRIOR TO THIS COURSE.** **TOPICS THAT SHOULD HAVE BEEN COVERED DURING THIS ORIENTATION INCLUDE:** • Local policies • Payroll procedures • Where the employee fits in the organization • Equipment issue • Compensation for injury	

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 0 - Introduction

LESSON: B - Basic Terminology

TIME: 15 minutes

TRAINING AIDS: Flipchart or white board, writing utensils, 3x5 note cards

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Identify nine parts of a fire.
2. Define nine fire behavior terms.
3. Discuss five other useful firefighting terms.

OUTLINE	AIDS & CUES
THE TERMS IN THIS UNIT ARE USED THROUGHOUT THE COURSE AND SHOULD HAVE BEEN PRESENTED TO THE STUDENTS DURING S-190, INTRODUCTION TO WILDLAND FIRE BEHAVIOR. **CONSIDER FORMING STUDENT TEAMS FOR JEOPARDY GAME FORMAT. ALLOW TEAMS FIVE MINUTES TO STUDY TERMS. KEEP TRACK OF SCORES ON FLIP CHART. ESTABLISH THREE CATEGORIES, I.E., PARTS OF A FIRE, FIRE BEHAVIOR TERMS, AND OTHER FIREFIGHTING TERMS. WRITE CATEGORIES ON FLIP CHART.**	0B-01-S130-EP

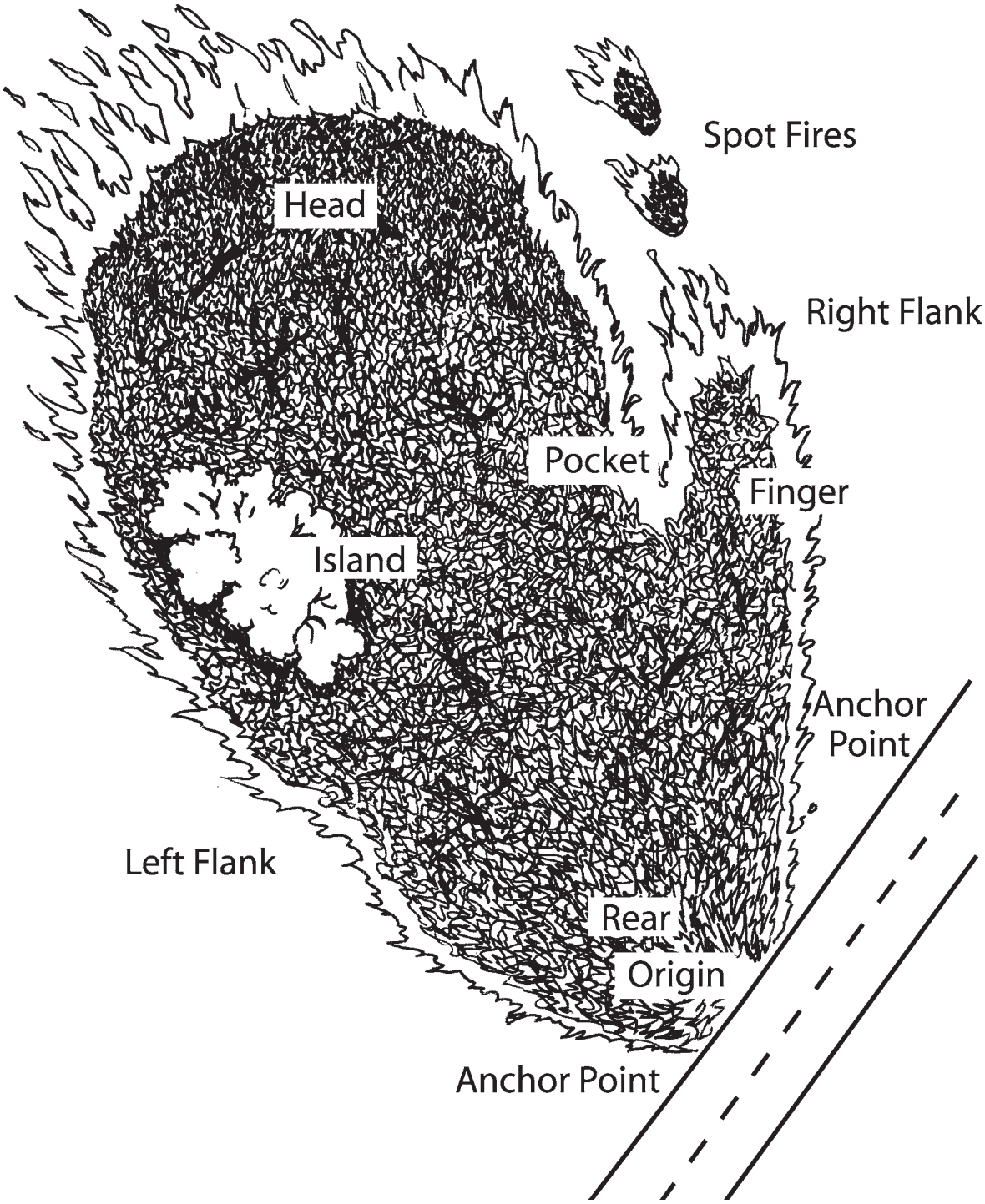
OUTLINE	AIDS & CUES
WRITE DEFINITIONS ON 3X5 CARDS AND PLACE IN STACK ON TABLE. SELECT GROUP TO BEGIN AND HAVE THEM SELECT CATEGORY. THE FIRST PERSON TO STAND GETS TO ATTEMPT ANSWER.	
PRESENT UNIT OBJECTIVES AND DISCUSS.	0B-02-S130-EP
I. INTRODUCTION	
As with any specialized work, fire suppression has a language of its own that allows firefighters to describe a situation and convey information. Before you can begin learning about fire behavior and fire suppression you must become familiar with the terms commonly used.	
II. PARTS OF THE FIRE	0B-03-S130-EP 0B-01-S130-IR SW p. 0B.2 thru 0B.3
A. Origin – The location where the fire started.	
B. Head – Shows the direction in which the fire is burning. This is the hottest and most active part of the fire.	
C. Flank (right and left) – Sides of the fire, parallel to the main direction of spread. May have active fire, but not as hot as the head of the fire.	
D. Rear/Heel – Opposite the head of the fire and burning less vigorously, if at all. Often near the fire origin.	
E. Perimeter – Boundary line of the fire or fire edge. May not have active fire on some portions.	

OUTLINE	AIDS & CUES
F. Finger – An area, usually a narrow strip, that burns away from the main part of the fire. Could be dangerous if personnel working the fire are flanked by a finger.	
G. Pocket – Unburned area between the main fire and any fingers.	
H. Island – Area of unburned fuel inside the fire perimeter.	
I. Spot Fire – Burning area outside the main fire perimeter, often caused by wind blown embers or rolling debris.	
III. FIRE BEHAVIOR TERMS	0B-04-S130-EP SW p. 0B.4
A. Spread – Movement of the fire. ROS is Rate of Spread and given in chains per hour. A chain is a surveying term and equals 66 feet. A good rule of thumb is to watch the fire spread for a minute as there are 60 minutes in an hour and just over 60 feet in a chain so this will give a fairly quick, relatively accurate measurement of the fire's forward progress (ex. 1 foot/minute = 1 chain/ hour).	
B. Smoldering – Fire burning without flame and barely spreading.	
C. Creeping – Fire burning with a low flame and spreading slowly.	
D. Running – Fire spreading rapidly with a well-defined head.	

OUTLINE	AIDS & CUES
E. Backing – Fire moving away from the head, downhill, or against the wind.	
F. Spotting – Sparks or embers produced by the main fire are carried by winds or convection column.	
G. Torching – Fire burning on the surface, but periodically igniting the crown of a single or small group of trees or shrubs before returning to the surface. Although sometimes confused with crowning this behavior is not as serious as a crown fire.	
H. Crowning – Fire that advances across tops of trees or shrubs more or less independent of surface fire. High fire intensity and high forward rate of spread. Use crown fire or crowning with care because it describes a very serious fire situation.	
I. Blowup – Sudden increase in fire intensity or rate of spread of a fire sufficient to preclude direct control or to upset existing suppression plans.	
IV. OTHER USEFUL FIREFIGHTING TERMS	0B-05-S130-EP SW p. 0B.5
The terms control line and fireline are both used, and although they are similar, there is a difference that is outlined in the following definitions.	
A. Control line – A comprehensive term used for all the constructed or natural fire barriers and treated fire edges used to contain the fire.	

OUTLINE	AIDS & CUES
B. Fireline – Any cleared strip or portion of a control line from which flammable material has been removed by scraping or digging down to mineral soil.	
C. Anchor point – An advantageous location, generally a fire barrier, from which to start constructing a fireline. Used to minimize the chance of being outflanked by the fire while the line is being constructed.	
D. Mopup – Final extinguishment of a fire after it is lined.	
E. Class of fire – This classifies the size of the fire with class "A" being the smallest and class "G" being the largest.	
REVIEW UNIT OBJECTIVES.	0B-06-S130-EP

PARTS OF THE FIRE



DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 1 - Firefighter Preparedness

TIME: 1 hour

TRAINING AIDS: Flipchart or white board, writing utensils, personal protective gear (line gear and overnight pack), Fireline Handbook

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Explain the importance of the proper use and maintenance of their assigned Personal Protective Equipment (PPE).

2. Develop a list of personal gear needed for an extended period away from their home station.

3. Explain the firefighter's accountability for personal and agency property.

4. List the benefits of maintaining a high level of physical fitness and health.

5. Explain how eating well and staying hydrated can reduce firefighter fatigue.

6. Explain the importance of keeping personal gear and assigned area in fire camp clean and organized.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS.	01-01-S130-EP thru 01-03-S130-EP
I. INTRODUCTION	
All firefighters need to be taught personal preparedness in the areas of:	
• Personal gear • Care and maintenance of personal gear • Accountability • Cleanliness and organization • Physical fitness	
II. PERSONAL GEAR	
To do a good job on any fire assignment, fire suppression personnel must be properly dressed and equipped. An ill-equipped and inadequately dressed firefighter cannot perform effectively for any length of time.	
Personnel may be formed into 20 person crews. To meet space and weight limitations all firefighting personnel are required to meet the following weight requirements:	
A. Weight Limits: Total individual gear weight = 65 pounds; personal gear weight = 45 pounds; web gear weight = 20 pounds (weight is without water).	01-04-S130-EP
INSTRUCTOR NEEDS TO VERIFY CURRENT WEIGHT LIMITS.	

OUTLINE	AIDS & CUES
B. Mandatory Items: Personal Protective Equipment (PPE)	01-05-S130-EP
REFERENCE FHB.	FHB (Firefighting Safety chapter)
Fighting fire is not only physically demanding work, but can be physically punishing as well. Fighting fire without exposing personnel to hazards is impossible, but in most cases personal injuries can be avoided.	
The safety gear the firefighter is issued is designed to <u>help</u> protect him or her when and if it is properly used and maintained. Proper use of PPE in conjunction with skill and common sense can prevent personal injuries.	
HAVE STUDENTS BRAINSTORM A LIST OF PERSONAL GEAR NEEDED FOR AN EXTENDED PERIOD AWAY FROM THE HOME STATION.	
THE FOLLOWING ITEMS ARE REQUIRED AND SHOULD BE AVAILABLE FOR DEMONSTRATION. ITEMS REQUIRED BY LOCAL AGENCIES SHOULD BE ADDRESSED AND SHOWN. THE INSTRUCTOR SHOULD DEMONSTRATE A FIRE READY LINE GEAR AND OVERNIGHT PACK.	
1. Hard hat - will provide protection when properly worn (never backwards). The hard hat is provided for your protection, always wear with a headliner. Chin straps should be worn as necessary.	

OUTLINE	AIDS & CUES
2. Eye protection (OSHA approved) - goggles, safety glasses. Eye protection is a provided and necessary part of all firefighters' apparel. Remember, the eyes are extremely vulnerable.	
GIVE SPECIFIC SITUATIONS; E.G., DEBRIS FROM HIGH WINDS, HELICOPTER BLADES, CHIPS AND DEBRIS FROM CHAIN SAWS AND NOZZLES, AND RIDING IN OPEN VEHICLES.	
3. Hearing protection - earplugs or ear "muffs" are necessary when firefighters are working around chain saws, pumps, helicopters, and other very noisy equipment and areas.	
4. Gloves - leather gloves are standard for most work.	
5. Flame-resistant clothing - Nomex™ (a trade name for arimid fiber clothing) is flame resistant but not fireproof. It offers no insulation to protect against burns.	
ALL WILDLAND FIRE AGENCIES REQUIRE FLAME RESISTANT TROUSERS AND SHIRTS. MODIFY THIS INFORMATION FOR ANY AREA SPECIFIC REQUIREMENTS.	
Both shirts and coveralls should be kept buttoned and tucked in to protect the exposed body parts. Clothing should be unbuttoned or loosened only on the supervisor's advice.	

OUTLINE	AIDS & CUES
Never begin an operational period with clothing or PPE that has gas, oil, or other flammable material on it. a. Trousers (Flame resistant). • Wear cuffless, loose fitting trousers, preferably of snag-proof material. Do not wear synthetic materials. Wear trousers over boot tops to keep out embers. • Do not cut the legs off because doing so will cause fraying, which is dangerous around open flame. • Wear a wide, high quality leather belt, if possible. b. Shirts (Flame resistant). • Wear long sleeved shirt that will secure at the collar and wrists for maximum protection. Keep shirt tucked in. • Do not paint names or decals on flame resistant clothing. This may reduce the flame resistant capabilities of the fabric.	

OUTLINE	AIDS & CUES
EMPHASIZE THE USE OF COTTON/ NON-SYNTHETIC UNDERWEAR AND UNDERGARMENTS WHEN FIGHTING FIRE.	
6. Boots	
a. Material Requirements:	
• Leather work boots • Lace-up, 8" high • Heavy soles with deep tread • Leather laces	
b. Unacceptable Materials:	
• Synthetic materials such as, nylon, gum soles, etc., which will melt when exposed to extreme heat • Steel toed boots • Zippered boots • Boots that lace to the toe, limbs and debris can get under the laces causing a firefighter to trip.	
c. Use caution while walking in hot ashes or coals. Limit time or avoid, if possible. Your boots will burn and disintegrate, and you may get severe burns on your feet before you realize it.	

OUTLINE	AIDS & CUES
7. Socks a. A medium weight wool or part wool boot sock is recommended. Some people prefer wearing a lighter sock under the heavier sock when hiking long distances. b. Take extra socks and change frequently (daily, if possible). If not possible, wash daily and hang them to dry. 8. Fire shelter with vinyl cover is required. 9. Canteens, used only for drinking fluids. 10. Head lamp, with fresh/spare batteries and spare bulb. **DEMONSTRATE METHODS TO ENSURE BATTERIES DO NOT DISCHARGE, E.G., CARDBOARD INSERT, REMOVING BATTERIES, ETC.** 11. Chain saw chaps are required whenever an individual is assigned as a chainsaw operator or swamper. **DETERMINE IF A SHROUD IS MANDATORY OR OPTIONAL FOR THE AREA IN WHICH YOU ARE INSTRUCTING.** 12. First aid kits are used for attending to minor injuries on the line.	

OUTLINE	AIDS & CUES
13. Flat (bastard) files, 10" or 12", for sharpening tools.	
14. Food, 1-2 meals minimum, preferably high energy.	
15. Personal gear pack (red bag), used to pack extra clothing and other optional items for up to 14 days.	
16. Sleeping bag, preferably light weight, is essential for western United States fires.	
17. Incident Response Pocket Guide, while only mandatory for some agencies, is highly recommended to be carried on the fireline at all times.	
C. Optional Items	
1. Hard hat shroud. Flame-resistant material attaches to hard hat to protect shoulders and neck from embers or heat.	
2. Tent	
3. Jacket or coat for night wear. No matter how hot an area is during the day, the nights may become quite cool.	
4. Extra clothing such as pants, shirts and socks are optional. Keep in mind the weight you will be carrying.	
5. Personal hygienic gear; for example, foot powder helps to prevent sore feet.	

OUTLINE	AIDS & CUES
6. Most firefighters keep a small "ditty bag" packed with some personal items and a fire shirt. The bag is packed at the start of the fire season and kept ready at all times. It is not a fire pack. A "ditty bag" is very important if you are assigned to a suppression crew.	
INSTRUCTORS ARE ENCOURAGED TO PROVIDE A LIST OF ITEMS THAT FIT THE NEEDS OF A PARTICULAR AGENCY/AREA FOR INITIAL ATTACK PACKS, CREW PACKS, DITTY BAGS, ETC. ALSO DISCUSS THE EFFECT AIRLINE REGULATIONS MAY HAVE ON ITEMS CARRIED DURING AIR TRAVEL.	
D. Other personal items. Some simple items will make your job easier and will add little to the overall pack weight. These items include:	
1. Matches (in a waterproof container)	
2. Watch	
3. Pocketknife	
4. Eyeglasses (if needed)/sunglasses	
5. Prescriptions (if needed)	
6. Water (one gallon per day/minimum)	
7. Rain gear	
8. Compass	

OUTLINE	AIDS & CUES
9. Toilet paper	
10. Spare boot laces	
11. Bandanas	
12. Flip flops for use in the showers to prevent athlete's foot	
13. Small towel	
14. Small flashlight	
15. Instant hand sanitizer	
If there are any other items that are critical to your comfort, carry them in your "ditty bag."	
REMIND STUDENTS THAT THEY MAY BE AWAY FROM HOME FOR AN EXTENDED PERIOD OF TIME AND SHOULD HAVE BILLS AND FINANCES TAKEN CARE OF.	
III. ACCOUNTABILITY	01-06-S130-EP
Firefighters will be issued gear worth more than $500. Firefighters are responsible for the proper use and maintenance of issued property. Keep in mind that damaged or lost equipment may be difficult to replace and could affect your ability to remain on the fireline.	
The agency will not be held responsible for any personal gear not necessary for use in fire activity. Cameras and portable radios are fun but not necessary and they add weight. If they are lost, stolen, damaged, or destroyed, you will not be reimbursed for them.	

OUTLINE	AIDS & CUES
Care and maintenance of personal and government issued equipment: A. Hard hat 1. Keep headband and straps clean. 2. Do not modify. 3. Clean hats with soap and water. 4. Inspect for cracks and damage. B. Nomex™ (fire resistant) clothing 1. Keep clean - Nomex™ loses its fire retardant capabilities if foreign substances are on or in the fibers. Check tag for washing instructions. Wash separately. 2. Replace clothing if ripped or torn. C. Boots 1. Keep clean and apply boot grease as necessary. 2. Insure that boots are in good repair. This should include inspecting and replacing soles, insuring all stitching is present, etc. **INFORM STUDENTS THAT BOOT REPAIR SHOULD BE DONE WELL IN ADVANCE OF FIRE SEASON.**	

OUTLINE	AIDS & CUES

IV. FIREFIGHTER FITNESS AND HEALTH

A. Introduction

Wildland firefighting is not normally conducted for short durations at sea level on flat terrain under moderate weather conditions. Firefighters routinely find themselves working shifts up to 16 hours, at high elevations on slopes in excess of 40%, and in temperatures over 100 degrees. To compound the situation, firefighters are often exposed to hazardous levels of smoke, frequently have an inadequate diet, sleep minimal hours, and are exposed to poor hygiene due to crowded living conditions in fire camp. In the western United States firefighters will typically sleep on the ground in sleeping bags after working all day. In the eastern United States firefighters are exposed to high humidities which increase the risk of heat related disorders. The normal wake up hour is at 0430. On large fires it is not uncommon to stand in line up to an hour for breakfast before going out on the line.

As a beginning firefighter, it must be understood that you will combat fatigue beginning from an initial dispatch all the way through a 14 day assignment. Fatigue can result in sloppy work habits and an inattentiveness towards safety. Fatigue is cumulative and is a well documented contributing factor to injuries and fatalities on the fireline.

As a wildland firefighter, maintaining a high level of physical fitness is critical in order to perform safely and effectively. Poor physical fitness can

OUTLINE	AIDS & CUES
directly result in endangering both you and your crew. Physical fitness can and will determine whether or not you will make it to an escape route to a safety zone.	
REMEMBER, WHEN PEOPLE GET TIRED, THAT IS WHEN THEY GET HURT!	
B. Physical Fitness - divided into two types	01-07-S130-EP
Aerobic fitness - is a measure of the maximum amount of oxygen that one can take into their body and transport to the muscles.	
Muscular fitness - includes both strength and muscular endurance.	
It is well documented that physically fit workers perform better in the heat, acclimate faster at high elevations, and are less likely to be injured on the fireline.	
Getting physically fit is a gradual process. Firefighters should begin training for the fire season a minimum of six weeks before starting work. Training should strike a balance between aerobic fitness (running) and muscular fitness (weight training), to ensure complete readiness for the upcoming fire season.	
ASK THE STUDENTS THE FOLLOWING:	
How many of you are currently participating in an active physical fitness program either at work or on your own?	

OUTLINE	AIDS & CUES
How can you know if you are in adequate physical condition for the upcoming fire season?	
EMPHASIZE TO THE STUDENTS IF THEY HAVE NOT YET BEGUN A RIGOROUS PHYSICAL FITNESS TRAINING PROGRAM, IT IS PROBABLY TOO LATE FOR THEM TO FUNCTION PRODUCTIVELY ON A FIRE CREW FOR AT LEAST THE FIRST HALF OF THIS FIRE SEASON.	
All firefighters are required to meet the minimum standard set by the work capacity test.	
Some firefighters such as smokejumpers have additional physical fitness requirements. Hotshot crews also have strenuous workout programs.	
BRIEFLY DISCUSS POSSIBLE WORKOUT ROUTINES WITH THE STUDENTS. POSSIBLE SUBJECTS TO INCLUDE ARE:	
• **WARMING UP AND STRETCHING** • **COOLING DOWN** • **RUNNING SCHEDULES** • **POWER HIKES** • **WEIGHT TRAINING TECHNIQUES AND SCHEDULES**	
INSTRUCTORS SHOULD REMEMBER THAT THIS IS NOT A PHYSICAL FITNESS COURSE AND LIMIT THE AMOUNT OF TIME ON THIS SUBJECT AS IS APPROPRIATE. EMPHASIZE TO THE STUDENTS THAT THEY SHOULD ALREADY BE PARTICIPATING IN A FITNESS PROGRAM.	

OUTLINE	AIDS & CUES
C. Diet	01-08-S130-EP

Firefighters can burn up to 300-600 calories an hour and over 6,000 calories a day. Daily caloric intake should equal expenditure. The key to a good diet is a balanced one that includes food in all the main food groups.

1. Carbohydrates

   - Should comprise 55-70% of caloric intake.
   - Provides glucose and glycogen for short intensive and long endurance activity.
   - Examples are whole grains, starchy vegetables, cereals, fresh fruit, pasta, and potatoes.

2. Fat

   - Should comprise 20-30% of caloric intake.
   - Provides a source of stored energy.
   - Polyunsaturated fats with a low cholesterol content are the best (low fat dairy products).

3. Protein

   - Should comprise 10-20% of caloric intake (additional amounts do not contribute to performance or build muscle tissue).
   - Large amounts may strain kidneys and cause dehydration.

OUTLINE	AIDS & CUES
• Examples are whole grains (rice), legumes (beans), fish, poultry, and lean red meat.	
4. Fiber	
• Important for a body's digestive system. • Reduce intake of refined flour and white sugar. • Examples are whole grains, cereals, fresh fruits, and vegetables.	
5. Calcium	
• Important for skeletal tissues. • 1,000 milligrams per day is recommended. • Low fat milk has 250 milligrams per 8 ounce serving.	
6. Vitamins and minerals	
• A balanced diet should provide adequate amounts of both. • Supplement with multi-vitamins when diet is inadequate.	
7. Sodium	
• Recommended intake is up to 2400 milligrams per day (average intake in the United States is 5000 milligrams).	

OUTLINE	AIDS & CUES
• If perspiration has been excessive, use salt on food to replace lost salts. • Do not use salt tablets. 8. Caffeine • Caffeine is a diuretic and can speed up the dehydration process. • Some studies have shown 1-2 cups coffee may improve performance. • Maximum recommended intake is 300 milligrams per day. • Cup of coffee averages 100 milligrams, tea or soft drink averages 70 milligrams, chocolate bar averages 40 milligrams. 9. Hints for a good performance: • Avoid alcohol. • Avoid eating red meat two days in a row. • Limit egg intake to one per day. • Eat whole wheat bread instead of white. • Substitute other seasonings for salt. • Eat ample amounts of fruit and vegetables. • Avoid large amounts of sugar calories. • Concentrate on getting enough carbohydrates. **THE ABOVE DIET GUIDELINES ARE RECOMMENDED ONLY AND MAY VARY FROM INDIVIDUAL TO INDIVIDUAL.**	

OUTLINE	AIDS & CUES
D. Fluids	01-09-S130-EP

Firefighters will lose up to two gallons of fluids on a hot day. You cannot rely on thirst alone to indicate your fluid needs. Inadequate fluid intake will result in dehydration which will have a cumulative effect on your performance and safety. Dehydration can lead directly into heat related disorders which can be life threatening.

1. Symptoms of dehydration are:

   - Morning headaches
   - Diminished or discoloration of urine
   - Diminished sweating
   - Constipation
   - Irritability

2. Firefighters can minimize dehydration by doing the following:

   - THE BEST THING YOU CAN DO IS LOAD UP ON WATER.
   - Keep a canteen by your side at all times, including while bedding down.
   - Use electrolyte replacing drinks in moderation.
   - Avoid excessive soft drinks and caffeine.
   - Avoid alcohol completely when on fire assignments.
   - Drink herbal teas as a hot drink if available instead of coffee.
   - Utilize supplemental carbohydrates during sustained exercise.

OUTLINE	AIDS & CUES
• Avoid performance enhancing supplements containing caffeine, ephedrine, and creatine which increase the risk of heart related injuries.	
E. Fatigue	01-10-S130-EP
Working without adequate rest produces fatigue. While tired muscles can be made to continue working, the brain cannot function adequately with too little sleep. When people become fatigued, accidents and injuries occur.	
STRESS TO THE STUDENTS THAT FATIGUE HAS BEEN IDENTIFIED AS A MAJOR FACTOR CONTRIBUTING TO IMPAIRED THINKING THAT HAS LED TO FATALITIES ON THE FIRELINE.	
1. Symptoms of fatigue are:	
• Feeling rundown and groggy in the morning. • Falling asleep at every break given. • Feeling light headed and having difficulty concentrating. • Irritability. • Dulling of the senses (resulting in a reduction in situation awareness).	

OUTLINE	AIDS & CUES
2. Firefighters can minimize fatigue by doing the following: • Maintain adequate food and water intake. • Pace work output while maintaining a steady rate of productivity. • Maintain 2 to 1 work to rest cycle. • Sleep whenever given the opportunity, avoid staying up late in fire camp when it is unnecessary. • MONITOR YOURSELF AND YOUR CO-WORKERS.	
STRESS TO THE STUDENTS THE IMPORTANCE OF MONITORING THEMSELVES AND THEIR CO-WORKERS FOR FATIGUE. GIVE EXAMPLES OF SITUATIONS WHEN YOU OR YOUR CO-WORKERS WERE FATIGUED AND WHAT THE EFFECT WAS ON YOUR PERFORMANCE AND SAFETY AWARENESS TO ILLUSTRATE THIS POINT.	
F. Personal Hygiene and Area Cleanliness	01-11-S130-EP
Fire crews live and work in a close environment with each other for weeks on end. Inattention to personal hygiene can directly lead to sickness and the spreading of colds and other contagious diseases. All it takes is one person to become sick for it to spread through an entire crew. This is especially true later in the season when people are more tired and the weather starts getting colder. When crews become sick, they are usually sent home from a fire.	

OUTLINE	AIDS & CUES
GIVE EXAMPLES OF CREWS YOU WERE ON WHERE SEVERAL INDIVIDUALS GOT SICK.	
1. Ways to maintain personal hygiene and prevent sickness from spreading through a fire crew:	
• WASH HANDS FREQUENTLY, especially before eating. Use instant hand sanitizer when soap and water are not available. This is probably one of the best preventative measures one can take. (Consider what a firefighter's hands come in contact with during a typical shift -- saw mix, drip torch mix, dirt, etc.)	
• Shower when given the opportunity. (This must be balanced with the opportunity to sleep.)	
• Avoid sneezing and coughing on each other.	
• Change socks and underwear frequently.	
• Use foot powder.	
• Monitor yourself and co-workers for signs of sickness.	
• Supplement diet with Vitamin C, Echinacea, zinc, and multi-vitamins if you are feeling fatigued and have early symptoms of sickness.	

OUTLINE	AIDS & CUES
2. Keeping your personal gear and assigned area in fire camp clean and organized has the advantage of: • Maintaining a professional appearance for the crew. • Being prepared to move on short notice. • Lessening the chance of losing items. • Minimizing impact to the environment.	
REVIEW UNIT OBJECTIVES.	01-12-S130-EP 01-13-S130-EP

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 2 - ICS Overview

TIME: 1 hour

TRAINING AIDS: None

REFERENCE: I-100, Basic ICS Administrator Reference Text

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Describe the firefighter's chain of command.
2. Define an incident and describe how the incident management structure is organized.
3. Describe the general responsibilities of each section in the Incident Command System (ICS).
4. Name the two positions above the firefighter in the chain of command.

OUTLINE	AIDS & CUES
IF I-100 IS BEING TAUGHT TO THIS GROUP OF STUDENTS, THIS SECTION MAY BE CONDENSED OR DELETED.	02-01-S130-EP 02-02-S130-EP 02-03-S130-EP
PRESENT UNIT OBJECTIVES AND DISCUSS.	
I. WHAT IS INCIDENT COMMAND SYSTEM?	
A. Management tool for responding to emergency situations. It establishes the chain of command.	
B. It is adaptable to many types of incidents (flood, hurricane, wildfire, search and rescue).	

OUTLINE	AIDS & CUES
C. It is adaptable to the size of the incident. It can grow to meet the needs of the incident while maintaining span of control.	
II. CHAIN OF COMMAND	02-04-S130-EP
Chain of command is the line of authority through which decisions are made, recommendations offered, and work assignments are given.	
AS THE PRESENTATION MOVES FROM SIMPLE TO COMPLEX DISCUSS HOW ICS ADAPTS AND GROWS.	
A. Small Fire Organization	02-05-S130-EP
1. 90% of wildland fires are suppressed during the initial attack phase, with a small organization.	
2. In a small organization of two to three firefighters, one must serve as the boss or incident commander.	
B. Span of Control	
1. The number of personnel a person can safely and effectively supervise.	
2. Key factor in firefighter safety.	
ASK THE CLASS HOW MANY PERSONNEL THEY THINK CAN BE SAFELY AND EFFECTIVELY SUPERVISED?	

OUTLINE	AIDS & CUES
3. Five is the recommended number of personnel that can be safely and effectively supervised.	
C. Building up to a 20-Person Handcrew Organization	02-06-S130-EP
1. One squad boss supervising a four to six person squad of firefighters.	
2. Add more firefighters and squad bosses as needed to maintain span of control.	
3. When a full 20 person crew is needed a crew boss is added to supervise the squad bosses.	
4. Span of control is maintained.	
III. LARGE FIRE MANAGEMENT ORGANIZATION	02-07-S130-EP
The Incident Command System is intended to be very adaptable to the needs of a specific incident. On smaller fires the organization is rather simple. As the fire grows in complexity, ICS adapts by growing as well.	
A. Fire Progression	
• More suppression resources are needed • Fire complexity increases • Span of control is maintained	

OUTLINE	AIDS & CUES
B. Incident Command System	02-08-S130-EP
Incident exceeds the capabilities of the initial attack resources. The need for a more elaborate division of tasks is needed to support the efforts. The incident is organized into the following five functional areas called sections:	
• Command • Operations • Planning • Logistics • Finance/Administration	
ASK THE CLASS WHAT DEFINES AN INCIDENT? AN EMERGENCY RESPONSE SITUATION.	02-09-S130-EP
C. Incident Types	
• Structure fire • Search and rescue • Flood • Hurricane response • Hazardous materials spill • Vehicle accident • Wildland fire • Nationally declared emergency	
IV. ICS SECTIONS RESPONSIBILITIES	
A. Command	02-10-S130-EP
1. This section has overall responsibility and decision-making for an incident.	

OUTLINE	AIDS & CUES
2. Positions in the command section include:	
BRIEFLY DESCRIBE DUTIES OF EACH POSITION.	
a. Incident commander b. Safety officer c. Information officer d. Liaison officer	
B. Operations Section	
1. Operations section develops and implements the strategy and tactics.	02-11-S130-EP
2. Positions in operations section include:	02-12-S130-EP
BRIEFLY DESCRIBE DUTIES OF EACH POSITION.	
a. Operations section chief	
b. Operations branch director	
c. Division/Group supervisor	
• Division supervisors are assigned to divisions; group supervisors are not tied to geographic boundaries (e.g., structure protection group).	
d. Task force leader	
• A task force is a group of unlike or mixed resources. For example: two engines, one handcrew, and one dozer.	

OUTLINE	AIDS & CUES
e. Strike team leader (tractor/plow, dozer, engine, crew)	
• A strike team is a group of like resources.	
f. Crew representative	
g. Single resource boss (crew, engine, dozer, felling, firing, tractor/plow)	
h. Advanced firefighter/squad boss	
i. Firefighter	
j. The air operations positions are also under the operations section.	
k. Staging area manager	
3. Operations may be divided geographically or functionally to maintain span of control.	02-13-S130-EP
ASK THE CLASS TO IDENTIFY THE TWO POSITIONS DIRECTLY ABOVE THE FIREFIGHTER IN THE CHAIN OF COMMAND.	02-14-S130-EP
ADVANCED FIREFIGHTER/SQUAD BOSS AND SINGLE RESOURCE BOSS.	
C. Planning Section	02-15-S130-EP
1. Responsible for documenting and displaying the approved strategy and tactics for the incident.	

OUTLINE	AIDS & CUES
2. The planning section includes:	
BRIEFLY DESCRIBE DUTIES OF EACH POSITION.	
a. Planning section chief b. Situation unit c. Resources unit d. Documentation unit e. Demobilization unit f. Human resource specialist g. Fire behavior analyst h. Field observer i. Other miscellaneous positions	
D. Logistics Section	02-16-S130-EP
1. Responsible for providing support and service for all incident personnel.	
2. The logistics section includes:	
BRIEFLY DESCRIBE DUTIES OF EACH POSITION.	
a. Logistics section chief b. Communications unit c. Supply unit d. Medical unit e. Food unit f. Facilities unit g. Ground support unit h. Other miscellaneous positions	
E. Finance/Administration Section	02-17-S130-EP
1. Responsible for processing payments, purchasing, contracts and providing cost estimates.	

OUTLINE	AIDS & CUES
2. The finance section includes:	
BRIEFLY DESCRIBE DUTIES OF EACH POSITION. a. Finance/Administration section chief b. Cost unit c. Procurement unit d. Compensation/claims unit e. Time unit f. Commissary manger g. Other miscellaneous positions	
REVIEW GENERAL RESPONSIBILITIES OF THE FIVE FUNCTIONAL AREAS IN ICS.	02-18-S130-EP
FOR MORE IN-DEPTH INFORMATION ON THE INCIDENT COMMAND SYSTEM, REFER STUDENTS TO THE I-100 COURSE.	
REVIEW UNIT OBJECTIVES.	02-19-S130-EP

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 3 - Resource Types

TIME: ½ hour

TRAINING AIDS: Flipchart or white board, writing utensils, Fireline Handbook

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Explain different types of crew organizations commonly used in initial attack and extended attack.

2. Explain the importance of respecting cultural differences in terms of food, standards of behavior, dress, and customs.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS.	03-01-S130-EP 03-02-S130-EP
I. INTRODUCTION	
Crew organization is important in saving time and in limiting confusion on arrival at wildland fires. With proper organization each firefighter will be individually prepared and upon arrival at a fire, have a specific task to perform.	
A. Firefighter Duties and Responsibilities	03-03-S130-EP
A firefighter is the basic resource used in control and extinguishment of wildland fires and works either as an individual or as a member of a crew under the supervision of a highly qualified individual.	FHB (Operations chapter)

OUTLINE	AIDS & CUES
1. Performs manual and semi-skilled labor.	
2. Ensures that objectives and instructions are understood.	
3. Performs work in a safe manner.	
4. Maintains self in the physical condition required to perform the arduous duties of fire suppression.	
5. Keeps personal clothing and equipment in serviceable condition.	
6. Reports close calls, accidents or injuries to supervisor.	
7. Reports hazardous conditions to supervisor.	
B. Crew Organization	03-04-S130-EP
GIVE EXAMPLES OF THE BENEFITS OF CREW ORGANIZATION AND ASK STUDENTS FOR ADDITIONAL ITEMS. EMPHASIZE THAT CREW ORGANIZATION WILL BE THE FOCUS FOR THIS UNIT.	
1. Establishes chain of command.	
2. Provides pre-planned job assignments.	
3. Creates teamwork.	
4. Gives individuals responsibility.	

OUTLINE	AIDS & CUES
5. Reduces confusion.	
6. Saves time.	
7. Maintains control.	
8. Builds esprit de corps.	
9. Creates respect among crew members.	
II. TYPES OF CREWS	FHB (Appendix A)
Firefighting crews are made up of 4-20 firefighters and are generally organized for specific firefighting assignments.	
A. Hand Crews	
Organized Type 1 and 2 crews must be 18-20 persons.	
Exception: Alaska organized crews total 16 for in-state dispatches to facilitate crew movement which is primarily by air. These crews total 18-20 when dispatched to the lower 48 states.	
Hand crews are typically used to construct fireline with cutting tools, scraping tools, smothering tools and chain saws. They can also be used to assist in making hose lays.	
1. Type 1 hand crews	03-05-S130-EP
Type 1 crews are a national resource funded by fire management. Firefighting is usually their primary job.	

OUTLINE	AIDS & CUES
Examples include:	
a. Interagency hotshot crews	
b. 18-20 person smokejumper crew	
2. Type 2 hand crews	03-06-S130-EP
Type 2 crews are broken into two categories, Type 2 and Type 2 with initial attack (IA) capabilities. The crews with IA capabilites have slightly higher standards than the regular Type 2 crews. Type 2 with IA capabilities can be broken into squads to conduct initial attack, fireline construction and firing (including burnout operations).	
Examples include:	
a. Snake River Valley (SRV)	
b. Southwest Firefighters (SWFF)	
c. Montana Indian Firefighters (MIFF)	
d. Inmates, ward residents, etc.	
e. Agency regulars	
f. Alaskan native	
g. Job corps	

OUTLINE	AIDS & CUES
h. Emergency Firefighters (EFF) or Call When Needed (CWN) firefighters; usually assembled on an as needed basis.	
i. Contract crews	
REFER TO THE FIRELINE HANDBOOK, APPENDIX A FOR OTHER DIFFERENCES AND SIMILARITIES BETWEEN TYPE 1 AND 2.	Fireline Handbook, Appendix A
DISCUSSION OF THE NEXT FOUR CREW TYPES IN DETAIL IS OPTIONAL. INSTRUCTOR NEEDS TO USE DISCRETION TO DETERMINE WHICH TYPES TO DISCUSS AT THIS TIME. EXPAND ON EACH TYPES AS APPROPRIATE FOR YOUR AREA.	
B. Engine Crews	03-07-S130-EP
Engine crews are used to pump water on mobile attack and extended hose lays. Engine crews use a combination of hand tools and water to fight fire.	
Types of engines and crew configurations:	
1. Type 1, 1000 gallon per minute (GPM), 400 gallon tank capacity, 4 crewmember minimum.	
2. Type 2, 500 GPM, 400 gallon tank capacity, 3 crewmember minimum.	
3. Type 3, 120 GPM, 300 gallon tank capacity, 2 crewmember minimum.	

OUTLINE	AIDS & CUES
4. Type 4, 70 GPM, 750 gallon tank capacity, 2 crewmember minimum.	
5. Type 5, 50 GPM, 500 gallon tank capacity, 2 crewmember minimum.	
6. Type 6, 50 GPM, 200 gallon tank capacity, 2 crewmember minimum.	
7. Type 7, 20 GPM, 125 gallon tank capacity, 2 crewmember minimum.	
C. Helitack Crews	03-08-S130-EP
Helitack crews are used for initial attack on small remote fires. They also manage the helicopter that transports ground crews to remote or hard to get to fires. Helicopters and crew can support ground crews both tactically and logistically. Crew size varies with agency. Call When Needed (CWN) helicopter standard crew size and examples of helicopter types are listed below.	
1. Type 1 Helicopter (e.g., Bell 214, Sikorsky S-61), 16 seats, manager only.	
2. Type 2 Helicopter (e.g., Bell 205, Bell 212), 10 seats, manager and three crew persons.	
3. Type 3 Helicopter (e.g., Bell 206, Hughes 500D, 500E, Hiller 12E, Bell 47), 3-5 seats, manager and two crew persons.	

OUTLINE	AIDS & CUES
D. Dozers/Tractor Plow Crews	03-09-S130-EP 03-10-S130-EP
Dozers and tractor plow units are used to construct firelines and to support other ground forces. Equipment will have an operator with a helper. Helper may be known as a swamper.	
Classifications range from Type 1 dozers being the heaviest to Type 3 being the lightest, and tractor plows Type 6 is the lightest.	
ADDITIONAL INFORMATION ON EQUIPMENT SPECIFICATIONS CAN BE FOUND IN THE FIRELINE HANDBOOK, APPENDIX A.	FHB (Appendix A)
III. CULTURAL DIFFERENCES	
Fighting fire can involve many people of different cultural backgrounds. Agency and local policies exist to govern these differences. Professionalism in fire suppression operations requires respecting these differences.	
INVOLVE THE STUDENTS IN THE FOLLOWING DISCUSSION. BRING OUT ANY LOCAL DIFFERENCES YOU MAY NOT BE AWARE OF AND DISCUSS.	
A. Areas of Cultural Differences	03-11-S130-EP
1. Food or dietary needs of any cultural/ ethnic group	
2. Housing	
3. Dress	

OUTLINE	AIDS & CUES
4. Religion	
GIVE EXAMPLES AND DISCUSS AGENCY RULES AND REGULATIONS. DEFINITION OF ETHNIC: PERTAINING TO A RELIGIOUS, RACIAL, NATIONAL, OR CULTURAL GROUP.	
B. Other Social and Ethnic Considerations	
1. Language barriers may impede communication, chain of command and could compromise safety.	
2. Rivalries that may exist between ethnic groups.	
3. Mixed personnel crews (inmates vs. others, male/female) may require separate facilities.	
ALL OF THE ABOVE CAN AFFECT WORK PRODUCTION RATES, SUPERVISORY CONTROL, AND/OR "GETTING THE JOB DONE."	
IV. CONCLUSION	03-12-S130-EP
Be respectful and courteous. Your behavior as an individual will be reflected in the crew you are working with. **BE PROFESSIONAL!**	
REVIEW UNIT OBJECTIVES.	03-13-S130-EP

Unit 4 - Risk Management

Notes to the Instructor

Unit 4 is designed to explain the risk management process outlined in the Incident Pocket Response Guide (IRPG). Concepts in this unit are interrelated and can prove challenging to present.

Lesson A - introduces the risk management process by combining Step 2, Hazard Assessment, represented by the Watch Out Situations, and Step 3, Hazard Control, represented by the Standard Firefighting Orders found in the IRPG. Many of the Watchout Situations pertain to concepts presented in Introduction to Wildland Fire Behavior, S-190. The instructor is encouraged to let the students work through the Watch Out Situations by using what they learned thus far to discover why this situation presents hazards for the firefighter. The Standard Firefighting Orders will illustrate the process used by firefighters to develop the controls designed to minimize the risks associated with the identified hazards. Lookouts, communications, escape routes, and safety zones (LCES) will be covered in detail in Lesson B.

Lesson B - presents LCES as the operational components of the Standard Firefighting Orders. It is important that the students understand this relationship to the Standard Firefighting Orders. These are the actions, the things firefighters do, to help control the hazards on the fireline.

Lesson C - discusses the use of the fire shelter and entrapment, and last resort survival alternatives.

Lesson D - is an adapted version of the L-180 Human Factors on the Fireline course. This introduces students to key concepts regarding situation awareness, communication responsibilities, and teamwork. Even though the firefighter will typically be a follower in the fire environment it is important for them to understand they have a role in assisting the decision maker by providing input, identifying hazards, asking questions for clarification, and showing initiative to accomplish the leader's intent. **Students that successfully complete S-130 should also be given credit and a certificate for completing L-180 Human Factors on the Fireline.**

DETAILED LESSON OUTLINE

COURSE:	Firefighter Training, S-130
UNIT:	4 - Risk Management
LESSON:	4A - Watch Out Situations and Standard Firefighting Orders
TESTING METHOD:	Scenerio
TIME:	3 hours
TRAINING AIDS:	Flipchart or white board, writing utensils, Standard Firefighting Orders and Watch Out Situations decal and card, Common Denominators of Fire Behavior pamphlet, "Risk Management for S-130" video or DVD, Incident Response Pocket Guide, Fireline Handbook
OBJECTIVES:	Upon completion of this lesson, students will be able to:

1. Identify the common denominators on tragedy fires.
2. Given a scenario, identify the appropriate Watch Out Situations.
3. Apply the appropriate Standard Firefighting Orders to minimize the potential for serious injury or death.

OUTLINE	AIDS & CUES
I. INTRODUCTION	4A-01-S130-EP 4A-02-S130-EP 4A-03-S130-EP
PRESENT LESSON OBJECTIVES AND DISCUSS.	
DISCUSS THE RELATIONSHIP BETWEEN THE FHB AND THE IRPG. EMPHASIZE THE POINTS BELOW.	
• Fireline Handbook focuses primarily on organizational and strategic issues of firefighting.	
• Fireline Handbook contains pertinent information for firefighters at all levels and is a good reference to either carry on the fireline or have access to in a vehicle.	
• Incident Response Pocket Guide focuses primarily on the tactical issues of firefighting.	
• Incident Response Pocket Guide fits nicely into a shirt pocket and is easily transported and referred to anywhere on the fireline.	
• All firefighters should carry the Incident Response Pocket Guide with them at all times.	
Wildland firefighting is a dangerous job. It requires that you be thoroughly familiar with the hazards in the fire environment. Your safety and the safety of others may depend upon your ability to recognize fire environment factors that may threaten your life. All fire personnel have the obligation to work safely and to protect themselves and others from injury. Safety is our #1 priority.	
Fatal and near fatal fires have occurred in most geographic areas and with most fuel types.	

OUTLINE	AIDS & CUES
HAND OUT A STANDARD FIREFIGHTING ORDERS AND WATCH OUT SITUATIONS DECAL AND CARD AND A COMMON DENOMINATORS OF FIRE BEHAVIOR PAMPHLET TO EACH STUDENT.	
START PART 1 OF THE RISK MANAGEMENT FOR S-130 VIDEO/DVD (INTRODUCTION). STOP VIDEO/DVD AFTER THIS SECTION.	Risk Management for S-130 video or DVD, Part 1
There are four major common denominators of fire behavior on fatal and near-fatal fires. Such fires often occur:	IRPG (Green - Operational)
• On relatively small fires or isolated areas of large fires.	
• In deceptively light fuels, such as grass, herbs, and light brush.	
• When fire responds to topographic conditions and runs uphill.	
• When there is an unexpected shift in wind direction or in wind speed.	
Alignment of topography and wind during the burning period should always be considered a trigger point to re-evaluate strategy and tactics.	
Fatalities have occurred during mopup and prescribed burning operations. The same fire environmental factors are present as with a wildfire. The fire environment may endanger safety and therefore demands the same respect as a wildfire.	

OUTLINE	AIDS & CUES
II. WATCH OUT SITUATIONS	IRPG (back cover)
The conditions or situations which we must be aware of and recognize are called the **Watch Out Situations**.	
Eighteen conditions or situations have been identified. The failure to recognize and respond to each of these situations has resulted in fatalities. The Watch Out Situations are signs or warnings that if positive action is not immediately taken you will endanger yourself or your coworkers.	
EMPHASIZE YOU DON'T VIOLATE THE WATCH OUT SITUATIONS. THEY SIMPLY OCCUR IN THE FIRE ENVIRONMENT. YOU MAY FAIL TO RECOGNIZE THEM OR FAIL TO PROPERLY RESPOND.	
REFER STUDENTS TO IRPG TO SHOW WHERE WE ARE IN THE RISK MANAGEMENT PROCESS.	IRPG (Green - Operational)
The response to the Watch Out Situations is to take positive action which will minimize the potential for serious injury or death. The actions you take are called the **Standard Firefighting Orders or Hazard Controls**. These will be discussed later in the lesson.	
START PART 2 (WATCH OUT SITUATIONS) OF THE VIDEO/DVD. STOP VIDEO/DVD AFTER THIS SECTION.	Risk Management for S-130 video or DVD, Part 2
IN GROUPS OF 3-5 STUDENTS, ASSIGN EACH GROUP THREE OR FOUR OF THE WATCH OUT SITUATIONS. HAVE THE GROUPS DEVISE RESPONSES TO THE QUESTIONS INCLUDED IN THEIR WORKBOOKS FOR THEIR ASSIGNED SITUATIONS.	SW p. 4A.2 thru 4A.6

OUTLINE	AIDS & CUES
ALLOW TEN MINUTES FOR THE GROUPS TO COMPLETE THEIR ASSIGNMENT. GROUPS MAY CREATE DRAWINGS TO ILLUSTRATE THEIR ANSWERS.	
HAVE GROUPS PRESENT THEIR RESPONSES.	
TOPICS AND QUESTIONS ARE PRESENTED BELOW FOR INSTRUCTOR INPUT.	
A. Watch Out Situations	
1. FIRE NOT SCOUTED AND SIZED UP.	4A-04-S130-EP
Why is this important?	
• Identify hazards. • Understand what you are up against.	
2. IN COUNTRY NOT SEEN IN DAYLIGHT	4A-05-S130-EP
Why is this important?	
• Identify hazards. • Identify escape routes and safety zones. • Overall safety of the suppression action.	
What can you do if you cannot wait to see the country in daylight?	
• Get briefing from someone who has worked the area.	

OUTLINE	AIDS & CUES
3. SAFETY ZONES AND ESCAPE ROUTES NOT IDENTIFIED. Why is this important? • Need to know where to go to be safe. • When time frames are tight need to act.	4A-06-S130-EP
REINFORCE THAT REGARDLESS OF THE SITUATION, ESCAPE ROUTES AND SAFETY ZONES MUST BE AN INTEGRAL PART OF <u>EVERY</u> FIRE. THIS WILL BE DISCUSSED MANY TIMES TODAY.	
4. UNFAMILIAR WITH WEATHER AND LOCAL FACTORS INFLUENCING FIRE BEHAVIOR. Why is it important? • Difficult to predict fire behavior. • Weather is the most variable factor affecting fire behavior. Weather patterns - Do all fires have them? • Yes, to some degree, some are very pronounced. How do you obtain this local information? • Information from local fire personnel. • Weather reports including “spot weather forecasts.”	4A-07-S130-EP

OUTLINE	AIDS & CUES
5. UNINFORMED ON STRATEGY, TACTICS AND HAZARDS. What does strategy mean? • Overall plan to achieve the fire suppression objectives. What are tactics? • Specific actions to suppress the fire; e.g., use air tankers to cool down west flank or construct 5 ft. wide handline across east flank. What hazards need to be identified? • Heavy fuel concentrations. • Chimneys where firefighters may get trapped. • Snags or hazardous trees near work areas. • Falling operations. • Dangerous terrain. • Any hazards which may endanger workers. What questions can be asked to reduce the risks? • Have strategy, tactics or hazards changed since last informed? • Can you get a briefing from your supervisor?	4A-08-S130-EP

OUTLINE	AIDS & CUES
EMPHASIZE THE IMPORTANCE OF GETTING A COMPLETE BRIEFING.	IRPG (Briefing Checklist inside back cover)
6. INSTRUCTIONS AND ASSIGNMENTS NOT CLEAR. What should your instructions include? • Who's in charge? • Location of work assignment. • Hazard identification. • Communication - type, radio frequency, contacts, what to communicate. • Escape routes and safety zone location. • Tactics to employ. • Fire weather/behavior expected. • Exactly what you are supposed to be doing. • Status of adjoining forces.	4A-09-S130-EP
7. NO COMMUNICATION LINK WITH CREW MEMBERS/SUPERVISOR. Why must you be in communication? • To be alert to changing conditions. • To be alert to problems developing. • To be alert to blowup. • To maintain control and prevent panic.	4A-10-S130-EP

OUTLINE	AIDS & CUES
8. CONSTRUCTING FIRELINE WITHOUT SAFE ANCHOR POINT.	4A-11-S130-EP
What is a safe anchor point?	
• Point or location not currently, or likely in the future to be, threatened by fire spread.	
• Place to begin your fireline where you're likely to hold your line.	
9. BUILDING FIRELINE DOWNHILL WITH FIRE BELOW.	4A-12-S130-EP
TALK ABOUT THE SERIOUSNESS OF THIS WATCH OUT SITUATION.	
What is the danger in building line downhill?	
• Potential for rapid uphill run of the fire - cannot predict lateral spread. • Cannot assure safe escape from fire traveling uphill. • Inability to establish a safe anchor point.	
Can you ever build line downhill?	
Yes, see IRPG, Downhill Checklist.	IRPG (Green-Operational)

OUTLINE	AIDS & CUES
10. ATTEMPTING FRONTAL ASSAULT ON FIRE. What are the dangers involved with a frontal assault? • No anchor point. • Lateral spread of fire - out flanked. • Rapid movement of fire toward, over you. • Heat and smoke intensity. • Inability to utilize satisfactory escape routes and safety zones.	4A-13-S130-EP
11. UNBURNED FUEL BETWEEN YOU AND THE FIRE. Why is this a “watch out situation”? • Wind switch or change in burning conditions can cause fire to blow up which can endanger workers as well as spread the fire across the fireline. How can you prevent this potential problem? • Burn out to your fireline.	4A-14-S130-EP
12. CANNOT SEE MAIN FIRE, NOT IN CONTACT WITH ANYONE WHO CAN. Why is this important? • Need to know current fire behavior, direction of spread.	4A-15-S130-EP

OUTLINE	AIDS & CUES
• Need to know if you or crew might be in danger. • Need to know if you or crew should move to the safety zone.	
13. ON A HILLSIDE WHERE ROLLING MATERIAL CAN IGNITE FUEL BELOW. What are the consequences? • Loss of control line. • Rapid fire spread uphill. • Endanger self and crew.	4A-16-S130-EP
14. WEATHER IS GETTING HOTTER AND DRIER. Why is this a “watch out situation?” • Increase in fuel combustion and fire behavior. • Increased chance for blowups, spotting. How can you tell if it is getting hotter and drier? • Your senses. • Weather forecasts/spot weather. • Observing fire behavior - more intense burning. • Taking weather periodically with weather kit.	4A-17-S130-EP

OUTLINE	AIDS & CUES
15. WIND INCREASES AND/OR CHANGES DIRECTION. Why is this a “watch out situation?” • More oxygen - increases fire intensity. • Increased chance for spotting - fire brands. • Increases likelihood for fire spread. • Increases likelihood for “reburns.”	4A-18-S130-EP
16. GETTING FREQUENT SPOT FIRES ACROSS LINE. What are the consequences of spot fires? • A spot below you (or other location) can run uphill and endanger crew/person. • Indicator of increased fire behavior. • Increases element of complexity to suppression effort.	4A-19-S130-EP
17. TERRAIN AND FUELS MAKE ESCAPE TO SAFETY ZONES DIFFICULT. Why is this a “watch out situation?” • Personnel should be able to escape with “reasonable ease.” • Time needed for escape will be increased. • Clear identification will take more work e.g., more flagging, glow sticks, saw work, etc.	4A-20-S130-EP

OUTLINE	AIDS & CUES
• Trigger point for re-evaluation will be moved up.	
18. TAKING A NAP NEAR THE FIRELINE.	4A-21-S130-EP
Although this is a convenient place what danger might there be?	
• Mechanized equipment traveling this route. • Danger of burning snags/trees falling.	
B. Watch Out Situations Checklist Scenario Exercise	
REFER STUDENTS TO STUDENT WORKBOOK AND READ INSTRUCTIONS.	4A-01-S130-IR SW p. 4A.13 thru 4A.15
ANSWER ANY QUESTIONS STUDENTS MAY HAVE AND START PART 3 OF THE VIDEO/DVD. STOP VIDEO/DVD AFTER THIS SECTION.	Risk Management for S-130 video or DVD, Part 3
AS A GROUP REVIEW AND DISCUSS THE SCENARIO USING THE QUESTIONS ON THE LAST PAGE. SUGGESTED ANSWERS ARE PROVIDED TO ASSIST INSTRUCTORS, BUT ANSWERS FROM THE CLASS MAY VARY BASED ON DIFFERENT PERSPECTIVES.	SW p. 4A.15 4A-02-S130-IR
EXERCISE SHOULD TAKE APPROXIMATELY 15 MINUTES.	

OUTLINE	AIDS & CUES
III. STANDARD FIREFIGHTING ORDERS	SW p. 4A.7
START THE LAST SECTION OF THE VIDEO/DVD (KREB'S INTERVIEW).	Risk Management for S-130 video or DVD, Part 4
1. Keep informed on fire weather conditions and forecasts. 2. Know what your fire is doing at all times. 3. Base all actions on current and expected behavior of the fire.	Orders 1-3 Fire Behavior 4A-22-S130-EP
4. Identify escape routes and safety zones, and make them known. 5. Post lookouts when there is possible danger. 6. Be alert. Keep calm. Think clearly. Act decisively.	Orders 4-6 Fireline Safety 4A-23-S130-EP
7. Maintain prompt communications with your forces, your supervisor and adjoining forces. 8. Give clear instructions and insure they are understood. 9. Maintain control of your forces at all times.	Orders 7-9 Organizational control 4A-24-S130-EP
10. Fight fire aggressively, having provided for safety first.	Order 10 Overall intent 4A-25-S130-EP

OUTLINE	AIDS & CUES
The **Standard Firefighting Orders** were developed by a Task Force commissioned by Forest Service Chief Richard E. McArdle in 1957. The task force reviewed the records of 16 tragedy fires that occurred from 1937 to 1956. Both the Blackwater Fire of 1937 on the Shoshone National Forest and the Mann Gulch Fire at the Gates of the Mountains in 1949 contributed to the wisdom contained in the Standard Firefighting Orders. For the Standard Firefighting Orders to make sense, you must understand the intent of their sequencing, and grouping which provide a process for engagement and re-evaluation. The Standard Firefighting Orders are in fact your rules of engagement. Remember, the orders are designed to move up and down in sequence in an engagement and re-evaluation process.	
AT THE COMPLETION OF THE VIDEO REFER STUDENTS TO IRPG TO SHOW WHERE WE ARE IN THE RISK MANAGEMENT PROCESS.	IRPG (Green-Operational)
INVOLVE STUDENTS IN DISCUSSION OF THE STANDARD FIREFIGHTING ORDERS. RELATE THESE TO THE WATCH OUT SITUATIONS AND TO MATERIAL PRESENTED IN PREVIOUS UNITS. ENGAGE THE STUDENTS BY USING THE QUESTIONS IN THE OUTLINE. PROVIDE EXAMPLES BASED ON YOUR EXPERIENCE.	SW p. 4A.7 thru 4A.11
A. <u>#1 Keep informed on fire weather conditions and forecasts.</u> Weather will most often dictate where and how your fire will move.	

OUTLINE	AIDS & CUES

What weather factors are most important to know?
 	
• Temperature
• Relative humidity
• Wind (velocity, direction, changes)
 	
What personal observations can you make?
 	
• General assessment of temperature, dryness and wind
• Weather measurements on site
• Observing on-site fire behavior
  - Flame length
  An 8' flame above a tree may not be a problem, where as 2' flame laying over the fireline may cause a change in tactics.
  - Smoke color
  - Ease/difficulty to extinguish fuels
• Wind patterns in relation to local topography
• Cloud type and extent of cover
 	
Where might you obtain “off-site” weather information?
 	
• Daily weather - agency radio transmission
• Request spot weather forecast
• Incident facilities
• Briefing from supervisor	

OUTLINE	AIDS & CUES
B. #2 Know what your fire is doing at all times. Observe, use lookouts and scouts. This is the basic order that all orders fall back on. What current information on the fire's status do you need to know? • Location of fire perimeter • How fast it is spreading • Direction of spread • Fuel related information (type, arrangement, etc.) • Fire behavior • Location of fuel or natural breaks • If it is spotting How do you obtain this information? • Personal observation • Scouts • A lookout or observer C. #3 Base all actions on current and expected behavior of the fire. Fire is not static. It will constantly move and grow until it is controlled. Once you have sized up the fire, begin to anticipate its movements. Current and expected fire behavior will help you do this.	

OUTLINE	AIDS & CUES
When applying this Standard Firefighting Order, what fire environment elements are considered? • Weather • Topography • Fuels What time of the day are burning conditions most active and why? • 1000-1700 (varies with geographic area and time of year) • Warmer temperatures • Lower humidities • Increased winds Where would most active burning take place for any operational period? • Above inversion layers • Thermal belts or mid-slope zones on night shift D. <u>#4 Identify escape routes and safety zones, and make them known.</u> This order must be in place before firefighters can become engaged. If the fire situation deteriorates, you can always move to a safety zone until the situation becomes clear to you.	

OUTLINE	AIDS & CUES
What would you consider when identifying escape routes and safety zones? • Escape routes clearly marked and identified to all; reassess as necessary. • Safety zones of proper size considering number of personnel and fuel types. **EMPHASIZE THAT ESCAPE ROUTES AND SAFETY ZONES MAY CHANGE DURING AN OPERATIONAL PERIOD.** E. <u>#5 Post lookouts when there is possible danger.</u> A lookout will be able to tell you **what your fire is doing**. The lookout can also take weather readings to help you predict future fire behavior. What things would you consider when assigning a lookout? • Must have communication with the crew/ supervisor. • Must have good fire knowledge and experience. • Must be able to recognize hazardous situations.	

OUTLINE	AIDS & CUES

F. #6 Be alert. Keep calm. Think clearly. Act decisively.
 	
You must first be clear and calm in your own mind to be safe and effective. If you are confused then move to a safety zone until the situation is clear again. Remember all of us, no matter what our experience level, will be confused and unsure of ourselves at times on the line. There are often just too many variables changing too fast for our minds to process. If you are confused, then move to your safety zone to watch and learn.
 	
What factors in the fire environment might adversely affect our alertness, thinking, judgment, and decision making ability?
 	
• Fatigue
• Heat stress
• Smoke (Carbon Monoxide)
• Stress
 	
What can you do to prevent or reduce the effect of the following factors?
 	
• Fatigue and heat stress
  - Maintain a good physical conditioning program.
  - Maintain a proper diet.
  - Replace liquids.
  - Get sufficient rest and sleep.
• Carbon Monoxide
  - Reduce intake/exposure.
• Stress
  - Know and understand the situation.	

OUTLINE	AIDS & CUES
What should you do to increase your decision making ability? • Maintain self control. • Develop contingency plans. • Become more cautious. • Monitor the situation more closely. • Double check critical information, calculations, etc. • Seek information and advice from others. • Know your own limitations. G. <u>#7 Maintain prompt communications with your forces, your supervisor and adjoining forces.</u> If your communication lines are broken then stop and take time to re-evaluate until the lines are open again. Who do you need to stay in communication with? • Crew members • Observers/lookouts • Supervisor What information do you need? • Instructions • Status changes/progress reports • Warnings Test radio equipment, carry extra batteries, establish contact schedules and contingency plan.	

OUTLINE	AIDS & CUES
Proper communications and information are vital to retaining control of personnel.	
H. <u>#8 Give clear instructions and insure they are understood.</u>	
When in doubt, ask for clarification of instructions.	
Whose responsibility is it to ensure instructions are given and understood?	
• Your supervisor • You	
How do you "ensure understanding"?	
• **Ask questions.** • Repeat - feed back instructions or information.	
I. <u>#9 Maintain control of your forces at all times.</u>	
How do you "maintain control"?	
• Ensure that assignments/instructions are clear and understood. • Establish and maintain communication. • Know location of your crewmembers at all times. • Know current fire status.	

OUTLINE	AIDS & CUES
J. #10 Fight fire aggressively, having provided for safety first. What safety considerations need to be taken into account prior to fighting fire aggressively? • Take action only after thoroughly scouting the area. • Receive and understand instructions and assignments. • Ensure lookouts alert personnel to danger. • Maintain good communications. • Ensure that strategy and tactics do not endanger firefighters. • Know where your escape routes and safety zones are. Before fully engaging, the **Standard Firefighting Orders** must be fully considered. If a safety problem arises at any point during engagement, then stop and re-evaluate the situation. Safety is written throughout the **Standard Firefighting Orders**. Always be prepared to re-evaluate and follow the sequence back through the orders at any time.	

OUTLINE	AIDS & CUES
IV. SUMMARY	
Firefighter fatalities have occurred because firefighters, or those in charge, failed to recognize life threatening situations or they failed to take proper action once a life threatening situation was recognized.	
In the 1950s, the Standard Firefighting Orders were introduced as guidelines to prevent future fire fatalities. Fire fatality investigations, since that time, have proven conclusively that if **Watch Out Situations** had been recognized, and proper **Standard Firefighting Orders** applied, the accidents could have been prevented.	
REVIEW LESSON OBJECTIVES.	4A-26-S130-EP

WATCH OUT SITUATIONS
SCENARIO

The scenario you are about to see portrays a tragic fire that occurred in the eastern region of the United States. Watch Out Situations were not observed and/or mitigated. Firefighters lost their lives.

In analyzing this scenario, you are reaping the only benefit that can ever be salvaged from a fire tragedy: a learning experience, to minimize the possibility that this could happen to you.

You will have the opportunity to recognize and react to "Watch Out Situations." Awareness of these hazardous situations is your key to survival in the wildland fire environment.

It is important that you look and listen at a high sensitivity level. Clues, both visual and verbal, will be apparent in this scenario, providing indicators that "Watch Out Situations" are present. Use the checklist on the following page to record your observations.

When the video/DVD is shut off, the class will work together as a group to answer the attached questions.

WATCH OUT SITUATIONS
CHECKLIST

_____1. Fire not scouted and sized up.

_____2. In country not seen in daylight.

_____3. Safety zones and escape routes not identified.

_____4. Unfamiliar with weather and local factors influencing fire behavior.

_____5. Uninformed on strategy, tactics and hazards.

_____6. Instructions and assignments not clear.

_____7. No communication link with crew members/supervisor.

_____8. Constructing fireline without safe anchor point.

_____9. Building fireline downhill with fire below.

_____10. Attempting frontal assault on fire.

_____11. Unburned fuel between you and the fire.

_____12. Cannot see main fire, not in contact with anyone who can.

_____13. On a hillside where rolling material can ignite fuel below.

_____14. Weather is getting hotter and drier.

_____15. Wind increases and/or changes direction.

_____16. Getting frequent spot fires across line.

_____17. Terrain and fuels make escape to safety zones difficult.

_____18. Taking a nap near the fireline.

WATCH OUT SITUATIONS
SCENARIO QUESTIONS

1. Which Watch Out Situations did you observe?

2. Was there an adequate briefing with Engine 731?

3. Why should weather and fuel conditions be part of the daily briefing?

4. What can crew members do if information is missing from the briefing?

5. Describe any other events you observed that contributed to the tragedy.

6. Why is it important to know what is happening on other divisions of the fire?

7. What is your number one priority?

WATCH OUT SITUATIONS
SCENARIO ANSWERS

1. Which Watch Out Situations did you observe?

#3 Safety zones and escape routes not identified.
#5 Uninformed on strategy, tactics and hazards.
#6 Instructions and assignments not clear.
#7 No communications link with crew members/supervisor.
#11 Unburned fuel between you and the fire.
#14 Weather is getting hotter and drier.
#15 Wind increases and/or changes direction.
#16 Getting frequent spot fires across line.
#17 Terrain and fuels make escape to safety zones difficult.

2. Was there an adequate briefing with Engine 731?

No, very little information was exchanged and no confirmation of the communication was ever received.

3. Why should weather and fuel conditions be part of the daily briefing?

The elements of weather and fuel conditions contribute significantly to fire behavior. Awareness is a major key.

4. What can crew members do if information is missing from the briefing?

Ask questions, follow along with the Briefing Checklist in the Incident Response Pocket Guide to assure information is provided.

5. Describe any other events you observed that contributed to the tragedy.

Multiple answers may apply here - discuss any that have not been touched on in #1 above.

6. Why is it important to know what is happening on other divisions of the fire?

The activity on the other divisions can affect your safety and operations.

7. What is your number one priority?

Safety.

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 4 - Risk Management

LESSON: B - LCES

TESTING METHOD: Scenario

TIME: 1 hour

TRAINING AIDS: Flipchart or white board, writing utensils, S-134, "LCES" video, LCES decal, Incident Response Pocket Guide

OBJECTIVES: Upon completion of this lesson, students will be able to:

1. Describe how Lookouts, Communications, Escape routes and Safety zones (LCES) is related to the Standard Firefighting Orders.

2. Define escape route, escape time, and safety zone.

3. Identify travel barriers that will affect escape time.

4. List the three types of safety zone categories and describe one example of each.

5. Describe a general guideline for determining safety zone size to avoid radiant heat injury.

6. Identify the limitations of utilizing the Incident Response Pocket Guide safety zone guidelines.

7. Describe the difference between deployment sites and safety zones.

OUTLINE	AIDS & CUES
PRESENT LESSON OBJECTIVES AND DISCUSS.	4B-01-S130-EP thru 4B-03-S130-EP
I. LCES AND THE STANDARD FIREFIGHTING ORDERS	
HAND OUT ONE LCES DECAL TO EACH STUDENT.	
HAVE STUDENTS REFER TO LCES CHECKLIST IN IRPG.	IRPG (Green - Operational)
Firefighters operating in high risk environments have developed some basic rules of engagement on the fireline. These rules where derived over time from wildland firefighter's experiences. Consequently their research and development cost was high, paid for by the mistakes of many firefighters. These are the Standard Firefighting Orders. These orders, if applied diligently, provide firefighters with a framework to organize and assess information concerning the fireline.	
Within the Standard Firefighting Orders, our basic rules of engagement, are LCES, which represent the four key operational components of the Orders. LCES was developed by Paul Gleason.	4B-04-S130-EP
LCES must always be in place when working on the fireline. It is a tool that looks at the Watch Out Situations to evaluate the assignment, identify the hazards, analyze the risks, and implement steps to ensure safety by interconnecting with the Standard Firefighting Orders, as its operational component.	
To reduce the risks of fire entrapment, lookouts must be posted with communications to each firefighter, and have a minimum of two escape routes from the firefighter's work location to a safety zone (not a shelter deployment site).	

OUTLINE	AIDS & CUES
The nature of wildfire suppression dictates continuous evaluation of LCES and the constant reevaluation and establishment of LCES as the fire grows.	
Generally, the end goal of the 10 Standard Firefighting Orders and LCES is hazard control on the fireline; more specifically entrapment avoidance.	
MANY OF THE SITUATIONS REQUIRING LCES ARE RELATED TO THE WATCH OUT SITUATIONS. THESE CAN BE REFERENCED ON THE BACK COVER OF THE IRPG.	
THE LCES VIDEO IS TO BE SHOWN IN FOUR PARTS. SHOW PART ONE OF THE VIDEO (*LOOKOUTS*).	LCES Video Part 1
USE QUESTIONS BELOW TO DISCUSS POINTS OF THE VIDEO.	SW p. 4B.2
A. Lookouts	
Black Water Fire - 1937, Wyoming. 15 Civilian Conservation Crew members killed.	
1. What would have posting lookouts done for the firefighters in this case?	
Answer: Provided advanced warning allowing time to avoid entrapment.	
2. What does the lookout need to be able to see?	
Answer: Lookout needs to be in a position where both the hazard and the firefighters can be seen.	

OUTLINE	AIDS & CUES
3. Who should be selected as a lookout? Answer: Selected individuals must be trained and skilled in observing the wildland fire environment and recognizing and anticipating changes in wildland fire behavior.	
DISCUSS VARIOUS POSITIONS THAT CAN BE USED AS LOOKOUTS/SCOUTS. FOR EXAMPLE, EXPERIENCED FIELD OBSERVERS, SINGLE RESOURCE OPERATIONS PERSONNEL, FIRE MONITORS.	
4. How many lookouts are needed? Answer: The number of lookouts needed is determined by the size of the fire and the terrain it covers.	
SHOW PART TWO OF THE LCES VIDEO (*COMMUNICATIONS*).	LCES Video Part 2
USE QUESTIONS BELOW TO DISCUSS POINTS OF THE VIDEO.	
B. Communications *Battlement Creek Fire - 1976, Colorado. Three hotshots killed.*	SW p. 4B.2 thru 4B.3
1. What was the main contributing factor to this accident? Answer: Miscommunication	

OUTLINE	AIDS & CUES
2. What are some barriers to communication? Answer: Language, ego, work cultures, terminology	
3. The method used to alert firefighters of approaching hazards must be what? Answer: Prompt and clear	
4. What communication devices/methods could be used? Answer: Radios, phones, word-of-mouth, flagging, face-to-face communication is the most effective.	
REITERATE TO STUDENTS THAT IF THEY HAVE DOUBTS ABOUT THEIR ABILITY TO COMMUNICATE, BACK OFF. TAKE THE TIME TO GET IT RIGHT--COMMUNICATION NEEDS TO BE CLEAR AND CONCISE!	
SHOW PART THREE OF THE LCES VIDEO (*ESCAPE ROUTES*).	LCES Video Part 3
USE THE QUESTIONS BELOW TO DISCUSS POINTS OF THE VIDEO.	
C. Escape Routes *Loop Fire - 1966, California. 12 hotshot crew members killed and another 9 were injured.*	SW p. 4B.3 thru 4B.4

OUTLINE	AIDS & CUES
1. What was this crew attempting to do? Answer: Construct line downhill 2. What happened? Answer: Firefighters where entrapped and burned over. 3. How could escape routes have been established to avoid this tragedy? Answer: Under the conditions present at the time, i.e., mid afternoon, the lack of adequate escape routes in this steep topography should have prompted managers and firefighters to consider other alternatives. If the hazards could not be mitigated the mission should have been turned down. This tragedy is an example of a failure to implement hazard assessment and control. 4. How would you define an escape route? Answer: An escape route is a path the firefighter takes from a location exposed to danger, to an area of safety. 5. What is escape time? Answer: The time it takes for all involved to make it to an area of safety.	

OUTLINE	AIDS & CUES
6. What are some travel barriers you might encounter that will increase escape time? Answer: Loose soil, rocky and difficult terrain, vegetation, uphill routes, downed timber, creek crossings, heavy smoke, night operations, panic of personnel and potentially dangerous wildlife. 7. When might you need to reevaluate or change your escape routes? Answer: Situation changes, i.e., changing weather conditions, forecasts, fire behavior, location/topography, fuels. 8. How many escape routes should be available to the firefighter? Why? Answer: More than one. Evaluate locations in front, to the rear, and on both sides of the firefighter. Fireline constructed indirect attack or parallel (leaving unburned fuel between you and the fire) to the fire, may compound situations. Unless safety zones have been identified ahead, behind, and to the sides, firefighter retreat may not be possible. **DISCUSS WHY FIREFIGHTERS MAY BE INSTRUCTED TO DISCARD EQUIPMENT (HANDTOOLS, SAWS, ETC.) AND PACKS (TO LIGHTEN THEIR LOAD AND DECREASE TIME NEEDED TO REACH SAFETY ZONES). AT ALL COSTS, DO NOT DISCARD THE FIRE SHELTER.**	

OUTLINE	AIDS & CUES
SHOW PART FOUR OF THE LCES VIDEO (*SAFETY ZONES)*.	LCES Video Part 4
USE THE QUESTIONS BELOW TO DISCUSS POINTS OF THE VIDEO.	
D. Safety Zones	SW p. 4B.4 thru 4B.7
1. What is a safety zone?	
Answer: A safety zone is a place where a fire shelter is not needed. Safety zones are locations where the threatened firefighter may find refuge from danger.	
There is a variety of areas that will work as safety zones. They fall into general categories - natural and constructed.	
THROUGH CLASS INTERACTIONS AND THE SLIDES PRESENTED, DISCUSS THE QUALITIES UNIQUE TO EACH TYPE OF SAFETY ZONE.	
2. Safety zone categories	
a. The burn	
b. Natural features	
c. Constructed features	

OUTLINE	AIDS & CUES
3. Examples of these types of safety zones may include:	
a. The burn: The burn, or commonly referred to as the black: What is unique about this photo is there is nothing left to burn, it is true black. There are no visible smokes and no open flame, indicating that there is little or no heat present at this safety zone.	4B-05-S130-EP
b. Natural: This large green meadow is an excellent example of a natural safety zone. It is large in size and devoid of any heavy fuel accumulation. If needed, it may be prepped by burning the grass. But in general, it represents a safety zone that needs little or no preparation.	4B-06-S130-EP
c. Natural: This photo was taken at a ridge-top meadow that would be more than adequate as a safety zone. Despite the large pine trees, the ground fuels are short and could easily be burned off, eliminating any chance of a surface fire reaching up into the pines.	4B-07-S130-EP
d. Natural: This photo represents another common natural safety zone. What are some of the factors that should be considered while viewing this photo?	4B-08-S130-EP

OUTLINE		AIDS & CUES
e.	Constructed: Burning-out, commonly referred to as the black-line concept, is securing control lines by removing fuels between the fire and the control line. What is unique about this is that the fuels are removed as firefighters progress and there is nothing left to burn, it is true black. Fire intensities decrease as fuels burn up and heat dissipates over time as this safety zone is constructed.	4B-09-S130-EP
f.	Constructed: This site was constructed with fire equipment. This historic photo illustrates the classic safety zone construction. Bulldozers are excellent in removing any combustible fuels from the safety zone.	4B-10-S130-EP
g.	Constructed: This photo taken at the Silver Creek spike camp/ helispot. It has been burned out and the rock slope is free of burnable fuels.	4B-11-S130-EP
h.	Constructed (agricultural): These orchards may provide an excellent safety zone for firefighters. The obvious safety zone would be deep into the orchard. The only preparation for this sites would be to turn on the sprinkler system if available.	4B-12-S130-EP

OUTLINE	AIDS & CUES
*Note: Years with extreme drought conditions might cause this area to not be a safety zone, i.e., Wenatchee Heights burnover.	
i. Constructed (agricultural): This is a grazed area. What would need to be done to this site to ensure its use as a safety zone?	4B-13-S130-EP
j. Constructed (forestry): This is a clear cut. Is this a good safety zone? If the answer is yes, what preparation needs to take place. Discuss.	4B-14-S130-EP
k. Constructed (urban): Shown in the next two photos are existing roads and highways that may serve as safety zones. What do these photos have in common? Are they adequate safety zones? Would they be adequate to support engine crews and/or hand crews? Is there any preparation that can be done?	4B-15-S130-EP 4B-16-S130-EP
4. Determining the size and location of an effective safety zone. Determining the actual size of a safety zone is no easy task. There is no black and white answer to determine how big a safety zone must be in order to be effective. However, the Incident Pocket Response Guide provides firefighters with guidance for safety zone assessment.	IRPG (Green-Operational, Safety Zone Guidelines)

OUTLINE	AIDS & CUES
Effective safety zones must be preplanned. This requires that safety zones be completed before they are needed. Firefighters must feel confident all safety issues have been identified and mitigated. Safety zones must be pre-located to avoid: • Locations that are downwind from the fire. • Locations that are in chimneys, saddles or narrow canyons. • Locations that require a steep uphill escape route (greater than 50% slope). • Exposure to heavy fuel concentrations on the windward side of ridges, rocks and other solid objects. Effective safety zones must be of sufficient size to mitigate the effects of radiant and convective heat while providing adequate space for the number of occupants. **EMPHASIZE THAT THE IRPG GUIDELINES ONLY IDENTIFY THE SEPARATION DISTANCE NEEDED TO REDUCE THE EFFECT OF RADIANT HEAT TRANSFER.**	

OUTLINE	AIDS & CUES
The IRPG table assumes no slope or wind. Convection is not addressed. Convective heat transfer from wind, fire-whirls and terrain influences will significantly increase the total heat transfer to firefighters and thus require significant increases in the distance separation guidelines.	
5. Scenario - Safety Zones	
During the fire season of 2001, fourteen firefighters and two civilians deployed their fire shelters while battling the Thirtymile Fire on the Okanogan-Wenatchee National Forest. Their only escape route was cut off and they retreated up canyon to what was believed to be a safety zone.	
SHOW SLIDES OF THE SITE AND DISCUSS.	4B-17-S130-EP 4B-18-S130-EP
The site was approximately ½ acre (100 feet by 100 feet) in size located adjacent to a rock talus and riparian vegetation. The fire burned as a crown fire resulting in flame lengths 60-100 feet high.	
HAVE CLASS USE IRPG TO DETERMINE MINIMUM SAFETY ZONE SIZE.	IRPG (Green-Operational, Safety Zone Guidelines)
ANSWER: AT MINIMUM (WITH NO SLOPE AND NO WIND) THESE FIREFIGHTERS NEEDED A SEPARATION DISTANCE EXCEEDING 400 FEET (12 ACRES) TO REDUCE THE THREAT OF INJURY.	

OUTLINE	AIDS & CUES
REFER TO SLIDES, DISCUSS PROCESS OF REASSESSING SITUATION WHEN CONDITIONS CHANGE, AND REITERATE THE IMPORTANCE OF PREPLANNING SAFETY ZONES. LINK TO LCES TO ENSURE NEW INFORMATION IS CONSIDERED.	
II. DEPLOYMENT SITES VS. SAFETY ZONES	
A. What is a deployment site and when should it be used?	
1. Deployment sites are used when fire conditions are such that escape routes and safety zones have been compromised.	
2. Deployment sites are last resort locations with generally light fuels in which a firefighter must deploy a fire shelter to aid in survival.	
3. REMEMBER....Safety zones are locations where the threatened firefighter may find refuge from danger without the aid of a fire shelter.	
B. Determining when to seek refuge may or may not be easily identifiable to all fire fighters.	
1. Stay alert to changing fire conditions and safety zone locations.	
2. As line construction proceeds, your position changes in relation to safety zones and escape routes.	

OUTLINE	AIDS & CUES
3. Quality LCES will help ensure timely warnings and adequate escape times.	
REFER TO SLIDE AND DISCUSS DECISION PROCESS.	4B-19-S130-EP
C. Scenarios	
THROUGH CLASS INTERACTIONS AND SLIDE PRESENTATION DISCUSS THE CONCEPTS AND QUESTIONS PRESENTED BELOW.	SW p. 4B.8
1. This photo of the Butte Fire shows the steep ridge with continuous heavy fuels below the ridge line. Crews assigned to this section of the control line were to fire off and secure control lines.	4B-20-S130-EP
What factors need to be evaluated to determine if this is a deployment site or a safety zone? Answer: Flame lengths, rate of spread, wind speed, wind direction, relative humidity, fuel loading, horizontal arrangement, vertical continuity, and slope.	
Two crews effectively used the large clear cut for a safety zone.	
2. We have previously identified these photos as natural safety zones.	4B-21-S130-EP 4B-22-S130-EP
In the first photo if the large pine trees torched out would your opinion change? Why?	

OUTLINE	AIDS & CUES
The second photo shows timber in the background that may be prone to extreme fire behavior. Would time of day affect your opinion of this meadow as a safety zone? Why?	
REVIEW LESSON OBJECTIVES.	4B-23-S130-EP 4B-24-S130-EP

DETAILED LESSON OUTLINE

COURSE:	Firefighter Training, S-130
UNIT:	4 - Risk Management
LESSON:	C - Fire Shelter
TESTING METHOD:	Performance evaluation
TIME:	2 hours
TRAINING AIDS:	Flipchart or white board, writing utensils, appropriate version of the practice fire shelters "Using Your Fire Shelter": 2001 edition, video AND Your Fire Shelter: 2001 edition, pamphlet OR "The New Generation Fire Shelter" video or DVD AND The New Generation Fire Shelter pamphlet
OBJECTIVES:	Upon completion of this lesson, students will be able to:

1. Explain the two most important functions of the fire shelter.
2. Discuss the inspection and care of the fire shelter.
3. Discuss the last resort survival options.
4. Discuss entrapment and deployment site.
5. Demonstrate the correct deployment procedures for the fire shelter in 25 seconds or less.

OUTLINE	AIDS & CUES
THIS LESSON IS BASED ON THE FIRE SHELTER PAMPHLET AND VIDEO OR DVD. THE TYPE OF FIRE SHELTER BEING USED [“OLD VERSION” VERSUS “NEW GENERATION FIRE SHELTER”] WILL DETERMINE THE APPROPRIEATE VIDEO/ DVD AND PAMPHLET TO USE IN THIS LESSON. SEE APPENDIX A FOR ORDERING INFORMATION. INFORMATION PROVIDED HERE MAY NEED TO BE UPDATED BASED ON THE FIRE SHELTER BEING USED.	
STUDENTS MUST BE ADVISED THAT THEY WILL BE REQUIRED TO DEMONSTRATE PROPER FIRE SHELTER DEPLOYMENT AND ENTRAPMENT PROCEDURES IN 25 SECONDS OR LESS TO PASS THIS LESSON.	
STUDENTS FAILING TO SUCCESSFULLY DEMONSTRATE PROPER FIRE SHELTER DEPLOYMENT WILL BE GIVEN ADDITIONAL TRAINING UNTIL PROFICIENT AT DEPLOYMENT IN 25 SECONDS OR LESS.	
CONSIDER SHELTER DEPLOYMENT PRACTICE IN TERRAIN SIMILAR TO THOSE FOUND IN FIRE SUPPRESSION ENVIRONMENTS (INCLUDING STEEP, UNEVEN GROUND AND WINDY CONDITIONS).	
PRESENT LESSON OBJECTIVES AND DISCUSS.	4C-01-S130-EP 4C-02-S130-EP

OUTLINE	AIDS & CUES
I. INTRODUCTION	
A fire shelter is an item of PPE, used only as a last resort. Use can increase your chances of surviving a life threatening burnover situation. However, the fire shelter is not a means to take chances and is not a substitute for following the **Standard Firefighting Orders** and **Watch Out Situations**. It is intended to be used as **YOUR LAST RESORT to survive fire entrapment**.	
HAND OUT THE APPROPRIATE FIRE SHELTER PAMPHLET TO EACH STUDENT.	Your Fire Shelter pamphlet OR New Generation Fire Shelter pamphlet
A. Two Most Important Functions of the Fire Shelter	
1. To reflect radiant heat. It is NOT designed for direct flame contact.	4C-03-S130-EP
2. To provide cooler, breathable air to protect your lungs and airway. You can survive third-degree burns; you can't survive scorched lungs and airway.	
B. Mandatory Carrying	4C-04-S130-EP
A fire shelter will be carried by...	
• all fireline personnel during all phases of fire suppression and prescribed fire operations.	
• all fire support personnel, such as drivers, who may be required to enter a fire area.	

OUTLINE	AIDS & CUES
C. Items to Wear and Take into Fire Shelter	4C-05-S130-EP
1. Gloves. Without gloves on it is very difficult to hold down the shelter while entrapped.	
2. Radio. Maintain communications with other trapped firefighters by radio. If radio is unavailable, shout back and forth.	
3. Hard hat. The hard hat will help keep the shelter away from your head and provide protection from radiant heat.	
4. Water. Water is vital during entrapment. Drinking water allows your body to continue to sweat, aiding in the natural cooling process. **Never** wet clothing or wear moistened respiratory protection (wet bandana).	
SHOW THE APPROPRIATE FIRE SHELTER VIDEO/ DVD. INSTRUCTOR SHOULD UPDATE STUDENTS ON CURRENT SHELTER AND TECHNIQUES.	"Using Your Fire Shelter": 2001 ed., video OR "The New Generation Fire Shelter" video or DVD
REFER STUDENTS TO PAMPHLET WHILE DISCUSSING THE FOLLOWING INFORMATION.	Fire Shelter pamphlet
II. SHELTER INSPECTION AND CARE	
A. Visual Inspection of the Shelter in the Polyethylene Case (should be made):	
1. When the fire shelter is issued to you.	

OUTLINE	AIDS & CUES
2. At the beginning of each fire season.	
3. Every two weeks during the fire season.	
B. Fire Shelter Damage	
1. Abrasion is the most common damage. Signs of abrasion include:	
a. Gray vinyl bag through which you cannot see the shelter, or visible dark gray stains.	
b. Aluminum particles in the bottom of the bag.	
2. Other signs of damage include:	
a. Tears along folded edges exceeding 1/4".	
b. Dents or punctures in the foil over one-inch wide.	
c. One-half inch or more of foil is missing.	
Remove the shelter from service if any of the above damages are detected. Any shelter that has been opened for inspection or used for demonstration will need to be replaced.	
Pinholes and small tears will not reduce your protection. You are still better off inside your shelter.	

OUTLINE	AIDS & CUES
PROVIDE EXAMPLES OF NEW AND DAMAGED FIRE SHELTERS IF POSSIBLE.	
C. Care and Handling	4C-06-S130-EP 4C-07-S130-EP
1. Keep the shelter away from sharp objects that may puncture it.	
2. Do not load heavy objects on top of the shelter.	
3. Avoid as much rough handling as possible.	
4. Do not lean against objects when wearing the shelter.	
5. Do not sit on the shelter or use it as a pillow.	
6. Carry the fire shelter in the polyethylene liner provided.	
7. Fire shelters should be carried where they can be quickly reached, even on the run. NEVER inside your pack.	
8. **Treat your fire shelter with respect**. It is a vital item of your personal safety gear.	
III. LAST RESORT SURVIVAL OPTIONS	
REFER STUDENTS TO GRAPHIC DEPICTING MISTAKES THAT LEAD TO ENTRAPMENT. STRESS THE IDEA THAT ENTRAPMENT AVOIDANCE RESULTS FROM DISCIPLINED SITUATIONAL AWARENESS COUPLED WITH A RESPECT FOR FIRE AS A NATURAL FORCE.	4C-08-S130-EP

OUTLINE	AIDS & CUES
A. Introduction	
1. Stay alert, keep calm, think clearly and act decisively. **DON'T PANIC**.	4C-09-S130-EP
2. Full PPE is required, especially a hard-hat and gloves!	
3. Protect your airway. People have been burned severely on other parts of the body and have completely recovered.	
4. Escape if possible. Outrun the flanks and get below the fire. If in light fuels and you can see the other side of the flame front run through the flames into the black. The fire shelter can also be used as a heat shield when moving. Always try to get to the best clearing possible with the time available.	
5. Make it a habit and part of your **situational awareness** to note survivable deployment sites throughout the work day, e.g., clearings, meadows, rocks, caves, mine-shafts, lee sides of ridges, streams, rivers, lakes, swamps.	
6. Never plan to share a shelter. The shelter is designed for one person; the extra space is needed for insulation. Two people have survived in one shelter, but the risk of injury dramatically increases.	

OUTLINE	AIDS & CUES
VISUALIZATION IS A TECHNIQUE DESCRIBED IN USING YOUR FIRE SHELTER. THIS IS NOT A REPLACEMENT FOR HANDS ON TRAINING, BUT CAN BE USED TO COMPLEMENT HANDS ON TRAINING.	
B. **Entrapment is Imminent**, but there **is Time** to Prepare.	4C-10-S130-EP
1. Drop any gear that will not be needed in the site preparation, e.g., packs, saws, and fuel and fusees (keep fusees if considering burnout). The bare minimums should be the fire shelter, a tool for removing ground fuel, and some drinking water. Dropping your gear will increase your speed in moving to a better area to deploy your shelter and your ability to get into the shelter.	
2. Avoid hazardous terrain and heavy fuels, e.g., narrow/box canyons, chimneys, saddles, debris filled rock piles, and areas with heavy concentrations of fuel. Be aware of snags, rolling rocks and any area that may have vehicle travel. If needed block the roadway to prevent injury from any vehicles.	
3. Rivers, streams, ponds, lakes	
a. About 2 feet in water depth that will cover your body, can save your life.	
b. Cover your head with your shelter to create an airway.	

OUTLINE	AIDS & CUES
c. Use caution in deep pools, rapid currents, and near waterfalls.	
4. Site preparation can reduce the potential fire intensity by improving the radiant heat distance separation. Cut and scatter as many of the fuels as possible. Remember time is a huge factor in this task. So your situation must be constantly reassessed based on the fire behavior observed.	
5. Individual site preparation considerations:	
a. Seek the lowest point.	
b. Greatest distance from the nearest fuels.	
c. Smooth surface textures for shelter seal.	
d. Utilize heat barriers.	
e. Remove ground fuels (4' x 8').	
f. Prepare to deploy as a crew with shelters grouped as close together as possible.	
6. Consider starting a burnout if you have time.	
a. Burnouts:	
• Aid in fuel reduction.	
• Reduce radiant heat.	

OUTLINE	AIDS & CUES
• Help avoid direct flame impingement.	
b. Be aware that a burnout might pull the advancing main fire toward you at a greater rate of spread.	
c. Burnouts must not jeopardize other individuals.	
d. Consider burnouts only in light fuels.	
7. Air resources may be an option, but may not always be available.	
8. Do not wait until the flame front is upon you to get into the shelter.	
C. No Time for Preparation, and the **Fire is on You**.	
1. Immediately deploy if there are hot embers raining down on you. Quickly find a depression, road cut, large boulder, or a dirt berm to use as a heat barrier.	
2. You will be hit with a blast of superheated air before the flame front reaches you. To avoid the impact:	
a. Drop to the ground as quickly as possible and do what ever it takes to get into your shelter.	
b. Find the lowest point available and get you face down into the dirt.	

OUTLINE	AIDS & CUES
c. Dig a shallow hole and use a dry bandana to breath through.	
3. Position your feet toward the fire.	
4. At all costs hang onto the shelter; the winds will be turbulent and powerful.	
5. Be prepared for the long-haul; entrapments have lasted up to 90 minutes. Drink water and stay calm.	
6. **Stay in your shelter**. The hardest thing you will be faced with is the natural instinct to flee or to help your fellow firefighters. Think about your family or your crew. STAY FOCUSED AND DO NOT LEAVE YOUR SHELTER.	
7. The noise will be horrendous. As the front passes the noise will lessen and the winds will decrease. Do not let this fool you. Another wave of fire may be on its way. At this point lift up a small portion of your shelter and take a look. WHEN IN DOUBT WAIT IT OUT.	
8. Do not leave your shelter until it is cold to the touch, or told to do so by a supervisor.	
D. Heat Barrier Options	4C-11-S130-EP
THE FOLLOWING ITEMS DISCUSSED CAN OFFER A TEMPORARY BARRIER FROM HEAT AND FLAMES AS THE FIRE FRONT PASSES. THEY ARE MENTIONED ONLY AS LAST RESORT SURVIVAL ALTERNATIVES!	

OUTLINE	AIDS & CUES
1. Vehicles as barriers a. If possible, consider driving out of the area. b. Vehicles such as crew rigs and engines can provide some heat barrier protection in <u>LIGHT FUELS.</u> c. Always try to move the vehicle away from fuels to the clearest area possible. d. Close all doors windows and vents. Line windows with your shelter to reflect the radiant heat. e. Lie down on the floor and face away from the flame front; protect your airway. f. Hazards associated with remaining in the vehicle include toxic smoke, melting plastic, etc. If forced to exit the vehicle due to hazards or flame impingement, exit rapidly away from the flaming front and deploy you a shelter. 2. Dozers, tractor plows, and water-tenders as barriers a. Fuels can be removed by using the dozer or grader.	

OUTLINE	AIDS & CUES
b. Heavy equipment does not move quickly.	
c. If time allows, construct a berm to use as a heat barrier and deploy behind it.	
d. Keep the blade facing towards the fire.	
e. Use caution in seeking refuge inside the enclosed cabs in these vehicles. Temperatures will be much higher at cab height than ground level.	
f. Additional hazards include shattered windows, ruptured hydraulic lines, and toxic smoke emitted from burning plastics.	
g. Distance yourself from the vehicle but allow it to act as a heat barrier when deploying your shelter.	
h. Remember to only consider this option in <u>LIGHT FUELS</u>.	
3. Structures as barriers	
a. Structures can offer a good heat barrier. They may eventually burn down but will offer protection as flaming front passes.	

OUTLINE	AIDS & CUES
b. Consider the size and construction materials, e.g., wood, bricks, concrete, metal. Vinyl siding is toxic when burning.	
c. Stay outside to protect the structure, but allow for ample time to enter when the front hits.	
d. Be aware of electrical and chemical hazards.	
e. Preparation includes moving flammables away from the structure.	
f. Burn out around the structure if possible.	
g. Stay on the floor, near an exit, away from the flame front and away from windows if possible.	
h. Stay calm, close all shades and wait for the front to pass.	
i. Be prepared to exit quickly if heat and smoke become too much. Once outside, stay low, move away from the structure, protect your airway and deploy your shelter.	
The Standard Firefighting Orders, LCES and the Watch Out Situations are tools that must be used on every assignment. If they are used properly, the LAST RESORT SURVIVAL techniques should not be needed. <u>Learn to use them!</u>	4C-12-S130-EP

OUTLINE	AIDS & CUES
VI. SUMMARY AND REVIEW	
INVOLVE THE STUDENTS IN A DISCUSSION FOR SUMMARY AND REVIEW.	
A. What is a Fire Shelter?	
1. An aluminized, heat reflective, personal, protective pup-tent.	
2. Required when performing fireline work.	
3. Simple to use.	
4. Proven to work in actual field conditions.	
5. **DOES NOT GUARANTEE YOUR SAFETY. IT IS A LAST RESORT**.	
6. Has two important functions:	
a. Provides cooler, breathable air to protect your lungs and airways.	
b. Reflects radiant heat.	
B. What a Fire Shelter is Not	
1. Reason to ignore erratic and extreme fire behavior indicators.	
2. A substitute for the **Standard Firefighting Orders**.	
3. A replacement for the **Watch Out Situations**.	

OUTLINE	AIDS & CUES
4. An alternative for LCES.	
5. Not intended to have prolonged direct flame contact. It is important not to set up next to jackpot fuels.	
C. Your Fire Shelter Must be Available and in Good Condition.	
The fire shelter is intended to be used as **YOUR LAST RESORT**.	
D. Fire Shelter Training Recommendations	
1. Shelter training is mandatory every year.	
2. Shelter deployment practice should occur several times during the fire season.	
REVIEW LESSON OBJECTIVES.	4C-13-S130-EP
VII. APPLICATION/EVALUATION	
HAVE SEVERAL PRACTICE FIRE SHELTERS AVAILABLE FOR THE STUDENTS TO WORK ON DEPLOYMENT TECHNIQUES IN PAIRS OR SMALL GROUPS.	
INSTRUCTOR SHOULD DEMONSTRATE THE CORRECT DEPLOYMENT PROCEDURES FOR THE FIRE SHELTER IN 25 SECONDS OR LESS.	
HAVE EACH STUDENT CORRECTLY DEPLOY A FIRE SHELTER WEARING ALL PPE UNTIL PROFICIENT IN 25 SECONDS OR LESS.	

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 4 - Risk Management

LESSON: D - Potential Hazards and Human Factors on the Fireline

TIME: 3 hours

TRAINING AIDS: Flipchart or white board, writing utensils, Fireline Handbook, Incident Response Pocket Guide, "Human Factors on the Fireline" video, L-180

OBJECTIVES: Upon completion of this lesson, students will be able to:

1. Define safety.
2. Define Situation Awareness and describe why it is important.
3. State the five communication responsibilities.
4. Identify potential hazards in the fire environment.
5. Define the Risk Management Process and describe why it is important.
6. Describe actions that foster teamwork.

OUTLINE	AIDS & CUES
I. INTRODUCTION	
Wildland firefighting is a dynamic and dangerous job. It requires that you be thoroughly familiar with the hazards of the fireline and the surrounding area. Your life and the lives of others may depend upon your ability to recognize a dangerous situation long before it develops. "Safety is a matter of common sense. Use it and you will keep yourself and others out of trouble and get the job done safely."	
All personnel have an obligation to work safely and to protect themselves and others from injury.	
During recent years, firefighters have been injured or killed because of their failure to adequately recognize and respond appropriately to hazards to themselves and others working around them. The trend in wildland fires for the 21st century is for increased severity and occurrence. This increase is due to several factors. Two of the most important reasons are the continued expansion of home building in areas surrounded by wildland fuels (the wildland/urban interface), and wildland fuel accumulations resulting from 100 years of fire suppression. This translates into the need for more firefighters to combat the increased severity and occurrence of fires resulting in an overall increase in exposure to hazards. You, as a firefighter, must remain alert and aware of all hazards that you might be exposed to.	
PRESENT LESSON OBJECTIVES AND DISCUSS.	4D-01-S130-EP 4D-02-S130-EP

OUTLINE	AIDS & CUES
II. SAFETY	
Defined in Webster's Dictionary as:	
A. The condition of being safe from undergoing or causing hurt, injury, or loss.	
B. A device on a piece of equipment to reduce hazard.	
C. Freedom from exposure to danger, exemption from injury, and to protect from injury.	
WITH THESE DEFINITIONS IN MIND, ASK THE STUDENTS TO CONSIDER:	
IS SAFETY SOMETHING WE DO? **OR** **IS SAFETY THE RESULT OF DOING THINGS RIGHT?**	
THE BEST ANSWER SHOULD BE THE RESULT OF DOING THINGS RIGHT. SAFETY TAKES DOING THINGS THE CORRECT AND PROVEN WAY WHICH MINIMIZES RISK (BY CONTROLLING EXPOSURE TO KNOWN HAZARDS) AND ULTIMATELY RESULTS IN THE STATE OF BEING SAFE.	
Our greatest chance of obtaining the desired state of safety as defined by Webster is the application of our most powerful tool – the brain of the wildland firefighter individually and collectively!	
REFER STUDENTS TO THE FRONT AND BACK COVERS OF THE FHB.	FHB

OUTLINE	AIDS & CUES
III. HUMAN FACTORS ON THE FIRELINE	
A. Introduction	
As stated before, wildland firefighting is high risk work done in a hazardous environment where individuals, such as beginning firefighters, can be killed or seriously injured. Most fatalities and accidents are the direct result of errors in human judgment. This lesson is designed to introduce you to some of the Human Factors commonly encountered on the fireline. The intent of this lesson is for you to become familiar with Human Factors which affect firefighter safety and productivity, and understand the implications of not recognizing the impact of these factors.	
SHOW VIDEO SEGMENT 1 FROM THE "HUMAN FACTORS ON THE FIRELINE" COURSE. USE THE FOLLOWING QUESTIONS TO DISCUSS AND REINFORCE THE MATERIAL PRESENTED IN THE VIDEO TO THE STUDENTS.	Human Factors on the Fireline Video Segment 1
STRESS TO THE STUDENTS THAT WHILE THE VIDEO WILL CONTAIN CONCEPTS GEARED TOWARD THE ADVANCED FIREFIGHTER AUDIENCE, MOST OF THE MATERIAL IS RELEVANT TO FIREFIGHTERS AT ALL LEVELS OF THE ORGANIZATION.	

OUTLINE	AIDS & CUES
B. Situation Awareness	
<u>DISCUSSION QUESTIONS FOR VIDEO SEGMENT 1</u>	SW p. 4D.2 thru 4D.3
INSTRUCTOR CAN CALL ON STUDENTS TO ANSWER QUESTION, OR ALLOW 5 MINUTES PER GROUP OF QUESTIONS TO ALLOW STUDENTS TO WRITE DOWN THEIR THOUGHTS.	
1. What concepts discussed in this first video segment do you think are relevant to the job of firefighting?	
• High risk environment • Requires teamwork • Subject to extreme conditions • Potential consequences are high if accidents do occur	
2. How much "human factor" do you think is involved in a wildland firefighter's job?	
• A high percentage	
3. Do you perceive human error as being a major factor when accidents occur? Do you think it will be any different on the fireline?	
• Most wildland fire accidents are rooted in human error.	

OUTLINE	AIDS & CUES
4. What is situation awareness (SA)? • Gathering information by observation and communication • Foundation of all the decision making • Ongoing cycle 5. Why should you, as a beginning firefighter, maintain good situation awareness? • You cannot depend entirely on your supervisor to see everything that is out there. • Each individual must start taking ownership in their safety from their first fire. • SA enables us to detect problems early. 6. Do you think maintaining your situation awareness on the fireline will be difficult? Why? • Inexperience • Stress (both personal and job related) • Fatigue • Distractions (environmental, personal, etc.) • Attitude	

OUTLINE	AIDS & CUES
7. What happens when you become distracted in any work environment? • You become focused on less important things and may not notice a problem or hazard. • Decision making capability is reduced. • Your ability to filter for the important information is diminished.	
C. Communication	
SHOW VIDEO SEGMENT 2 FROM THE "HUMAN FACTORS ON THE FIRELINE" COURSE. USE THE FOLLOWING QUESTIONS TO DISCUSS AND REINFORCE THE MATERIAL PRESENTED IN THE VIDEO TO THE STUDENTS.	Human Factors on the Fireline Video Segment 2
<u>DISCUSSION QUESTIONS FOR VIDEO SEGMENT 2</u>	SW p. 4D.3 thru 4D.4
1. What is it about communication that is so important to you as beginning firefighters? • Communication is required for you to receive orders and instructions. • Communication is required for you to be aware of many new hazards and safety concerns. • Communication is required for you to make others aware of what you see in a situation. • Communication will be how you will learn about the business of firefighting.	

OUTLINE	AIDS & CUES
2. What is required for effective communication to take place? • Sender (talker), receiver (listener), and an exchange of information. • Feedback of important information through the chain of command. 3. What can you do as a beginning firefighter to help ensure that there is clear communication between you and your supervisor or if you are unsure of a situation? • Be focused and pay attention. • Clarify any unclear information. • Ask questions. • Repeat instructions back to your supervisor. • Switch roles frequently back and forth during the communication process. **EMPHASIZE THERE ARE FOUR THINGS THE STUDENTS ALWAYS NEED TO KNOW.** **1. WHAT TASK AM I TO PERFORM.** **2. WHAT ARE THE KNOWN HAZARDS.** **3. WHERE DO I GO TO BE SAFE.** **4. HOW DO I GET THERE.**	

OUTLINE	AIDS & CUES
4. What are some common communication barriers that you have experienced in your day- to-day lives? • Preconceived opinions • Distractions • Filtering information • Not listening, thinking about your response while the sender is talking • Having an attitude either towards the sender themselves or the message they are sending	
SHOW VIDEO SEGMENT 3 FROM THE "HUMAN FACTORS ON THE FIRELINE" COURSE. USE THE FOLLOWING QUESTION TO DISCUSS AND REINFORCE THE MATERIAL PRESENTED IN THE VIDEO TO THE STUDENTS.	Human Factors on the Fireline Video Segment 3
<u>DISCUSSION QUESTION FOR VIDEO SEGMENT 3</u>	SW p. 4D.4
5. As a beginning firefighter, you would most likely prefer to be addressed on the fireline with direct statements. Why are direct statements important? • They allow for clear and effective communication.	
SHOW VIDEO SEGMENT 4 FROM THE "HUMAN FACTORS ON THE FIRELINE" COURSE. USE THE FOLLOWING QUESTIONS TO DISCUSS AND REINFORCE THE MATERIAL PRESENTED IN THE VIDEO TO THE STUDENTS.	Human Factors on the Fireline Video Segment 4

OUTLINE	AIDS & CUES
INSTRUCTOR SHOULD BE ABLE TO PROVIDE EXAMPLES OF LOCAL COMMUNICATION STANDARD OPERATING PROCEDURES AND GUIDELINES USED ON THE FIRELINE, E.G., ESTABLISHED HAND SIGNALS SUCH AS FOR HELICOPTER AND WATER HANDLING OPERATIONS, "LAY OUT A PROGRESSIVE HOSELAY," "COLD TRAIL THIS PIECE OF LINE," "THE STRUCTURES ARE SECURE."	
<u>DISCUSSION QUESTIONS FOR VIDEO SEGMENT 4</u>	SW p. 4D.4
6. Have any of you used standardized communication procedures in your work environments prior to firefighting?	
SCENARIO: Give the students the following instructions using typical fire terminology: "bump up the line to the division break and grid for spots back to the anchor point." Have the students ask for clarification on these unclear instructions. Using a flip chart the instructor can explain briefly to the students the following:	
• **What does "bump up the line" mean?** • **What is a "division break"?** • **What is meant by "gridding for spots"?** • **What is an "anchor point"?**	
With experience and training this process will become streamlined and result in efficient communication on the fireline. This illustrates the concept of standard operating procedures that are contained in typical fire terminology.	

OUTLINE	AIDS & CUES
SHOW VIDEO SEGMENT 5 FROM THE "HUMAN FACTORS ON THE FIRELINE" COURSE. USE THE FOLLOWING QUESTIONS TO DISCUSS AND REINFORCE THE MATERIAL PRESENTED IN THE VIDEO TO THE STUDENTS.	Human Factors on the Fireline Video Segment 5
<u>DISCUSSION QUESTIONS FOR VIDEO SEGMENT 5</u>	SW p. 4D.4 thru 4D.5

7. Of the five communication responsibilities (briefing, debriefing, communicate hazards, acknowledge messages, ask if you don't know) which do you feel will apply most directly to you as a beginning firefighter?

   - All of them, but particularly the following:

     - Communicating hazards
     - Acknowledging messages
     - Asking if you don't know

8. As a beginning firefighter, would you ever feel reluctant to point out hazards to a more experienced crew member?

   - Yes, you probably will. However, emphasize that even experienced crew members may not necessarily see all the hazards in the fire environment.

9. Should you be encouraged to ask questions in situations where you are unsure of what you are supposed to do?

OUTLINE	AIDS & CUES
• Yes, good leaders want their firefighters to know what to do. However, this is not a perfect world and many insecure leaders feel that withholding information makes them more in control.	
10. How would you deal with a situation where you were discouraged from asking questions?	
NO TEXTBOOK ANSWER, INSTRUCTOR SHOULD SOLICIT ANSWERS FROM THE STUDENTS.	
EMPHASIZE THEY CAN TRY ASKING THE SAME QUESTIONS TO EXPERIENCED CREW MEMBERS OR ASKING THEM AGAIN AT THE "AFTER ACTION REVIEW." STUDENTS WILL NEED TO LEARN TO DISTINGUISH BETWEEN QUESTIONS OF URGENCY VERSUS QUESTIONS OF CURIOSITY.	
IV. THE FIRELINE ENVIRONMENT	4D-03-S130-EP
A. Hazards in the fireline environment can be organized into two categories:	
1. Subjective hazard: one has direct control over it; e.g., condition of equipment, the decision to turn back. (Subjective - the firefighter is in control and should work to eliminate these.)	

OUTLINE	AIDS & CUES
2. Objective hazard: one has no control over the risks inherent to firefighting; e.g., environment. (Objective - recognize and mitigate.)	
Four frequently encountered and potentially fatal hazards in the fire environment:	
a. Lightning	FHB (Firefighter Safety chapter)
b. Fire weakened timber	
c. Rolling rocks, logs	
d. Entrapment by fires	
USE CLASS DISCUSSION TO IDENTIFY SPECIFIC HAZARDS WITHIN EACH OF THE FOLLOWING AREAS. CONSIDER LISTING STUDENT RESPONSES ON A FLIPCHART AND POSTING THEM ON THE WALLS. ALLOW 10 TO 15 MINUTES FOR EXERCISE.	
THE LIST OF HAZARDS BELOW IS NOT ALL INCLUSIVE OF EVERY POSSIBLE HAZARD ENCOUNTERED IN FIREFIGHTING. STUDENT DISCUSSION SHOULD EXPAND ON THIS LIST. FOR ADDITIONAL REFERENCE USE FIRELINE HANDBOOK.	FHB (Firefighter Safety chapter)
B. Fire Environment Hazards	4D-04-S130-EP
1. The actual fire (running, smoldering, creeping)	
2. Burns	

OUTLINE	AIDS & CUES
3. Smoke (poor visibility)	
4. Unexpected or erratic winds	
5. Steep terrain	
6. Falling snags	
7. Low relative humidity, high temperatures	
C. Human Related Hazards	
1. Attitude (poor morale, fear, over-confidence, etc.)	
2. Physical condition	
3. Experience level	
4. Training level	
5. Fatigue	
6. Critical stress	
D. Other Environmental Hazards	
1. Heat stress	
2. Hypothermia	
3. Darkness	
4. Carbon monoxide	
5. Dust	

OUTLINE	AIDS & CUES
E. Biological Hazards	
1. Snakes	
2. Insects (bees, ticks, etc.)	
3. Animals (bears, moose, etc.)	
4. Plants (poison oak, ivy, etc.)	
5. Microorganisms (giardia)	
6. Viral Infections (colds, influenza, etc.)	
F. Equipment Hazards	
1. Hand tools (pulaski, shovel, saws, tools)	
2. Burns from mufflers (pumps, saws, firing devices, etc.)	
3. Noise (hearing impairment levels)	
4. Foreign objects thrown from moving parts	
G. Vehicle Hazards (trucks, dozers, tractor/plows)	
1. Operating around personnel	
2. Mechanical failure (brakes)	
3. Shifting cargo	
4. Unskilled/inattentive or fatigued operator	

OUTLINE	AIDS & CUES
H. Aircraft (Rotor and Fixed-Wing) Hazards	4D-05-S130-EP
1. Retardant drops	
2. Bucket drops (water)	
3. Sling loads	
4. Helicopter rotor wash breaking trees and snags (tops, branches, limbs, etc.).	
5. Personnel working around aircraft	
I. Base Camp Related Hazards	
1. Selection of sleeping areas	
2. Sanitation. Maintaining personal hygiene helps prevent gastrointestinal and respiratory disorders.	
3. Incorrectly handled food	
J. Wildland/Urban Interface Hazards	
1. Powerlines	
2. HAZMAT (covered in depth in Unit 13)	
3. Propane tanks	
4. Panicked public	
5. Traffic	

OUTLINE	AIDS & CUES
MENTION THAT HAZARDS SHOULD BE FLAGGED WHENEVER POSSIBLE AND COMMUNICATED TO ALL FIREFIGHTERS IN THE AREA.	
K. Tree and Snag Hazards	
The hazards associated with trees and snags deserve special mention. Throughout the years that firefighters have engaged in organized fire suppression actions, snags and trees have remained a constant source of hazards resulting in fireline accidents. This hazard group is second only to aviation accidents when accounting for the fatality and injury rate due to fire suppression activities.	
Since all trees and snags cannot be eliminated from the fire environment, it is important that we become familiar with identifying and mitigating this hazard.	
REFER TO FHB FOR SAFETY FLAGGING STANDARDS.	FHB (Firefighting Safety Chapter)
Visible categories or conditions of trees	
• Living • Dead (snags)	
1. Hazards to be aware of when working around trees	
• Felling operations • Aircraft working above (retardant and bucket drops)	

OUTLINE	AIDS & CUES
• Strong winds • Mechanized equipment, e.g., dozers, (damaged root system due to line construction, broken tops) • Cat faces and fire scars (fire inside) • Branches, limbs and tops (loose cracked, widow-makers, etc.) • Heavy lean • Hang ups • Ground disturbance (erosion) • Shallow, exposed or burned roots • Natural damage (evidence of insect activity, disease and decay). Indicators are conks, dead and downed trees, discoloration. 2. Dead (snags) concerns • Snags may fall without warning or external disturbance. • Trees that are burned out at the base or anywhere on the trunk or branches are **extremely dangerous!** Trees and snags that have been exposed to fire may have more than one hazard, whether it is a visible hazard or a potential hazard. Any change in windspeed or direction may cause sound-looking, burned trees to fall. Firefighters must remain aware of these hazards at all times in their work area.	

OUTLINE	AIDS & CUES
SUMMARIZE THE FIRELINE ENVIRONMENT SECTION. • Any hazard or potential hazard should be reported to your immediate supervisor and co-workers. • If the area is unsafe to work in or around, it should be flagged so others are aware of any dangers. • There are two options for an unsafe area: - Make the area safe before entering. - Avoid the area if it cannot be made safe. **MENTION THE IMPORTANCE OF INFORMING YOUR SUPERVISOR OF ANY DANGEROUS OR UNSAFE CONDITION. ALSO, THE HAZARDS OF WORKING ALONE NOT ONLY ENDANGER YOURSELF, BUT OTHERS AS WELL.** **THE STUDENTS SHOULD BE BEGINNING TO FORM AN IMPRESSION OF WHAT THE FIRELINE IS LIKE AND WHAT IT WILL TAKE TO OPERATE SAFELY THERE.** **ASK THE STUDENTS TO SUMMARIZE THE FIRE ENVIRONMENT IN ONE SENTENCE. SOLICIT AND DISCUSS ANSWERS FROM THE GROUP. EMPHASIZE THEIR RECOGNITION OF THE FIRELINE AS A <u>HIGH RISK</u> ENVIRONMENT.**	

OUTLINE	AIDS & CUES
V. RISK MANAGEMENT PROCESS	
HAVE STUDENTS LOOK AT THE RISK MANAGEMENT PROCESS IN THE INCIDENT RESPONSE POCKET GUIDE. EXPLAIN THAT THIS IS A TOOL TO BE USED TO HELP SUPERVISORS MAKE BETTER DECISIONS ON THE FIRELINE.	IRPG (Green - Operational)
IT IS THE PROCESS FOR APPLYING THE 18 WATCH OUTS, THE STANDARD FIREFIGHTING ORDERS, AND LCES.	
EMPHASIZE THAT THE STUDENTS, AS BEGINNER FIREFIGHTERS, HAVE A PROFESSIONAL RESPONSIBILITY TO BEGIN TO UNDERSTAND THE RISKS THEY WILL ENCOUNTER ON THE FIRELINE.	
USE THE FOLLOWING POINTS TO INTRODUCE AND DISCUSS THE RISK MANAGEMENT PROCESS.	
A. STEP 1 - SITUATION AWARENESS	4D-06-S130-EP SW p. 4D.7 thru 4D.8
Is there any specific information that you, as a beginning firefighter, will want to know from your supervisor on every assignment?	
• What specific task am I to perform? • What are the known hazards at the work location? • Where do I go to be safe if there is a problem (safety zone)? • How do I get there (escape route)?	

OUTLINE	AIDS & CUES
B. STEP 2 - HAZARD ASSESSMENT	
1. There are specific tools that help you identify hazards on the fireline work environment.	
• Watchout Situations • Four Common Denominators • Situational Awareness	
2. Do you have a professional responsibility to begin to learn how to identify hazards as a beginning firefighter?	
• Yes	
C. STEP 3 - HAZARD CONTROL	
1. We have basic rules of engagement on the fireline. These rules provide the primary hazard control/mitigations for all operations on the fireline.	
• Standard Firefighting Orders	
2. There are four key operational components of the Standard Firefighting Orders that must always be in place when working on the fireline.	
• Lookouts, Communication links, Escape routes, and Safety Zones.	

OUTLINE	AIDS & CUES
D. STEP 4 - DECISION POINT	
1. Will you be making tactical decisions on the fireline?	
• Not right away	
2. Should you ask questions if you do not understand a decision being made?	
• Yes	
3. If your supervisor tells you this is not a good time to ask questions because of the situation at hand, when is another time you could bring up your question?	
• If you are unsure of what to do next or have a concern about your safety, be persistent and communicate that to your supervisor. Remember the four questions that were just discussed for situation awareness.	
• If you are asking a question because you are curious to learn, ask at the "after action review" or post fire critique.	
E. STEP 5 - EVALUATE	
1. Why do you think the risk management process must be continually evaluated?	
• The fire is continually changing.	

OUTLINE	AIDS & CUES
• Your location on the fire may change. • Fire personnel may become distracted, fatigued, and/or stressed.	
2. Do you, as well as your supervisor, have a responsibility to continually evaluate the risks in your work environment?	
• Yes	
VI. TEAMWORK	4D-07-S130-EP
EMPHASIZE THE FOLLOWING KEY POINTS TO THE STUDENTS.	
• Firefighting is not an individual undertaking.	
• Being a successful team member is one of the foundations of safe and effective firefighting.	
• The measure of success a team will attain is dependent on the level of participation of each member.	
• Participation is based on having a good attitude, a willingness to learn, and a willingness to get along and work together with others.	
• Good team members help each other and look out for each other's safety.	

OUTLINE	AIDS & CUES
USE THE FOLLOWING QUESTIONS FOR DISCUSSION AND TO REINFORCE THE TEAMWORK CONCEPT. A. What are some successful teams you have seen or been involved with prior to today? • No textbook answer, solicit answers from the students. B. What were some characteristics of successful teams you have seen or been involved with? • Continuous and effective communication. • Continual experimentation in order to improve performance. • High performance is expected by team members as well as team leaders. • Needs of the team come before the needs of individuals. • Cohesion among team. C. What were some characteristics of unsuccessful teams you have seen or been involved with? • Poor communication. • Attitudes or conflicts causing cliques to develop. • Poor work ethic. • Lack of respect for other team members. • Failure to strive to improve performance or learn new tasks. • Shifting blame to others for poor performance. • Team members putting own needs first before the team.	

OUTLINE	AIDS & CUES
D. Why is teamwork so important in firefighting? • Individuals cannot know all the hazards in the work environment. • Individuals cannot by themselves accomplish most tasks that are assigned to a crew. • Good teamwork goes hand in hand with good communication. • A crew is only as strong as its weakest member.	
RECAP THE TEAMWORK DISCUSSION BY REVIEWING TEAMWORK GUIDELINES.	4D-01-S130-IR SW p. 4D.9
INSTRUCTOR SHOULD PROVIDE EXAMPLES FROM HIS/HER EXPERIENCE THAT REINFORCE THESE GUIDELINES. KEY POINTS TO EMPHASIZE: • **STUDENTS ARE RESPONSIBLE FOR THEIR ACTIONS AND THEIR ACTIONs WILL BE THE DETERMINING FACTOR FOR THE SUCCESS OF ANY TEAM THEY WORK ON.** • **UNLIKE PREVIOUS TEAMS THEY MAY HAVE PARTICIPATED ON, THIS HAS PARTICULAR IMPORTANCE IN FIREFIGHTING DUE TO THE HIGH RISK ENVIRONMENT THAT THEY WILL WORK IN.**	
ALLOW FOR QUESTIONS AND DISCUSSION AS TIME PERMITS.	
REVIEW LESSON OBJECTIVES.	4D-08-S130-EP

TEAMWORK GUIDELINES

1. **Know Yourself and Seek Improvement.**
   Responsibility to learn and improve.

2. **Be Technically and Tactically Proficient.**
   Responsibility to reduce errors.

3. **Comply With Orders and Initiate Appropriate Actions in the Absence Of Orders.**
   Understand the intent of your assignment.

4. **Develop a Sense of Responsibility and Take Responsibility for Your Actions.**
   Admit your mistakes and learn from them.

5. **Make Sound and Timely Decisions and Recommendations.**
   Responsibility to be aware of your situation (S.A.)
   Responsibility to minimize risk.
   Learn the risk management process.

6. **Set the Example for Others.**
   Make sure your actions as a firefighter are professional.

7. **Be Familiar with Your Leader and Their Job, and Anticipate Their Requirements.**
   Responsibility to learn and improve.

8. **Keep Your Leader Informed.**
   Provide feedback when asked.

9. **Understand the Task and Ethically Accomplish It.**
   Seek clarification when intent is unclear.

10. **Be a Team Member - But Not a "Yes Person."**
    Responsibility to work as a team member.
    Use all the communication tools.

DETAILED LESSON OUTLINE

COURSE	Firefighter Training, S-130
UNIT:	5 - Transportation Safety
TIME:	½ hour
TESTING METHODS:	Performance evaluation and written examination
TRAINING AIDS:	Flipchart or white board, writing utensils, as many types of vehicles available as possible to aid the students in the demonstration
OBJECTIVE:	Upon completion of this unit, students will be able to:

- Develop a list of three safety procedures to follow when traveling by each of the following:

  - Vehicle
  - Boat
  - Helicopter
  - Fixed-wing aircraft
  - On foot

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVE AND DISCUSS.	05-01-S130-EP 05-02-S130-EP
INSTRUCTOR SHOULD ADVISE STUDENTS THEY WILL BE REQUIRED TO PASS A PERFORMANCE EVALUATION AND A QUIZ ADMINISTERED DURING THE FIELD EXERCISE. SUCCESSFUL COMPLETION OF THIS UNIT REQUIRES 100% CORRECT PERFORMANCE AND A SCORE OF AT LEAST 21 OF 30 POINTS (70%) ON THE UNIT QUIZ.	
A STUDENT FAILING THE PERFORMANCE EVALUATION OR WRITTEN QUIZ WILL NEED ADDITIONAL TRAINING AND TESTING UNTIL PROPER PERFORMANCE IS ACHIEVED.	
I. INTRODUCTION	
Fire suppression is hazardous, as is travel to the fire and along the fireline. The roads and terrain can be extremely rough. Helicopter flights expose the firefighters to the hazards of flying in mountainous terrain. At times it may also be necessary to be transported by boats. Although these many forms of transportation save time and energy, they also expose the firefighter to the many hazards that are inherent with each type of transportation.	
INCLUDE DEMONSTRATIONS AS MUCH AS POSSIBLE IN LESSON PRESENTATION. USE TRAVEL TO AND FROM TRAINING SITES AND SIMULATED DEMONSTRATIONS TO ACHIEVE TRAINING OBJECTIVES.	

OUTLINE	AIDS & CUES
II. VEHICLE TRAVEL	05-03-S130-EP
A. Loading	
1. Provide one person to control loading.	
2. Use steps or safety devices.	
3. Provide lights at night.	
4. When traveling, stay off running boards, bumpers, and steps.	
5. Keep tools boxed.	
6. Do not overload.	
B. Riding	
1. Avoid horseplay.	
2. Keep arms and legs inside.	
3. Do not throw anything off vehicle.	
4. Do not smoke.	
5. Wear seat belts.	
C. Unloading	
1. Provide one person to control unloading.	
2. Stay seated until vehicle stops.	

OUTLINE	AIDS & CUES
3. Wait for steps or tailgate to be lowered, if appropriate.	
4. Move away from vehicle.	
III. BOAT TRAVEL	05-04-S130-EP
A. Loading	
1. Wear life preservers.	
2. Stay seated.	
3. Follow boat crew directions.	
4. Do not overload.	
B. Riding	
1. Keep arms and legs inside.	
2. Remain seated.	
3. Remain still, do not rock the boat.	
C. Unloading	
1. Wait for boat to be secured.	
2. Be careful on wet rocks and painted surfaces, they may be slippery.	

OUTLINE	AIDS & CUES
IV. HELICOPTER TRAVEL	05-05-S130-EP

CONSIDER USING LOCAL QUALIFIED HELITACK PERSONNEL FOR PRESENTATION ON HELICOPTER TRAVEL.

Generally, all helicopter operations will be managed by qualified helitack personnel. Helitack is responsible for the loading and unloading of personnel and gear. Even if the operation is managed by helitack, each firefighter should be aware of what is happening on the helispot or helibase.

Major hazards are rotors and air turbulence from the rotors.

A. Loading

1. Follow instructions of personnel responsible for loading.

2. Approach helicopter when directed by pilot or person responsible for loading, keeping eye contact with pilot.

3. Never approach a helicopter from the rear.

4. Never approach from ground that is higher than the helicopter.

5. Fasten hard hat chin strap or hold hard hat firmly in your hand close to your body.

6. Walk in crouched position when underneath main rotor. Do not run.

OUTLINE	AIDS & CUES
7. Tools will be loaded by qualified helitack personnel.	
8. Never throw anything from or near the helicopter.	
9. Pack all gear securely and hold it firmly or tie it down.	
10. Wear eye and ear protection when around helicopters. Face away from helicopters when they are taking off and landing to avoid blowing dust or debris.	
11. Follow directions of helitack personnel.	
12. Fasten seat belt.	
13. Have person responsible for loading or unloading open and close door.	
14. Know what the emergency egress procedure is.	
B. Riding	
1. Do not smoke or chew tobacco.	
2. Keep hands off controls, door, and window knobs.	
3. Hold gear firmly.	
4. Never throw anything out of a helicopter.	
5. Fasten hard hat chin strap.	

OUTLINE	AIDS & CUES
6. Do not distract the pilot, particularly during landing or take off.	
7. Stay seated. Do not unfasten seat belt until directed by helitack personnel.	
C. Unloading	
1. Wait for signal from pilot or helitack.	
2. Crouch and exit to the front or side, as directed. Never go uphill away from the helicopter.	
3. Use red handles only for emergencies; these handles jettison the doors.	
4. Re-fasten seatbelts prior to exiting helicopter.	
V. FIXED-WING AIRCRAFT TRAVEL	05-06-S130-EP
If in a large transport aircraft, follow the directions of pilot and attendants.	
For smaller aircraft:	
• Remember the pilot is in command. Follow the pilot's instructions.	
• Never open a door while in flight.	
• Do not distract the pilot during take-off or landing.	
• No smoking.	

OUTLINE	AIDS & CUES
• Do not slam door shut; assure nothing is hanging outside the door that could cause damage.	
• Fasten seat belt/shoulder harness.	
• Know emergency egress procedure.	
VI. EMERGENCY LANDING PROCEDURES FOR AIRCRAFT	
Position yourself in the correct crash position as dictated by the pilot or helitack crew.	
VII. FOOT TRAVEL	05-07-S130-EP
A. Your supervisor will set the pace and select the route for your crew.	
B. Crew members <u>must</u> stay together. If you are separated, stay on the fireline and try to make contact with your crew. You are safe in the burned area and you will eventually be found.	
C. Maintain proper distance between crew members (10-feet).	
D. Hazards you will encounter while walking to or from the fire are:	
1. Darkness (hampers your ability to recognize many objects in time to avoid them).	
2. Your hand tools.	
3. Another person's hand tools.	

OUTLINE	AIDS & CUES
4. Falling trees, tree-tops, hanging loose debris from saws or tractors, fire or disease weakened trees.	
5. Leaning trees.	
6. Snags.	
7. Whipping branches.	
8. Rolling rocks or logs.	
9. Vehicles, heavy equipment, ATVs, aircraft working overhead.	
10. Unstable footing.	
11. Stream or canal crossings.	
a. Avoid high log crossings.	
b. Watch the log (not the water).	
c. In swift current; face across stream; use a stick for balance; remove boots; loosen pack.	
12. Stump holes.	
a. Avoid root holes from upended trees.	
b. Watch for burned stumps that may be hidden under ash layer. Beware of white ash that may indicate stump hole (test with stick or hand tool).	

OUTLINE	AIDS & CUES
13. Local hazards (poisonous insects, snakes, or plants; polluted water; etc.).	
14. Fire location (know where the fire is, follow your crew leader's directions in an emergency).	
VIII. APPLICATION/EVALUATION	
INSTRUCTOR MAY USE STUDENT TRAVEL DURING THE TRAINING TO PRACTICE TRAVEL AND TRANSPORTATION OF PERSONNEL AND TOOLS.	
PERFORMANCE EVALUATION (GROUP OR INDIVIDUAL EXERCISE):	
USING THE CHECKLIST, OBSERVE STUDENTS TRAVELING DURING THE TRAINING. INSTRUCTOR MAY HAVE STUDENTS LOAD AND UNLOAD FROM VEHICLES AND AIRCRAFT.	05-01-S130-IR SW p. 5.7
ANY ITEM NOT CHECKED AS SUCCESSFULLY COMPLETED, CONSTITUTES FAILURE. ADDITIONAL TRAINING AND TESTING IS NEEDED UNTIL PROPER PERFORMANCE IS ACHIEVED.	
INSTRUCTOR SHOULD ADMINISTER UNIT QUIZ. AFTER COMPLETION, GRADE QUIZZES AND THEN REVIEW ANSWERS WITH STUDENTS.	05-02-S130-IR SW p. 5.8
REVIEW UNIT OBJECTIVE.	05-10-S130-EP

FIREFIGHTER TRAINING, S-130
UNIT 5 - TRANSPORTATION SAFETY
PERFORMANCE EVALUATION

Performance evaluation:

Observe students traveling during the training. Instructor may have students load and unload from vehicles and aircraft.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

☐ 1. PPE properly worn.

☐ 2. Safety measures taken (seat belts, life vests, etc.).

☐ 3. Tools and personnel separated.

☐ 4. Follows directions of appropriate personnel.

☐ 5. Appropriate spacing during foot travel.

☐ 6. Eye protection utilized where necessary.

FIREFIGHTER TRAINING, S-130
5 - TRANSPORTATION SAFETY

UNIT QUIZ WITH ANSWERS

List three safety procedures for each of the following five modes of transportation. There are many possible answers; if unsure of the correctness of a particular answer, refer to page numbers. **(6 pt. each = 30 possible points)**

1. Vehicle safety procedures: (6 pts.)

   - **See page 5.3 - 5.4 for possible answers.**

2. Boat safety procedures: (6 pts.)

   - **See page 5.4 for possible answers.**

3. Helicopter safety procedures: (6 pts.)

   - **See page 5.5 - 5.7 for possible answers.**

4. Fixed-wing aircraft safety procedures: (6 pts.)

   - **See page 5.7 for possible answers.**

5. Foot travel safety procedures: (6 pts.)

   - **See page 5.8 - 5.10 for possible answers.**

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 6 - Hand Tools

TIME: 3½ hours

TESTING METHODS: Performance evaluations and optional written examination

TRAINING AIDS: Commonly used serviceable and non-serviceable tools and equipment, files, whetstones, flagging tape, file with wooden handle and protective hose or leather guard, pulaski, axe, shovel, McLeod, adz-hoe, swatter, gunnysack

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Given hand tools, personal protective equipment, and proper maintenance tools, check the condition of each item, perform field maintenance, and identify those needing replacement.

2. Demonstrate the proper sharpening techniques for commonly used tools.

3. Given a description of three fireline jobs and a choice of tools, state the tool that would be used for each job.

4. Demonstrate the proper methods of carrying and passing tools.

5. Demonstrate the proper spacing when using hand tools.

6. Demonstrate the proper placement, near a fireline, of one or more tools when not in use.

7. Given a swatter or gunnysack and personal protective equipment, check the condition of the fire swatter and perform field maintenance.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS. **DUE TO THE FIELD DESIGN OF THIS UNIT THERE ARE NO POWERPOINT SLIDES.** **INSTRUCTOR SHOULD ADVISE STUDENTS THEY WILL BE REQUIRED TO PASS TWO PERFORMANCE EVALUATIONS AND A QUIZ (OPTIONAL) ADMINISTERED IN THIS UNIT. SUCCESSFUL COMPLETION OF THIS UNIT REQUIRES 100% CORRECT PERFORMANCE AND A SCORE OF AT LEAST 21 OF 30 POINTS (70%) ON THE UNIT QUIZ (IF INSTRUCTOR CHOOSES TO GRADE THE QUIZ).** **A STUDENT FAILING THE PERFORMANCE EVALUATION OR WRITTEN QUIZ (OPTIONAL) WILL NEED ADDITIONAL TRAINING AND TESTING UNTIL PROPER PERFORMANCE IS ACHIEVED.** **THIS UNIT WILL ADDRESS THE MOST COMMONLY USED TOOLS. IF OTHER TOOLS ARE USED IN YOUR AREA, THE INSTRUCTOR SHOULD ACQUIRE THESE AND INCLUDE INSTRUCTION ON THE USE AND MAINTENANCE OF THEM. ALL TOOLS SHOULD BE AVAILABLE FOR VIEWING DURING PRESENTATIONS AND FOR ACTUAL HANDS-ON TRAINING IN USE AND MAINTENANCE.**	

OUTLINE	AIDS & CUES
I. INTRODUCTION	
Each year, firefighters and hand tools play an important part in the control and suppression of wildland fires.	
How effectively you use the hand tool depends on your knowledge of it, your ability to use it properly, and the care you give it. The finest tool is of little use if it is improperly used or maintained.	
II. CUTTING TOOLS	
Cutting tools are used primarily for fireline construction, including cutting brush and small trees, grubbing, trenching, and some removal of ground cover.	
Normally, many hours of field experience are needed before any degree of skill is acquired in using these tools. These tools are dangerous and must be used with extreme caution.	
MIX LECTURE AND DEMONSTRATION FOR STUDENTS IN SAFETY, USE AND MAINTENANCE OF THE FOLLOWING CUTTING TOOLS.	
A. Single-bit Ax	
1. Terminology/parts	
a. Head	
b. Cutting edge	
c. Eye	

OUTLINE	AIDS & CUES
d. Handle	
• Shoulder	
• Butt	
e. Wedges	
• Metal	
• Wood	
2. Single-bit ax use	
a. Swing action downward motion at 45 degree angle. Effective in mopup for felling snags and with hammerhead for breaking stumps, logs and heavier materials apart, and driving wedges.	
b. Grip and stance	
• Hold securely	
• Place feet apart on solid footing.	
3. Single-bit ax sharpening	
Sharpen back 2½ inches on each side with even bevel on both sides.	
ADDITIONAL SAFETY INFORMATION ON SHARPENING TOOLS IN THE GENERAL SAFETY SECTION OF THIS UNIT.	

OUTLINE	AIDS & CUES
B. Pulaski	
1. Pulaski terminology/parts	
a. Head	
b. Cutting edge	
c. Grubbing edge	
d. Eye	
e. Handle	
• Shoulder	
• Butt	
f. Wedges	
• Metal	
• Wood	
2. Pulaski use	
a. Use cutting edge just like an ax.	
b. Use grubbing edge for:	
• Digging roots	
• Trenching	

OUTLINE	AIDS & CUES
c. Grip and stance	
• Hold securely.	
• Place feet apart on solid footing.	
3. Pulaski sharpening	
a. Taper cutting edge 2 inches wide with an even bevel on each side.	
b. Bevel grubbing edge 3/8 inch wide on a 45 degree angle on one side only.	
C. Adz Hoe	
1. Adz hoe terminology/parts	
a. Head	
b. Grubbing edge	
c. Eye	
d. Handle	
2. Adz hoe use	
a. Use grubbing edge for:	
• Digging roots	
• Removing grass	
• Trenching	

OUTLINE	AIDS & CUES
b. Grip and stance • Hold securely • Place feet apart on solid footing. 3. Adz hoe sharpening Bevel grubbing edge 3/8 inch wide on a 45 degree angle on inside only. III. GENERAL INSPECTION - CUTTING TOOLS Tool head • Cracks, gouges, wear and holding wedge • Damaged cutting head • Rust • Safety guards **ANY TOOL THAT CANNOT BE REPAIRED OR THAT IS UNSAFE SHOULD BE REMOVED FROM SERVICE.** IV. SCRAPING TOOLS Used primarily for fireline construction and mopup operations. Skill in the use and maintenance of each tool is required to ensure a safe and effective working environment.	

OUTLINE	AIDS & CUES
MIX LECTURE AND DEMONSTRATION FOR STUDENTS IN SAFETY, USE AND MAINTENANCE OF THE FOLLOWING SCRAPING TOOLS.	
A. Shovel (round point)	
1. Shovel terminology/parts	
a. Blade	
b. Cutting edge	
c. Handle	
d. Heel	
e. Rivets	
f. Shank	
g. Face	
h. Point	
2. Shovel use	
a. Digging	
b. Scraping	
c. Smothering	
d. Beating	
e. Cutting light fuels	
f. Throwing dirt	

OUTLINE	AIDS & CUES
3. Shovel grip and stance a. Hold securely b. Place feet apart on solid footing. c. When scraping, use your knee for bracing your arm (less tiring). d. When throwing dirt, use over-the-shoulder method or side swing. 4. Shovel care and maintenance Always wear gloves and a long-sleeved shirt when performing tool maintenance. a. Inspection • Tool head - Cracks - Damaged cutting edge - Rust - Safety guards • Tool handle - Smooth - Aligned - Secure **ANY TOOL THAT CANNOT BE REPAIRED OR THAT IS UNSAFE SHOULD BE REMOVED FROM SERVICE AND FLAGGED.**	

OUTLINE	AIDS & CUES
b. Sharpening procedures	
• Sharpen edge 1½ inches from heel.	
• Sharpen to a point.	
B. McLeod (kortick removable head)	
1. McLeod terminology/parts	
a. Head	
b. Cutting edge	
c. Rake	
d. Rivet	
e. Shank	
f. Handle	
2. McLeod use	
Primarily a scraping tool but can be used for cutting.	
3. McLeod grip and stance	
a. Keep one hand near the shank.	
b. Place feet apart on solid footing.	
c. Use cutting and pulling motion with downward pressure on handle.	

OUTLINE	AIDS & CUES
d. Scrape (do not chop).	
e. Use knee for support (less tiring).	
4. Care and maintenance	
a. Inspection	
• Tool head	
- Cracks - Damaged cutting edge - Rust - Safety guards	
• Tool handle	
- Smooth - Aligned - Secure	
ANY TOOL THAT CANNOT BE REPAIRED OR THAT IS UNSAFE SHOULD BE REMOVED FROM SERVICE AND FLAGGED.	
b. Sharpening procedures	
• Keep 45° cutting edge. Bevel on outside face.	
• Keep cutting edge straight and square.	

OUTLINE	AIDS & CUES
C. Combi Tool	
1. Combi Tool terminology/parts	
a. Head	
b. Pick/grub hoe	
c. Blade	
d. Hinge/Hinge bolt	
e. Friction nut	
f. Rivet	
g. Shank	
h. Handle	
i. Cutting edge	
2. Combi Tool use	
Primarily used for digging, scraping, smothering, cutting and picking in light fuels. Building roll trench and working between rocks.	
3. Combi Tool grip and stance	
a. Place feet apart on solid footing.	
b. Keep a firm grip.	
c. When scraping, use your knee for bracing your arm (less tiring).	

OUTLINE	AIDS & CUES
4. Combi Tool care and maintenance	
a. Inspection	
• Tool head	
- Cracks - Damaged cutting edge - Damaged pick - Rust - Hinge/hinge bolt - Friction nut	
• Tool handle	
- Smooth - Aligned - Secure	
ANY TOOL THAT CANNOT BE REPAIRED OR THAT IS UNSAFE SHOULD BE REMOVED FROM SERVICE, AND FLAGGED.	
b. Sharpening	
• Stabilize the tool by sticking the pick end in the ground.	
• Sharpen the blade and pick at a 45° angle.	

OUTLINE	AIDS & CUES
D. Fire Rake (also known as a council tool/rake)	
1. Fire rake terminology/parts	
a. Handle	
b. Shank	
c. Tines	
d. Screws or bolts	
2. Fire rake use	
a. Primary use - to final sweep line and clean rocky areas.	
b. Use extreme care to avoid spreading the fire. Tines will pick up unburned fuel.	
3. Fire rake grip and stance	
Grip and stance	
a. Place feet apart on solid footing.	
b. Keep a firm grip.	
c. Use pulling leaf rake technique.	
d. Keep weight off of tines.	
4. Fire rake care and maintenance	
a. Inspection	

OUTLINE	AIDS & CUES
• Tool head - Missing or bent tines - Safety guards • Tool handle - Smooth - Aligned - Secure **ANY TOOL THAT CANNOT BE REPAIRED OR THAT IS UNSAFE SHOULD BE REMOVED FROM SERVICE AND FLAGGED.** b. No sharpening required V. GENERAL SAFETY - HAND TOOLS A. Utilizing Hand Tools 1. Maintain proper clearance (minimum 10 feet or greater depending on conditions, or minimum of three tool lengths) from fellow workers when: a. Walking b. Working 2. Be careful of hazardous underbrush and canopy. 3. Know proper carrying procedures. a. Balance point	

OUTLINE	AIDS & CUES
b. Downhill side	
c. Cutting edge away from body	
4. Inspect periodically.	
a. Handle	
b. Head (keep edge sharp)	
c. Secure attachment	
5. Keep eyes on what you are cutting.	
6. Wear safety glasses at all times when using tools.	
7. Watch cutting angle so it will not cause ricochet.	
8. Know how to pass.	
a. Signal calling (“coming through”).	
b. Wait to be given right-of-way.	
9. When transferring tools, always pass them handle first.	
10. When it is not in use, lean tool against an object in a safe area so that it will stand upright, or lay flat and lay a shovel over it.	
11. Do not run with hand tools.	

OUTLINE	AIDS & CUES
B. Sharpening Hand Tools	
Your job as a firefighter requires that you develop the ability to field maintain hand tools commonly used in your area. A professional firefighter must keep cutting tools ready for use.	
A sharp, properly maintained cutting tool is essential for accomplishing the job. A dull tool is dangerous and makes work more difficult.	
INSTRUCTOR SHOULD PROVIDE DEMONSTRATION AND HANDS-ON USE OF THE FILE FOR EACH TOOL.	
1. Secure tools.	
2. Maintain clearance around working area.	
3. Always use a proper file such as a 12" flat mill bastard with handle and guard.	
4. Always wear gloves and a long sleeve shirt.	
5. Assure that file is in good condition. A worn file will slip. Use full length of file.	
6. Use palm of hand flat against the file's end. Do not allow fingers to wrap around.	
7. Do not run your finger along the length of the blade when checking for sharpness. Make a visual inspection only.	

OUTLINE	AIDS & CUES
8. Do not allow tool to remain in log or stump if you leave the area.	
9. Use file at proper angle.	
VI. GENERAL STORAGE - HAND TOOLS	
A. Safety Guards	
1. Boxes	
2. Old hose	
3. Masking tape	
4. Sheaths	
5. Old inner tubes	
6. Old conveyor belt	
B. Vehicles	
1. Secure safety guards properly.	
2. Place in proper tool compartment.	
3. Bundle tools for helicopter transport.	
C. Proximity to Fireline	
DEMONSTRATE THE PROPER PLACEMENT OF EXCESS TOOLS NEAR THE FIRELINE.	

OUTLINE	AIDS & CUES
1. Store tools a safe distance from fireline and traffic.	
2. Keep tools visible to crew members and others.	
3. Flag areas where tools are kept, if possible.	
4. Keep sharp cutting edges near the ground.	
5. Cover tool heads with sheaths, if available, or by some other protection (shovel).	
VII. APPLICATION/EVALUATION	
HAVE STUDENTS DEMONSTRATE THE USE AND CARE OF TOOLS COMMONLY USED IN THEIR AREAS.	
PERFORMANCE EVALUATION (GROUP OR INDIVIDUAL EXERCISE):	
USING THE CHECKLIST, EVALUATE STUDENTS DEMONSTRATING THE PROPER PROCEDURES FOR CARRYING COMMONLY USED SCRAPING TOOLS AND FOR PASSING CREW MEMBERS WHILE WORKING WITH THESE TOOLS.	06-01-S130-IR SW p. 6.7
ANY ITEM NOT CHECKED AS SUCCESSFULLY COMPLETED, CONSTITUTES FAILURE. ADDITIONAL TRAINING AND TESTING IS NEEDED UNTIL PROPER PERFORMANCE IS ACHIEVED.	

OUTLINE	AIDS & CUES
VIII. ALTERNATIVE TOOLS	
Fire swatters (flappers) and gunnysacks are used primarily for suppressing fires in light fuels, such as pastures, pine needle litter, light hardwood litter, and light grasses. Fire swatters are very effective when used in conjunction with the backpack pump or fire rake. Spruce boughs can also be used as smothering tools.	
A. Swatter (flapper)	
1. Swatter terminology	
a. Flap (12 inches by 15 inches)	
b. Steel frame and shank (4½ inches)	
c. Rivets (four)	
d. Handle (5 feet)	
2. Swatter use	
a. Should be very lightly patted or dragged directly on and along fire edge.	
Hard vertical swatting can cause fire embers to spread fire and may unnecessarily tire the firefighter.	
b. Tool should be kept moving to prevent it from burning.	

OUTLINE	AIDS & CUES
3. Swatter grip and stance	
a. Grip firmly.	
b. Keep eyes on target.	
c. Place feet apart on solid footing.	
d. May either be pushed or pulled along fire edge.	
4. Swatter care and maintenance.	
a. Inspect flap for:	
• Torn rivet holes.	
• Worn edges.	
• Cracking in outer rubber-coated webbing.	
b. Inspect steel frame and shank for:	
• Missing rivets.	
• Cracked, broken, or bent condition.	
c. Inspect handle for:	
• Smoothness.	
• Solid condition (no splits, cracks).	

OUTLINE	AIDS & CUES
• Alignment. • Secure fit to flap. d. Conduct periodic inspections during use. **ANY TOOL THAT CANNOT BE REPAIRED OR THAT IS UNSAFE SHOULD BE REMOVED FROM SERVICE.** 5. Swatter storage When not in use, store so that flap will be in a flat position. B. Gunnysack/Burlap 1. Gunnysack use a. After wetting the bottom portion, (part to be applied to the fire) the gunnysack should be very lightly patted or dragged directly on and along fire edge. Re-wet burlap as needed. b. Hard vertical swatting should be avoided as it tends to spread fire and unnecessarily tires the firefighter. c. Burlap should be kept moving to prevent it from burning.	

OUTLINE	AIDS & CUES
2. Gunnysack grip and stance	
a. Grip firmly.	
b. Keep eyes on target.	
c. Place feet apart on solid footing.	
d. May be pulled along fire edge.	
3. Gunnysack care and maintenance	
a. Conduct periodic inspections during use for:	
• Proper wetness	
• Burnt spots	
b. If the sack is burnt, replace it.	
4. Gunnysack storage	
Store burlap in a dry area.	
IX. APPLICATION/EVALUATION	
HAVE STUDENT DEMONSTRATE USE OF AN ALTERNATIVE TOOL.	
PERFORMANCE EVALUATION (GROUP OR INDIVIDUAL EXERCISE):	
USING THE CHECKLIST, EVALUATE STUDENTS DEMONSTRATING THE PROPER GRIP, STANCE AND USE OF AN ALTERNATIVE TOOL.	06-02-S-130-IR SW p. 6.8

OUTLINE	AIDS & CUES
ANY ITEM NOT CHECKED AS SUCCESSFULLY COMPLETED, CONSTITUTES FAILURE. ADDITIONAL TRAINING AND TESTING IS NEEDED UNTIL PROPER PERFORMANCE IS ACHIEVED.	
OPTIONAL: **INSTRUCTOR SHOULD ADMINISTER UNIT QUIZ. AFTER COMPLETION, GRADE QUIZZES AND THEN REVIEW ANSWERS WITH STUDENTS.**	06-03-S-130-IR SW p. 6.9 thru 6.11
REVIEW UNIT OBJECTIVES.	

FIREFIGHTER TRAINING, S-130
UNIT 6 - HAND TOOLS
PERFORMANCE EVALUATION

Performance evaluation:

Demonstrate the proper procedures for carrying commonly used scraping tools and for passing crew members while working with these tools.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

☐ 1. PPE properly worn.

☐ 2. Maintains proper spacing.

☐ 3. Carries tool on the downhill side.

☐ 4. Cutting edge is away from body.

☐ 5. McLeod is carried with cutting edge up.

☐ 6. Signal prior to passing crew members.

☐ 7. Wait to be given right-of-way.

FIREFIGHTER TRAINING, S-130
UNIT 6 - HAND TOOLS
PERFORMANCE EVALUATION

Performance evaluation:

Demonstrate the proper grips, stance and use of an alternative tool.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

☐ 1. PPE properly worn.

☐ 2. Tool lightly patted or dragged along fire edge.

☐ 3. Constant movement to prevent burning.

☐ 4. Firm grip.

☐ 5. Feet apart, solid stance.

☐ 6. Eyes on target.

FIREFIGHTER TRAINING, S-130
UNIT 6 - Hand Tools

UNIT QUIZ WITH ANSWERS
(30 possible points)

1. List five commonly used hand tools. (5 points)

- **Shovel**
- **Pulaski**
- **Wire broom**
- **Council rake**
- **Brush hook**
- **Ax (single-bit)**
- **McLeod**
- **Adze hoe (hazel hoe)**
- **Fire swatter**
- **Combi tool**

2. Identify the maintenance procedures for the following conditions of tool handles and tool heads. (8 points)

HANDLE/CONDITION CHECK	MAINTENANCE
Tool handle is not straight.	**Replace**
Tool handle is not smooth.	**Sand or scrape smooth**
Tool handle is cracked.	**Replace**
Retaining bolts/pins are not tight.	**Tighten or replace**
Tool head is loose.	**Replace**
Tool head is dull.	**Sharpen**
Tool head is chipped.	**Replace**
Tool blade is bent.	**Replace**

3. Describe the proper safety techniques for sharpening and field maintenance of tools. (3 points)

- **Proper safety equipment.**
- **Maintain clearance around working area.**
- **Always use file handle and guard.**
- **Secure tools.**
- **Use file in good condition.**
- **Use visual inspection for sharpness.**
- **Do not allow tool to remain in log or stump unattended.**

4. Describe the proper method of carrying hand tools commonly used in your area. (3 points)

- **Carry tool on downslope side.**
- **Carry tool with sharp instrument pointing forward and down toward ground.**
- **Do not carry tool on shoulder or across back.**
- **Carry McLeod tool with sharp edge up.**

5. Using the list of hand tools below, select which hand tools you would use for each of the fireline tasks (multiple answers may apply). (5 points)

Hand Tools:

a.	Shovel	e.	Ax
b.	Pulaski	f.	McLeod
c.	Fire swatter	g.	Fire rake
d.	Adze Hoe		

Tasks:	Hand Tools:
Limbing a spruce tree.	**a, b, e, f, g**
Constructing a line in a hardwood forest.	**a, f, g**
Knocking down flame in light cheatgrass.	**a, c, f, g**
Digging line in tundra.	**b**
Falling a 3"- 6" diameter tree in a primitive area.	**b, e**

6. Demonstrate or describe the proper method of passing hand tools commonly used in your area. (2 points)

- **Pass tool, handle first.**
- **Do not release until co-worker takes a firm hold.**

7. What is the minimum spacing while working or walking with a handtool? (2 points)

Minimum 10 feet or greater, depending on conditions, or minimum of three tool lengths.

8. Describe proper placement of commonly used tools when they are not needed in fireline construction. (2 points)

Tools should:

- **Be a safe distance away from fireline and traffic.**
- **Be visible to crew members and others.**
- **Be flagged, if possible.**
- **Be near the ground, if sharp.**
- **Have heads covered with sheath, if available, or some type of protection (shovel).**

Notes to the Instructor

This unit will give the students background information followed by hands-on demonstration in the field. A sample agenda (p. 7.2) for organizing the hands-on practice of the skills in units 7, 8 and 15 (optional) is included to aid the instructor. These are suggestions; the instructor is encouraged to develop hands-on practice sessions and performance evaluation that fit the needs and logistical demands of the training site. For additional information on firing devices, instructor can utilize the Ignition Operations, S-234 course.

Unit 15 Pump Operations is an optional unit. It is designed as an introduction to elementary pump operations. If the instructor cadre chooses to provide students with this information it should presented after unit 8. For additional information on pump operations, instructor can utilize the Portable Pumps and Water Use, S-211, course and/or the Water Handling Equipment Guide.

If the instructor cadre chooses not to include the information provided in Unit 15, the students should be referred to the information to read through on their own.

Sample Outline for Performance Evaluation
Units 7, 8, and Unit 15 (optional)

FIELD EXERCISE

STATION 1 - Firing Devices and Water Use Hand Signals

- Demonstrate fusees, drip torch and field expedient methods.
- Demonstrate hand signals.

STATION 2 - Backpack Pump, Hose & Fittings, Hose Lays

- Demonstrate backpack pump.
- Discuss hose sizes, couplings (1/4 turn & threads), marking unserviceable hose.
- Discuss “Ys”, reducers, increasers, adaptors, nozzles and spray patterns, hose clamps, spanner wrenches.
- Set-up simple and progressive hose lays.

STATION 3 (optional) - Pump Setup and Operation

- Demonstrate pump setup and operation.
- Suggest “trouble shooting” tips.
- Talk about environmental concerns and protection.
- Have each student set up and start the pump.

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 7 - Firing Devices

TIME: 1 hour

TESTING METHODS: Oral and performance evaluations

TRAINING AIDS: Fusees, drip torch, rags, adjustable wrench, matches, vehicle with torch mounted, stopwatch or wristwatch, shovel or other tools, matches, materials for a field exercise

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Describe two hazards to operators when using a fusee.
2. Demonstrate or simulate how to ignite, use, and extinguish a fusee.
3. Describe four hazards to operators when using a drip torch.
4. State the proper fuel mixture for a drip torch.
5. Prepare a drip torch for use and ignite.
6. Demonstrate the safe use of the drip torch.
7. Extinguish a drip torch and prepare it for storage.
8. Describe two field expedient methods for igniting wildland fuels.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS. **DUE TO THE FIELD DESIGN OF THIS UNIT THERE ARE NO POWERPOINT SLIDES.** **THIS UNIT CONSISTS OF THREE SECTIONS. EACH SECTION CONCLUDES WITH AN EVALUATION INCLUDING ORAL RESPONSES AND A PERFORMANCE EVALUATION. THESE EVALUATIONS ARE DESIGNED FOR THE FIELD OR A SIMULATED AREA.** **INSTRUCTOR MAY CHOOSE TO ADMINISTER ALL EVALUATIONS AT THE CONCLUSION OF THE UNIT OR INDIVIDUALLY AT THE END OF EACH PRESENTATION.** **INSTRUCTOR SHOULD ADVISE STUDENTS THAT THEY WILL BE REQUIRED TO PASS EACH EVALUATION WITH 100% CORRECT PERFORMANCE.** **A STUDENT FAILING A PERFORMANCE EVALUATION WILL NEED ADDITIONAL TRAINING AND TESTING UNTIL PROPER PERFORMANCE IS ACHIEVED.** I. FUSEE The fusee is an effective device used for burning out control lines and backfiring on wildland fires. It provides a method of firing grass, pine needles, leaves, brush, and similar types of dry fuel that will ignite freely and radiate sufficient heat to sustain combustion. Often the fusee is used for traffic control as a warning device. The compound that makes up the fusee, when	

OUTLINE	AIDS & CUES
ignited, is subject to splattering and can cause severe burns if not handled properly. Proper personal protective equipment (PPE) must be worn when using fusees.	
HAVE FUSEES AVAILABLE FOR PRESENTATION AND DEMONSTRATION. INSTRUCTOR SHOULD DEMONSTRATE USE, CARE AND EXTINGUISHING OF A FUSEE. IF POSSIBLE, GIVE ONE FUSEE TO EACH STUDENT TO PROVIDE ACTUAL HANDS-ON EXPERIENCE IGNITING AND EXTINGUISHING A FUSEE. REINFORCE SAFETY CONSIDERATIONS WITH USE.	
A. Fusee Terminology	
1. Safety cap	
2. Fusee	
3. Wrapper (waxed)	
4. Handle (ferrule)	
5. Contents (phosphorous)	
6. Striker (igniter)	
B. Fusee Features	
1. Fusee has protected ignition surface.	
2. Fusee is approximately 10 to 18 inches long.	
3. Fusee burns for 15 to 30 minutes.	

OUTLINE	AIDS & CUES
4. Temperature of flame is approximately 1,400 degrees Fahrenheit.	
C. Fusee Use	
1. Grip fusee by the handle.	
2. Remove striker cap by taped end.	
3. Scratch striker against ignition surface by striking down and away from body. Turn your head to side while striking. Stand upwind of the fusee if possible, to avoid inhaling fumes.	
4. Hold away from body.	
5. When using, carry fusee in downward position.	
6. Devise wooden extension for handle (improvise) or place several fusees together end-to-end.	
7. Keep on the burn side of the fireline.	
8. To extinguish, strike burning end sharply on ground or extinguish the fusee in mineral soil. Watch for splattering of hot slag.	
9. Do not leave fusee where livestock might eat.	
D. Fusee Care and Maintenance	
1. If it is punctured, dispose of fusee.	

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2. If fusee is damaged or wrapper is worn, properly dispose of fusee.	
3. Keep cap in place, do not lose or allow to become loose.	
4. Keep fusee clean, dry, and away from water and oil.	
5. Keep fusee away from heat.	
E. Fusee Safety	
1. Wear eye protection and gloves.	
2. Insure that sleeves are rolled down.	
3. Do not remove cap until ready to use.	
4. Turn your head to the side when striking.	
5. When lit, keep fusee away from body and clothing.	
6. Be careful, phosphorous can cause severe burns.	
7. Keep lighted fusee away from anything you do not want to burn.	
8. Avoid breathing fusee smoke and vapors.	
9. Do not stare at bright flame.	
10. Do not point fusee at anyone; point it downward.	

OUTLINE	AIDS & CUES
FUSEES ARE CONSIDERED HAZARDOUS MATERIALS. DISPOSE OF FUSEES IN ACCORDANCE WITH AGENCY POLICY.	
F. Fusee Storage	
1. Tape or rubber band together for storage.	
2. Do not store where fusees will rub together or be damaged.	
3. Store in a cool, dry place if possible.	
PERFORMANCE EVALUATION:	07-01-S130-IR SW p. 7.5
USING THE CHECKLIST, HAVE EACH STUDENT GIVE AN ORAL RESPONSE TO THE QUESTION, THEN SIMULATE OR DEMONSTRATE LIGHTING, EXTINGUISHING, AND MAINTAINING FUSEE.	
DISCUSS SAFETY CONSIDERATIONS WITH STUDENTS WHILE THE ABOVE IS TAKING PLACE.	
ANY ITEM NOT CHECKED AS SUCCESSFULLY COMPLETED, CONSTITUTES FAILURE. ADDITIONAL TRAINING AND TESTING IS NEEDED UNTIL PROPER PERFORMANCE IS ACHIEVED.	
II. DRIP TORCH	
The drip torch is used for burning out fuels. It is also known as a burning out torch and it contains a mixture of liquid fuels that will flame when ignited. The fuel flows through a spout to the wick, which becomes saturated with fuel and burns continuously, permitting	

OUTLINE	AIDS & CUES
the person using the torch to cast burning liquid to ignite the fuel. Proper personal protective equipment (PPE) must be worn when using the drip torch.	
THE DRIP TORCH SHOULD BE VISIBLE AND USED FOR PRESENTATION AND DEMONSTRATION.	
REMIND STUDENTS THAT PROPER PRE-CAUTIONS NEED TO BE USED WHEN HANDLING DRIP TORCH FUEL. FUEL IS CONSIDERED A HAZARDOUS MATERIAL. ENSURE THAT FUEL IS SAFEGUARDED ANY TIME IT IS USED, ESPECIALLY IN SENSITIVE AREAS SUCH AS WATERSHEDS, STREAMS, ETC. CLEAN UP ALL FUEL SPILLS.	
A. Drip Torch Terminology	
1. Drip torch (orchard torch)	
2. Fuel tank with handle	
3. Tank vent or breather valve	
4. Spout and nozzle	
5. Wick and wick holder	
6. Tank cover and gasket	
7. Tank lock ring (o-ring)	
8. Fuel	
9. Torch holder and hold-down spring	
10. Personal protective equipment (PPE)	

OUTLINE	AIDS & CUES
B. Drip Torch Use	
1. Prepare the following fuel mix (1-1/4 gallon capacity).	
Mix 4 parts diesel fuel to 1 part gasoline (4-1 gas). Fill to one-fourth inch from top to allow for expansion.	
2. Prepare for use.	
a. Put on safety clothing.	
b. Remove torch from vehicle.	
c. Shake torch to mix fuel after removing torch from vehicle, and set torch down in cleared area.	
d. Unscrew lock ring.	
e. Remove and secure flow plug.	
f. Remove spout from fuel tank. Inspect rubber gasket and fuel supply.	
g. Set spout upright on torch in space provided, with wick facing opposite and away from handle.	
h. Screw lock ring on fuel tank tightly.	
i. Open air vent three-fourths of the way.	
j. Wipe off spilled fuel.	

OUTLINE	AIDS & CUES
3. Lighting the drip torch. a. Spread fuel on a small amount of ground litter or paper in a cleared area where torch will be used, then ignite. b. Light torch from ground fire. c. Carry torch upright until ready for use. d. Tilt torch downward when using. (May be used in a swinging motion parallel to the direction of travel.) e. Be careful of where you spread the fire. f. Each droplet of fuel should ignite if fuel is mixed properly. 4. Preparing the drip torch for storage after use. a. Extinguish or let wick burn dry, set upright and let cool. b. Remove lock ring. c. Reverse spout and put inside tank. d. Replace lock ring securely. e. Replace flow plug.	

OUTLINE	AIDS & CUES
f. Close air breather valve.	
g. Clean and store empty after fire season.	
h. Fill to proper level when storing during fire season.	
C. Drip Torch Care and Maintenance	
1. Check tank for dents, leaks, and damaged threads.	
2. Check spout, wick, wick holder, and flow plug.	
3. Check gaskets.	
4. Open air vent.	
5. Ensure that holder and spring clamp are bolted to vehicle.	
D. Safety	
1. Do not exceed the gasoline mix ratio. Too much gasoline may cause the torch to explode upon ignition.	
2. Keep torch away from your body, clothing, and boots.	
3. When using torch, burn from top of hill downward.	
4. Keep fuel flowing so wick does not burn out.	

OUTLINE	AIDS & CUES
5. Extinguish torch when not in use.	
6. Do not insert the spout and wick into fuel can until they are cool.	
7. Carry the torch by the handle only.	
8. Maintain torch.	
9. Do not open or fill the drip torch near open flame, hot embers, sparks, or while smoking (because of dangerous vapors). Do not breathe vapors.	
10. Fuel mixtures are considered hazardous materials and should be treated as such. Wash as soon as possible following exposure.	
11. Carry on downhill side.	
12. Have escape route planned when using torch.	
13. Wear gloves and keep sleeves rolled down. (Always wear personal protective equipment.)	
14. Change contaminated clothes.	

OUTLINE	AIDS & CUES
PERFORMANCE EVALUATION:	07-02-S130-IR SW pp. 7.6 thru 7.7
USING THE CHECKLIST, HAVE EACH STUDENT GIVE AN ORAL RESPONSE TO THE QUESTIONS, THEN SIMULATE OR DEMONSTRATE ASSEMBLY, USE, AND STORAGE OF THE DRIP TORCH.	
DISCUSS SAFETY CONSIDERATIONS WITH STUDENTS WHILE THE ABOVE IS TAKING PLACE. ANY ITEM NOT CHECKED AS SUCCESSFULLY COMPLETED, CONSTITUTES FAILURE. ADDITIONAL TRAINING AND TESTING IS NEEDED UNTIL PROPER PERFORMANCE IS ACHIEVED.	
III. FIELD EXPEDIENT METHODS OF IGNITING WILDLAND FUELS	
A. Methods of Ignition	
Several methods of ignition can be used to accomplish burnout. Some suggestions are:	
• With a tool, drag burning needles or leaves (natural fuels) along the ground.	
• Fusee	
• Drip torch	
• Use matches	
• Other methods (at discretion of instructor).	
INSTRUCTOR SHOULD DEMONSTRATE OR SIMULATE USE OF EACH METHOD.	

OUTLINE	AIDS & CUES
B. Safety	
MANY OF THE METHODS ARE SIMILAR TO THOSE PRESENTED IN THE PREVIOUS SECTIONS OF THIS UNIT. INVOLVE THE STUDENTS IN DISCUSSIONS AND/OR USE THE PREVIOUS SECTIONS TO COMPARE AND CONTRAST.	
Be alert for:	
1. Rolling materials.	
2. Spreading of burning embers outside fireline.	
3. What is going on around you; stay in contact with the person above and below you.	
PERFORMANCE EVALUATION:	07-03-S130-IR SW p. 7.8
USING THE CHECKLIST, HAVE EACH STUDENT GIVE AN ORAL RESPONSE TO THE QUESTION, THEN SIMULATE OR DEMONSTRATE EACH METHOD, EXPLAINING BENEFITS AND HAZARDS.	
DISCUSS SAFETY CONSIDERATIONS WITH STUDENTS WHILE THE ABOVE IS TAKING PLACE.	
ANY ITEM NOT CHECKED AS SUCCESSFULLY COMPLETED, CONSTITUTES FAILURE. ADDITIONAL TRAINING AND TESTING IS NEEDED UNTIL PROPER PERFORMANCE IS ACHIEVED.	
REVIEW UNIT OBJECTIVES.	

FIREFIGHTER TRAINING, S-130
UNIT 7 - FUSEE PERFORMANCE EVALUATION

The instructor will ask the following question for an oral response. The question and performance evaluation are pass/fail.

List two hazards to operators when using a fusee.

Fusee particles and fumes.

Performance evaluation:

Given a fusee and a cleared area, demonstrate (1) igniting a fusee, (2) igniting wildland fuel, and (3) extinguishing the fusee.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

- ☐ 1. Sleeves down, gloves on and eye protection in place.
- ☐ 2. Remove striker protector.
- ☐ 3. Expose igniter.
- ☐ 4. Place striker on igniter.
- ☐ 5. Turn face away from fusee.
- ☐ 6. Light fusee by sharply scratching the igniter across the striker.
- ☐ 7. Strike fusee (away from body).
- ☐ 8. Apply flame to simulated fuel.
- ☐ 9. Extinguish fusee by striking sharply on ground or by placing lighted end in mineral soil.

FIREFIGHTER TRAINING, S-130
UNIT 7 - DRIP TORCH PERFORMANCE EVALUATION

The instructor will ask the following two questions for an oral response. All questions and the performance evaluation are pass/fail.

1. Describe four hazards to operators when using a drip torch.

   Flaming fuel, improper fuel mix, flash back or explosion, carrying burning torch on uphill side, personal burns.

2. Describe the fuel mixture for a drip torch.

   4 parts diesel fuel, 1 part gasoline.

Performance evaluation:

Given a drip torch in proper working order, rags, matches, a cleared area and PPE, correctly demonstrate the proper procedures for (a) assembly, (b) lighting, carrying and spreading burning fuel, extinguishing, and (c) storing the drip torch.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box:

If a. and b. of the performance examination takes more than five minutes or if there is a failure on any step or procedure, this constitutes failure of the exam.

a. Assemble the drip torch.

- ☐ Shake fuel.
- ☐ Unscrew locking ring.
- ☐ Unscrew and secure fuel flow plug.
- ☐ Remove spout and inspect gasket, fuel, and wick.
- ☐ Set spout with wick in correct position and secure lock ring.
- ☐ Open air vent.
- ☐ Wipe off spilled fuel.

b. Demonstrate proper procedure for lighting, carrying and spreading burning fuel, and extinguishing of the drip torch.

- ☐ Spread fuel on ground litter or paper.
- ☐ Ignite fuel.
- ☐ Ignite drip torch from ground fire.
- ☐ Demonstrate proper procedure for carrying and spreading burning fuel.
- ☐ Extinguish wick by setting upright and letting wick burn dry.

c. Storage procedures

- ☐ Let wick cool before storage.
- ☐ Return drip torch to condition of readiness.

FIREFIGHTER TRAINING, S-130
UNIT 7 - BURNOUT PERFORMANCE EVALUATION

The instructor will ask the following question for an oral response. The question and performance evaluation are pass/fail.

Describe two field expedient methods for igniting wildland fuels.

Drag burning natural fuels with a tool, oil-soaked rag on a stick, matches.

Performance evaluation:

Given a cleared area, PPE, and materials necessary for a field expedient method of igniting wildland fuels, correctly demonstrate or simulate the proper procedures for igniting a field expedient device and ensure that all safety considerations are met.

- Ignite field expedient device.
- Demonstrate proper procedure for spreading burning fuel.
- Extinguish properly.
- Ensure all safety considerations are met.

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 8 - Use of Water

TIME: 3 hours

TESTING METHOD: Individual and/or group performance evaluations

TRAINING AIDS: Backpack pump, hose, fittings, accessories, hard hat, water source, any additional items necessary for a field exercise, Incident Response Pocket Guide, Fireline Handbook

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Given a backpack pump and a source of water, demonstrate how to properly operate and maintain the pump.

2. Correctly identify common hose components and accessories.

3. Describe the process of correctly unrolling hose.

4. Use a hose clamp and/or field-expedient method to restrict water flow in a charged line.

5. Describe and demonstrate the two hose lay methods.

6. Correctly identify the water use hand signals.

7. Demonstrate the nozzle settings for straight stream and fog spray.

8. Describe a fire situation when the straight and fog spray nozzle water streams would be used.

9. Describe three protective measures for hose and fittings when in use or being transported.

10. Describe four hazards to hose lays.

11. Retrieve deployed hose using two methods; i.e., watermelon roll, firefighters' carry, figure 8.

12. Identify and mark non-serviceable sections of hose and couplings.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS. **DUE TO THE FIELD DESIGN OF THIS UNIT THERE ARE NO POWERPOINT SLIDES.** **INSTRUCTOR SHOULD ADVISE STUDENTS THEY WILL BE REQUIRED TO PASS SEVERAL PERFORMANCE EVALUATIONS THROUGHOUT THIS UNIT. SUCCESSFUL COMPLETION OF THIS UNIT REQUIRES 100% CORRECT PERFORMANCE.** **A STUDENT FAILING A PERFORMANCE EVALUATION WILL NEED ADDITIONAL TRAINING AND TESTING UNTIL PROPER PERFORMANCE IS ACHIEVED.** I. BACKPACK PUMP **THIS UNIT WILL FOCUS ON THE COLLAPSIBLE MODEL BACKPACK PUMP AVAILABLE IN THE NATIONAL FIRE EQUIPMENT SYSTEM CATALOG NFES 1149.** **IF OTHER MODELS ARE USED IN YOUR LOCAL AREA IT IS THE INSTRUCTOR'S RESPONSIBILITY TO OBTAIN THESE ITEMS AND PREPARE TO ALTER THE LESSON PLAN APPROPRIATELY.** A. Introduction The backpack pump is a valuable tool. It may be used in many fire situations, but is particularly useful in hot spotting and mopup.	

OUTLINE	AIDS & CUES
INSTRUCTOR SHOULD INCLUDE DEMONSTRATION AND HANDS-ON USE BY STUDENTS IN THIS PRESENTATION.	
B. Terminology/Parts	
1. Five gallon collapsible tank	
2. Shoulder straps w/clips	
3. Filler cap	
4. Flexible hose (and hose clamp)	
5. Suction check valve	
6. Trombone pump	
• Combination nozzle and washer • Handle • Adjusting nut • Barrel	
7. Trombone clip	
C. Use	
1. Lift with your legs and keep your back straight.	
2. Maintain good footing and stance.	
3. Work trombone in and out (method of priming).	
4. Change nozzle tip to produce fog or straight stream.	

OUTLINE	AIDS & CUES
5. Direct streams in swinging motion parallel to fire perimeter and at base of flame.	
6. Refill from water source (use clean water only; muddy water will plug water passages).	
D. Care and Maintenance	
In the event that the backpack pump should fail to operate properly, on-scene field repairs may be required. Several things to check for if the backpack pump is malfunctioning include:	
1. Check for water in the tank.	
2. Check outlet in bottom for blockage.	
3. Check nozzle tip for blockage.	
4. Disconnect hose from tank and pump assembly and check for blockage inside the hose.	
5. Check to ensure that ball in check valve is not stuck in the open or closed position.	
Never put oil or grease on any nozzles or backpack pump. Use powdered graphite or non-oil based lubricant. Oil and grease will collect dirt and grime.	
E. Safety	
1. Lift properly. When full, a 5-gallon backpack pump weighs approximately 45 pounds.	

OUTLINE	AIDS & CUES
2. Adjust carrying straps to fit body frame.	
3. Do not climb over obstacles while wearing a backpack pump.	
4. Do not run with backpack pump.	
5. Do not use anything but water in a backpack pump.	
II. WATER DELIVERY SYSTEMS	
A. Introduction	
Firefighters may be called upon to work with various types of water delivery systems. These systems may use engines or other water sources (such as ponds or streams) from which to pump.	
B. Components and Accessories	
INSTRUCTOR SHOULD HAVE ALL COMPONENTS AND ACCESSORIES AND HOSE SAMPLES AVAILABLE FOR DISPLAY WHEN PRESENTING THE FOLLOWING MATERIAL. CONSIDER USING THE SHOW AND TELL METHOD AND ALLOW THE STUDENTS THE OPPORTUNITY TO HANDLE EACH ITEM.	
1. Fittings and Connections	
a. Pressure relief valve	
• A spring-loaded, adjustable valve placed between the pump and the discharge hose.	

OUTLINE	AIDS & CUES
• Used to release excess pressure on the pump due to kinks or nozzle shut-off.	
b. Check and bleeder valve	
• A combination valve and water check.	
• Used to keep water from flowing back into the pump when the pump stops, and to relieve pressure on the pump when it is restarted.	
c. Adapter	
• Used to connect hoses together that have different type threads.	
d. Increaser	
• Used to increase from one size to a larger size.	
e. Reducer	
• Used to reduce from one size of hose to a smaller hose.	

OUTLINE	AIDS & CUES
f. Couplings • There are two types of couplings: - double female - used to connect two male ends of hose or fittings. - double male - used to connect two female ends. g. Caps and plugs • Used to provide thread protection and to close off certain pieces of hose or accessories when not in use. h. Washer or gasket • Used in all female ends of adapters, reducers, increasers, connectors, caps, or other pieces of equipment with female ends to provide a tighter, more complete seal. i. Tee (with or without shut-off) • Used to bring a hose off a main line.	

OUTLINE	AIDS & CUES
j. Wye (with or without shutoff) • Used to divide single line into two lines. k. In-line shutoff valve • Used to shut off water. • Enables the person holding nozzle to stop water flow without shutting off the pump. • Restricts downhill head pressure. 2. Nozzles a. Used to control distribution of water. b. Made of various materials, e.g., brass, plastic. Multiple head nozzles allow the operator to change from straight stream to fog/ spray with the flip of a lever. 3. Hose a. Used to deliver water from the water source to the fire.	

OUTLINE	AIDS & CUES
b. Types of hose • Garden • High pressure • Cotton-Synthetic Jacket, Rubber Lined (CSJRL) • Linen or unlined • Suction c. Sizes vary widely. Standard sizes can be ordered from the National Fire Equipment System (NFES) catalog. d. Hose normally comes in 50-foot or 100-foot lengths. e. Each length of hose has two couplings or connectors, one female and one male. Variations of coupling types include: • Rocker lug • Pin lug • Quick connect (or "¼ turn")	

OUTLINE	AIDS & CUES
f. There are several different thread types used locally for water-use accessories; The following three types are universally used: • Garden Hose (GHT) • National Pipe Straight Hose (NPSH) • National Hose (NH) g. Hose is stored in several ways: • On reels. Usually for high pressure hose. • In baskets. Used on engines to store hose. • In packs. Usually a backpack (hosepack) is carried by the firefighter. Hose is prepackaged and pre-connected. 4. Accessories a. Gravity sock • Used to take advantage of flowing water that is above the fire.	

OUTLINE	AIDS & CUES
• The mouth is placed in the stream and anchored securely. • The tail is attached to the fire hose. b. Spanner wrench • Used to loosen connections. • Spanners come in many sizes and shapes depending on required connection sizes. c. Hose clamp • Used to stop flow of water through the hose. d. Mopup kits • Used in situations where mopup is required. • Consist of a wand, a control, and two or three nozzles, • Designed for use with garden hose.	

OUTLINE	AIDS & CUES
5. Safety equipment a. Ear plugs should be used by the pump operator. b. Eye protection should be used by the nozzle operator. These items are of special emphasis when working with water delivery systems and must be utilized in addition to required PPE. III. UNROLLING HOSE **DEMONSTRATE THE PROPER METHOD OF UNROLLING HOSE.** Process for unrolling hose • Remove and store ties (string, rubber band, or other locally used methods). • Unroll so that the female end always points toward the water source and the male end points toward the fire. IV. RESTRICTING WATER FLOW **DEMONSTRATE THE USE OF THE HOSE CLAMP OR OTHER FIELD EXPEDIENT METHODS OF RESTRICTING WATER FLOW.**	

OUTLINE	AIDS & CUES
Process for restricting water flow	
• If nozzle or gated wye is used, turn it off.	
• Place hose clamp, or crimp hose, 18 inches from coupling.	
• After hose is clamped off, open nozzle to relieve pressure.	
V. DELIVERY SYSTEMS	
A. Hose Lay	
A hose lay is any method or technique used to get water from the water source to the fire. There are two methods of assembling hose lays, simple and progressive.	
Inventory equipment on hand before starting and order additional equipment needed.	
INSTRUCTOR SHOULD DRAW AND DESCRIBE A SIMPLE AND PROGRESSIVE HOSE LAY. USE THIS FOR DISCUSSION BELOW.	Flipchart or white board
B. Simple hose lay	
Made up of lengths of hose connected together to reach the fire, plus a nozzle to regulate the water flow and the application of the water.	

OUTLINE	AIDS & CUES
C. Progressive hose lay 1. Designed for speed and safety on a hot, fast running fire where mobile attack is not possible. 2. Effective during mopup stages of the fire. 3. Once the main hose line reaches the fire, a gated wye or tee can be placed in the line every two lengths. • Wyes or hose tees can be placed on these branches and split again to get the job done. • The hose attached to these wyes is normally 1 or 1 1/2 inches, although 3/4 inch may be used. 4. Construction of a progressive hose lay allows direct attack on the fire at several points. Each situation will determine the method or technique of hose lay to be used. Some considerations are: • Fire situation • Topography • Water source • Availability of equipment and personnel	

OUTLINE	AIDS & CUES
VI. HAND SIGNALS	
Communication is essential to the firefighting effort. At one time or another you may be without radios. At such times hand signals may be used.	
REFER STUDENTS TO THE IRPG AND/OR THE FHB FOR WATER USE HAND SIGNALS. INSTRUCTOR SHOULD DEMONSTRATE AND DISCUSS THESE SIGNALS WITH STUDENTS, THEN HAVE THE STUDENTS PRACTICE THE SIGNALS.	IRPG (White-Guides) FHB (Appendix A)
VII. WATER PATTERNS	
A. Straight Stream	
The amount of water used in a straight stream is more than with other nozzle applications.	
Straight stream is used when:	
1. The fire is too hot to get close.	
2. The fire is confined to a small area.	
3. A lot of pressure is needed to reach any distance.	
4. Targets cannot be reached with fog/spray.	
5. Hot roots or beds need to be dug out during mopup.	

OUTLINE	AIDS & CUES
B. Fog/spray Fog pattern provides the most personal protection. 1. Fog spray is used when: • Close work is possible. • Fire covers a larger area. • A smaller volume of water is required to put out the fire or water conservation is necessary. 2. Fire situations where fog/spray may be used are: • Hot spotting • Building a wet line • Direct attack • Mopup C. Application **DEMONSTRATE CORRECT WATER APPLICATION. STRESS WATER CONSERVATION WITH STUDENTS.** 1. If the fire is hot, use a straight stream to knock the flames down so you can get closer to the edge (if fog/spray will not work).	

OUTLINE	AIDS & CUES
2. Turn and direct the fog spray parallel to the edge at the base of the flames.	
3. Be sure fire is knocked down well before proceeding.	
4. Watch for flare-ups along the extinguished edge.	
5. Follow up water with a mechanized or hand line as soon as possible, especially in heavy fuels. Fire edges that have been knocked down with water may come back to life if not completely extinguished.	
6. Aim accurately and maintain water stream in a sweeping motion.	
7. Apply water intermittently. This action will help conserve water.	
8. Watch the pressure. High pressure will deliver air as well as water to the fire and can fan the flame rather than knock it down. Excessive pressure wastes water while low pressure may not penetrate to the base of the flame.	
HAVE STUDENTS DEMONSTRATE THE CORRECT METHOD OF USING THE BACKPACK PUMP TO PRODUCE A STRAIGHT STREAM AND FOG SPRAY.	

OUTLINE	AIDS & CUES
VIII. CARE OF HOSE, FITTINGS, AND ACCESSORIES	
A. Roll hose to protect exposed threads.	
B. Replace protective caps on accessories and male hose ends.	
C. Be sure female ends have correct gasket size.	
D. Drain water from hose.	
E. Use accepted method of rolling hose when retrieving, e.g., watermelon roll, figure eight.	
INSTRUCTOR SHOULD DESCRIBE AND/OR DEMONSTRATE LOCAL METHOD USED FOR RETRIEVING HOSE.	
F. Hazards to Hose and Accessories	
1. Fire damage	
2. Sharp rocks	
3. Vehicle damage in traffic areas	
4. Tool damaged from hitting or placing hose on sharp tools	
5. Hose reels	
ASK STUDENTS FOR ADDITIONAL INPUT ON HOW TO PROPERLY PROTECT HOSE (E.G., PROPER CLEANING METHODS).	

OUTLINE	AIDS & CUES
G. Defective Hose and Accessories	
1. Examples that make the hose unusable include:	
• Damaged threads	
• Inoperative valves	
• Holes in hose	
• Other standards established by agency policy	
2. Each defective item should be marked to identify the defect or problem and then be returned.	
DEMONSTRATE TO STUDENTS THE PROCEDURE FOR MARKING DEFECTIVE OR PROBLEM HOSE AND ACCESSORIES.	
ENSURE THAT ALL STUDENTS HAVE HANDS-ON FAMILIARITY WITH HOSE AND ACCESSORIES.	
IX. EVALUATION	
PERFORMANCE EVALUATIONS (GROUP OR INDIVIDUAL EXERCISE):	
USING THE CHECKLIST, EVALUATE STUDENTS PROPERLY OPERATING AND MAINTAINING A BACKPACK PUMP.	08-01-S130-IR SW p. 8.5
USING THE CHECKLIST, EVALUATE STUDENTS PERFORMING WATER USE METHODS AND TECHNIQUES.	08-02-S130-IR SW p. 8.6

OUTLINE	AIDS & CUES
ANY ITEM NOT CHECKED AS SUCCESSFULLY COMPLETED, CONSTITUTES FAILURE. ADDITIONAL TRAINING AND TESTING IS NEEDED UNTIL PROPER PERFORMANCE IS ACHIEVED. **REVIEW UNIT OBJECTIVES.**	

FIREFIGHTER TRAINING, S-130
BACKPACK PUMP
PERFORMANCE EVALUATION

Performance evaluation:

Demonstrate the proper way to operate and maintain a backpack pump.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

☐ 1. Fill with clean or strained water.

☐ 2. Maintain proper footing and stance.

☐ 3. Maintain proper body position for carrying and lifting.

☐ 4. Use both straight stream and fog spray.

☐ 5. Directs stream properly.

☐ 6. Clear clogged nozzle, if clogged.

☐ 7. Clean quick connect, if dirty.

FIREFIGHTER TRAINING, S-130
USE OF HOSE AND WATER
PERFORMANCE EVALUATION

Performance evaluation:

Demonstrate correct methods and techniques of the use of hose and water.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

☐ 1. Utilize proper hand signals.

☐ 2. Identify commonly used fittings and hose.

☐ 3. Set up hose lays and identify hazards to those hose lays.

☐ 4. Restrict water flow by the use of hose clamp or field-expedient method (charged line).

☐ 5. Utilize various nozzle settings.

☐ 6. Utilize proper water application.

☐ 7. Perform hose retrieval.

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 9 - Suppression

TIME: 1 to 1½ hours

TESTING METHODS: Performance evaluation and/or written examination

TRAINING AIDS: Flipchart or white board, writing utensils, hand tools, field location, Fireline Handbook

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Describe three methods for breaking the fire triangle.
2. Describe three methods of attack on a fire.
3. List three suppression techniques and describe their uses.
4. Describe the blackline concept.
5. Describe four kinds of fire control line.
6. Name four threats/hazards to an existing control line when fire is burning inside the line.
7. Describe the proper follow-up procedures for a dozer or tractor plow fireline.
8. Describe two kinds of coordinated crew techniques used for fireline construction and with at least four additional personnel, construct a fireline utilizing these techniques.
9. Describe safety procedures to follow when in an area where retardant/water drops are being made.

10. Describe five safety procedures to follow when working around engines, tractor plows, and dozers.

11. Demonstrate the proper use of appropriate hand tools during fire suppression activities.

12. Demonstrate the construction of a cup trench on a steep slope.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS.	09-01-S130-EP thru 09-04-S130-EP
INSTRUCTOR SHOULD ADVISE STUDENTS THEY WILL BE REQUIRED TO PASS A PERFORMANCE EVALUATION AND A QUIZ (OPTIONAL) ADMINISTERED AT THE COMPLETION OF THIS UNIT. SUCCESSFUL COMPLETION OF THIS UNIT REQUIRES 100% CORRECT PERFORMANCE AND A SCORE OF AT LEAST 35 OF 50 POINTS (70%) ON THE UNIT QUIZ (IF INSTRUCTOR CHOOSES TO GRADE THE QUIZ).	
A STUDENT FAILING THE PERFORMANCE EVALUATION OR WRITTEN QUIZ (OPTIONAL) WILL NEED ADDITIONAL TRAINING AND TESTING UNTIL PROPER PERFORMANCE IS ACHIEVED.	
I. INTRODUCTION	
The ultimate objective in firefighting is <u>to control the fire</u>. This unit introduces a variety of methods, techniques, skills, and knowledge about the firefighter's job in fire suppression and tells how to do this job safely and efficiently.	
The terms control line and fireline are both used throughout this unit and the course. The terms are defined as follows:	
• <u>Control Line</u>: Comprehensive term used for all the constructed or natural fire barriers and treated fire edges used to control the fire.	

OUTLINE	AIDS & CUES
• Fireline: Any cleared strip or portion of a control line from which flammable material has been removed by scraping or digging down to mineral soil.	
II. THE FIRE TRIANGLE AND FIRELINE CONSTRUCTION STANDARDS	
A. Elements of the Fire Triangle	09-05-S130-EP
1. Oxygen - in the air	
2. Heat - a source of ignition	
3. Fuel - any combustible materials	
Suppressing and extinguishing a fire is accomplished by removing one or more legs of the fire triangle.	
B. Methods for Breaking the Fire Triangle	09-06-S130-EP
1. Oxygen - Suffocate the fire with dirt or water to rob the fire of oxygen.	
2. Heat - Cool the fire by applying water, dirt, retardant or a combination.	
3. Fuel - Separate the fuel to prevent combustion or remove fuel during fireline construction.	
Heat can also be removed during night mopup by chunking fuels, allow to burn down, and then spreading hot materials to expose them to the cooler night air.	

OUTLINE	AIDS & CUES
C. Fireline Construction Standards	09-07-S130-EP

Some factors that likely will influence standards for line construction are:

1. Fuel type of the area (forest, desert, arctic tundra).

2. Fuel moisture. The lower the fuel moisture the greater the chances for combustion and fire spread.

3. Continuity and arrangement of fuels. The closer and more continuous the fuels, both horizontally and vertically, the greater the chance for combustion and fire spread (heavy fuel loading, ladder fuels).

4. Temperatures will inversely affect fuel moisture. The higher the temperatures the lower the fuel moisture. As fires burn more intensely, more heat is produced and combustion and fire spread increase.

5. Increases in wind will increase the amount of oxygen available and preheat fuels, increasing the chances for combustion and fire spread.

All the above may or may not affect the standards for fireline construction, depending on the fuel type and situation. They should all be considered in fireline construction. Your supervisor should provide you with the fireline construction standards that will be needed to control the fire spread.

OUTLINE	AIDS & CUES
INVOLVE THE STUDENTS IN A DISCUSSION OF OTHER FACTORS/CONDITIONS THAT MAY INFLUENCE FIRELINE CONSTRUCTION STANDARDS IN THEIR LOCAL AREA AND/OR OTHER AREAS.	
INSTRUCTOR MAY WANT TO DISCUSS LOCAL RATES OF SPREAD. CONSIDER DEFINING TYPES OF EXTREME FIRE BEHAVIOR OR ANY LOCAL TERMS.	
III. METHODS OF ATTACK	FHB (Initial Attack Chapter) 09-08-S130-EP
These methods relate to the location of firefighters constructing a fireline.	
A. Direct Attack	
Constructing a fireline right on the fire perimeter. Keep one foot in the black and one foot in the unburned area.	
B. Indirect Attack	
Constructing a fireline some distance from the fire perimeter. Should use a barrier (natural or constructed) in fireline construction, if available. Intervening strip is wide and fuels are burned out. Allows choice of timing for burning out.	
C. Flanking/Parallel Attack	
Constructing a fireline by working along the flanks from an anchor point. May be either direct or indirect. Distance from control line is dependent on fire intensity. Intervening strips of narrow fuels are immediately burned out.	

OUTLINE	AIDS & CUES
INSTRUCTOR SHOULD DISCUSS THE APPROPRIATE SITUATIONS FOR USING EACH STRATEGY.	
IV. SUPPRESSION TECHNIQUES AND USES	09-09-S130-EP
A. Hotspotting	
Checking the spread of fire at points of more rapid spread or special threat. Is usually the initial step in prompt control with emphasis on first priorities.	
Used during suppression to cool the fire edge and to allow personnel engaged in line construction to get close enough to attack the fire directly. Can also be used when certain areas of the fireline are hotter than others, thereby hitting these areas early enough to prevent the fire from “making a run,” or to slow the rate of spread.	
DESCRIBE LOCAL SPECIFICATIONS.	
B. Cold Trailing	09-10-S130-EP
A method of controlling a partly dead fire edge by carefully inspecting and feeling with the hands to detect any fire, digging out and extinguishing every live spot, and lining any live edge.	
C. Scratch Line	09-11-S130-EP
Used as an expedient method for a fuel break in light fuels until a wider line can be constructed.	

OUTLINE	AIDS & CUES
D. Fireproofing Fuel	09-12-S130-EP
Used to reduce the chance of igniting fuels outside the control line by spraying them with water or chemicals or covering them with dirt.	
E. Burning Out	09-13-S130-EP 09-14-S130-EP
Setting a fire inside the control line to consume the fuel between the fire and the control line.	
V. BLACKLINE CONCEPT	
Fuels that remain between the main fire and the control line are burned out, or allowed to burn to the control line. This method ensures that fuels and heat remain inside the control line and prevents the fire from making a run at the control line. This action provides for safety of the control forces and security of the control lines.	
CHECK WITH LOCAL AGENCY TO DETERMINE LINE CONSTRUCTION REQUIREMENTS, I.E., AGENCY GUIDELINES FOR MINIMUM IMPACT SUPPRESSION TACTICS.	
VI. TYPES OF FIRE CONTROL LINE (TO MINERAL SOIL, PERMAFROST, OR WATER LEVEL)	
A. Constructed Fireline	09-15-S130-EP
• Hand line (cup trench, underslung)	09-16-S130-EP
• Machine line	
• Wet line	

OUTLINE	AIDS & CUES
• Retardant line	
• Detonation cord line	
• Black-line	
B. Natural Control Line	09-17-S130-EP
• Cold fire edge	
• Fuel break (streams, lakes, ponds, rock slides, and areas of sparse fuels)	
• Previously constructed barriers (roads, canals, etc.)	
VII. THREATS TO EXISTING CONTROL LINE	09-18-S130-EP
Once the control line is completed, it has to be secured by mopping up inward from that line to prevent the fire from jumping the line in one of the following manners.	
A. Spotting	
Wind gusts or convection column can pick up embers and carry them across control lines.	
B. Rolling Debris	
Fires on steep slopes need a good trench to catch debris from rolling across constructed lines.	

OUTLINE	AIDS & CUES
C. Creeping Root systems may burn under control line. Lines not built to mineral soil, water level, or permafrost may allow fire to creep across or under the control line. D. Radiant Heat Build up of unburned fuel inside and/or adjacent to the control line could ignite and become hot enough to radiate heat and ignite fuels on the other side of the line.	
VIII. DOZER OR TRACTOR PLOW FIRELINE FOLLOW UP PROCEDURES FOR FIRELINE PERSONNEL A. Clean Up Ensure that all combustible materials are removed from the control line. Control line extended to mineral soil, permafrost or water level. B. Break Up Machine Piles and Berms These may contain burning fuels that could smolder for months and start a fire at a later date. Use machines whenever possible. C. Fireproof Needed Areas Include adjacent areas outside the control line that may be endangered from radiant heat inside the control line.	09-19-S130-EP

OUTLINE	AIDS & CUES
D. Prepare and Burn Out Control Line Utilize the black-line concept to secure the line. E. Secure the Control Line Limb up any trees that may threaten the security of the control line. Snags that threaten the security of the control line should also be knocked down. F. Mopup the Interior Ensure that there are no threats to the control line from inside the fire area. G. Patrol the Control Line This is to ensure that any spots or areas that remain hot after completion of the control line will be located and extinguished.	
IX. TYPES OF COORDINATED CREW TECHNIQUES	09-20-S130-EP
EXPLAIN THAT THESE TECHNIQUES MAY NOT ALWAYS INVOLVE AN ORGANIZED 20 PERSON CREW. CREW SIZE MAY BE SMALLER DEPENDING ON THE SITUATION AND AVAILABILITY OF PERSONNEL. COORDINATED CREW EFFORTS REMAIN IMPORTANT IN ALL SITUATIONS. **DEFINE PROPER MIX AND ORDER OF TOOLS WITHIN THE CREW WHEN CONSTRUCTING A FIRELINE.**	

OUTLINE	AIDS & CUES
A. One-lick (Progressive) Each crew member does one to several licks or strokes of work and moves forward a specific distance. Distances are determined by the number of crew members, types of tools, and number of licks needed per area of fireline to complete the work for that tool. B. Bump-up (Leap frog) Each member completes a given section of line unless "bumped-up" by another crew member before completion.	
X. RETARDANT/WATER DROP SAFETY PROCEDURES A. Retardants and water are useful tools in the suppression of wildfire, but can be dangerous to personnel working in the drop area. Retardants will reduce the rate of spread but rarely extinguish a fire. An airplane traveling at 130 knots and dropping 2,000 gallons (as much as 10 pounds per gallon) can do a lot of damage to the drop area. Such as: 1. Uprooting brush and small trees 2. Breaking large trees 3. Moving rocks and debris	FHB (Firefighting Safety Chapter) 09-21-S130-EP

OUTLINE	AIDS & CUES
B. If you have prior information that there will be a drop in your area: 1. Indicate your presence (usually a supervisor responsibility). 2. Move out of the area. At least 200 feet perpendicular to the drop. 3. Remain clear of large old trees, snags, etc. Maintain a distance 1½ times the height of the nearest tree. 4. Determine when drops are completed. 5. Move back into the area quickly to take advantage of the retardant/water effects on the fire. 6. Remember that the area may be slick after retardant drop. C. Retardant drops from air tankers can be dangerous. A low drop has sufficient velocity and mass to not only knock you off your feet but also to throw you a considerable distance. Bodily injuries can be caused by low drops in the following examples: 1. Being thrown against rocks, trees, etc. 2. Being struck by flying debris knocked out of trees by the retardant. 3. Being struck by tools or debris kicked up by the retardant.	

OUTLINE	AIDS & CUES
D. If you are unable to move clear of the drop area, follow accepted agency procedures for protecting yourself and others.	
1. Lie down facing oncoming aircraft, helmet on with chin strap, feet spread, goggles in place.	
2. Hold hand tool at side, grab something solid such as a rock, tree, or shrub to break the force of a low drop. If available or possible, get behind tractor, brush guard, etc.	
3. After the initial drop move out of area until you have received assurance that no more drops are to be made in that area.	
XI. SAFETY PROCEDURES USED AROUND FIRELINE EQUIPMENT	09-22-S130-EP
Heavy equipment such as tractor plows, engines, and dozers is helpful and reduces the time needed to construct a control line and to mop up after a fire. However, it may be dangerous when crews or individuals are working in the same area.	
Certain safety procedures should be followed for each type of machinery.	
A. Engines	FHB (Firefighting Safety Unit)
1. Be alert when an engine is moving.	
2. Be alert to hazards of charged hoseline.	

OUTLINE	AIDS & CUES
3. Nozzle operators and personnel nearby must wear eye protection.	
4. Be alert and on the lookout for rolling materials when working uphill or downhill of equipment.	
5. Be alert during night operations.	
6. Take extra precautions when visibility is poor.	
7. Be alert to hazards when removing stuck vehicle (winch cables, jacks, slipping).	
B. Tractor Plow and Dozer	FHB (Firefighting Safety Unit)
1. Be alert when machine is moving.	
2. The dozer/tractor always has the right of way. Maintain a 50 foot minimum distance.	
3. Work a safe distance away, depending on fuels and terrain. *In timber - minimum two tree lengths away. Low fuel type - minimum 50' behind and 100' ahead.*	
4. Be careful and maintain stable footing when working around winch cables.	
5. Be alert and on the lookout for rolling materials when working uphill or downhill of equipment.	

OUTLINE	AIDS & CUES
6. Take extra precautions when visibility is poor.	
7. Be alert to soft spots or bogs.	
8. Do not assume the operator knows where you are.	
9. Be alert to the hazards of night operations.	
10. Leave headlamps on.	
11. Do not sleep on the fireline.	
DISCUSS SAFETY PROCEDURES FOR OTHER EQUIPMENT USED LOCALLY.	
XII. APPLICATION/EVALUATION	
INSTRUCTOR SHOULD DEMONSTRATE THE FOLLOWING TECHNIQUES AND HAVE STUDENTS PAIR UP TO PRACTICE AND CRITIQUE THESE PROCEDURES UNTIL EACH STUDENT CAN SUCCESSFULLY COMPLETE EACH PERFORMANCE (SEE INSTRUCTOR CHECKLIST FOR CRITERIA).	
A. Demonstrate the proper use of appropriate hand tools during suppression activities (line construction, hot spotting, mopup).	
B. Construct a control line using at least two coordinated crew techniques.	
C. Demonstrate the construction of a control line with a cup trench on a steep slope.	

OUTLINE	AIDS & CUES
D. Demonstrate the proper procedures to follow when caught in a retardant/water drop.	
PERFORMANCE EVALUATION (GROUP OR INDIVIDUAL EXERCISE)	09-01-S130-IR SW p. 9.9 thru 9.10
BASED ON THE INSTRUCTOR CHECKLISTS PROVIDED ABOVE, INSTRUCTOR WILL EVALUATE STUDENTS' PERFORMANCE.	
ANY ITEM NOT CHECKED AS SUCCESSFULLY COMPLETED, CONSTITUTES FAILURE. ADDITIONAL TRAINING AND TESTING IS NEEDED UNTIL PROPER PERFORMANCE IS ACHIEVED.	
THERE MAY BE AN OPPORTUNITY TO COMBINE THE MOPUP EXERCISE FROM UNIT 11 WITH THIS EXERCISE. SEE PAGE 11.17 - 11.18 FOR FURTHER REFERENCE.	pp. 11.17 thru 11.18
OPTIONAL: **INSTRUCTOR SHOULD ADMINISTER UNIT QUIZ. AFTER COMPLETION, GRADE QUIZZES AND THEN REVIEW ANSWERS WITH STUDENTS.**	09-02-S130-IR SW p. 9.11 thru 9.12
REVIEW UNIT OBJECTIVES.	09-23-S130-EP thru 09-25-S130-EP

FIREFIGHTER TRAINING, S-130
UNIT 9 - SUPPRESSION
PERFORMANCE EVALUATION

Performance evaluation:

INSTRUCTOR CHECKLISTS:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

1. Demonstrate the proper use of appropriate hand tools during suppression activities (line construction, hot spotting, mopup).

   ☐ a. Inspect tool.

   ☐ b. Safe use of hand tool.

2. Construct a control line using at least two coordinated crew techniques.

   ☐ a. Proper spacing when walking and working (10 - 15 feet apart).

   ☐ b. Line extending to mineral soil, water level, or permafrost.

   ☐ c. Proper intra-crew communications.

   ☐ d. Proper use of crew for specified method.

3. Demonstrate the construction of a control line with a cup trench on a steep slope.

- ☐ a. Adequate downhill berm.
- ☐ b. Appropriate tool choice.
- ☐ c. Adherence to safety procedures.
- ☐ d. Cup trench can withstand a rolling firebrand representative of the area; e.g., rolling pine cones, pieces of wood, logs, palmetto, cacti, nuts.

4. Demonstrate the proper procedures to follow when caught in a retardant/ water drop.

In some instances, it may not be possible to complete evaluation of situation #4. However, the instructor should ensure that students have a thorough understanding of these techniques and their local variations.

Contingency:
Student will describe each method and local variation of each. May be done orally or in writing. Instructor evaluates students to ensure they meet the objective.

- ☐ a. Wear full PPE.
- ☐ b. Lie face down, head toward direction of incoming aircraft.
- ☐ c. Helmet on securely with chin strap, feet spread, goggles in place.
- ☐ d. Hand tool held firmly at side.
- ☐ e. Grab something solid such as a rock, tree or shrub.
- ☐ f. Move out of area.

FIREFIGHTER TRAINING, S-130
UNIT 9 - SUPPRESSION

UNIT QUIZ WITH ANSWERS
(50 Total Points)

A minimum score of 35 points is required for a passing grade.

1. Identify the three elements of the fire triangle. (3 points)

   Heat, oxygen, fuel.

2. Name and describe two primary methods of attack on a fire. (6 points)

   Direct—next to fire perimeter.

   Indirect—some distance from fire.

3. Explain when the following five suppression practices are used. (10 points)

   a. Hotspotting
   Used during fireline construction to cool down the fire edge so personnel can get close enough to directly attack the fire.

   Used when certain areas of the control line are hotter than others.

   Used to control the rate of spread.

   b. Cold trailing
   A method of controlling a partly dead fire edge by carefully inspecting and feeling with the hands to detect any fire, digging out and extinguishing every live spot, and lining any live edge.

   c. Cup trench
   Used in steep terrain where the fire is uphill from the control line. A cup trench is used to keep rolling debris from going across the control line.

d. Scratch line
Used as an expedient method for causing a fuel break in light fuels until a wider line can be constructed.

e. Fireproofing
Used to reduce the chance of igniting fuels outside the control line by spraying them with water or covering with dirt.

4. Describe the blacklining concept. (2 points)
Fire is allowed to burn to the control line or is burned out from the control line.

5. Identify four kinds of control line, natural or constructed. (4 points)
Hand line, machine line, wet line, retardant line, detonated cord line, cold fire edge, fuel breaks, previously constructed barriers

6. Name four threats or hazards to an existing control line when fire is burning inside the line. (4 points)
Spotting, rolling debris, creeping, radiant heat

7. Identify the proper procedures for follow up of a dozer or tractor plow control line. (5 points)
Clean up after the equipment.
Break up machine piles and berms.
Fireproof needed areas.
Prepare and burn out control lines.
Patrol the control line.
Limb up any trees that threaten control line.
Mop up the interior.

8. Name two kinds of coordinated crew techniques used for fireline construction. (2 points)
One-lick or Progressive
Bump-up or Leap frog

9. Describe safety procedures to follow when in an area where retardant/water drops are being made. (4 points)

Indicate your presence.
Move out of target area.
Remain clear of large old trees, snags, etc.
Determine when drops are completed.
Move back into area quickly to take advantage of retardant effects.
Remember that the area may be slick.

10. Identify five safety procedures to consider when working around each of the following: (10 points)

a. Engine

Be alert when an engine is moving.
Be alert to hazards of charged hoselines.
Wear eye protection near charged nozzles.
Be alert and on the lookout for rolling materials.
Be alert during night operations.
Take extra precautions when visibility is poor.
Be alert to hazards (such as winch cables) when removing stuck vehicle.

b. Dozer/Tractor Plows

Be alert when machine is moving.
Dozer/tractor always has the right of way.
Maintain stable footing and watch for winch cables.
Work a safe distance away, depending on fuels and terrain.
Be alert for rolling materials.
Take extra precautions when visibility is poor.
Be alert to soft spots or bogs.
Do not assume the operator knows where you are.
Be alert to hazards of night operations.
Leave headlamps on.
Do not sleep on the fireline.

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 10 - Patrolling and Communication

LESSON: A - Patrolling

TIME: 20 minutes

TESTING METHODS: Group exercise and optional written examination

TRAINING AIDS: Flipchart or white board, writing utensils, mobile and portable radios

OBJECTIVES: Upon completion of this lesson, students will be able to:

1. Describe five ways to communicate with designated personnel.
2. Describe a systematic method of locating spot fires.
3. Describe four considerations when patrolling a fire.

OUTLINE	AIDS & CUES
PRESENT LESSON OBJECTIVES AND DISCUSS.	10A-01-S130-EP thru 10A-03-S130-EP
I. INTRODUCTION	
As a member of a fire crew, you may be called upon to:	
A. Communicate any unusual situation to your supervisor.	
B. Patrol a section of line.	
C. Patrol for spots or spot fires outside the fireline.	

OUTLINE	AIDS & CUES
II. MAINTAINING GOOD COMMUNICATION	
A. Communication Methods	10A-04-S130-EP
SOLICIT METHODS OF COMMUNICATION FROM THE CLASS.	
1. Hand signals	
2. Written messages	
3. Use of runners	
4. Mirrors	
5. Whistles or airhorns	
6. Two-way radios	
B. Identify a Communication Plan in Advance with Supervisor.	10A-05-S130-EP
This may include:	
1. What type of communication to use.	
2. How often you must report.	
3. What kind of information to report.	
4. What types of signals to use if necessary.	
5. Having a backup plan.	

OUTLINE	AIDS & CUES
III. PATROLLING THE FIRE AREA	
A patrol travels a given route to prevent, detect, and suppress fires. When patrolling a predetermined area, whether constructed fireline or unburned area, personnel should have good clear instructions on their assignment. Considerations for patrolling an area or path include:	
A. Purpose of the Patrol Assignment	10A-06-S130-EP
1. To patrol constructed line looking for weak areas, hot spots, and slopovers.	
2. To reinforce the line when necessary.	
3. To patrol an area outside of the line looking for spot fires.	
B. Coverage of the Assigned Area	
1. This should be determined by your supervisor and the situation.	
2. Is the area fairly hot or does it consist of a long cold section of line?	
3. Does the assigned area need to be covered once every operational period or in any other emergency?	
4. Do instructions tell how often the reports should be made and how to report to the supervisor in case help is needed or in case of an emergency?	

OUTLINE	AIDS & CUES
C. Information to be Reported	
1. The need for help in the patrol area.	
2. The fire behavior.	
3. Machinery in the area.	
4. Any hazards.	
D. Consider working in pairs or in a systematic approach.	
E. Always know where safety zones are located and have planned escape routes.	
CONSIDER ASKING THE STUDENTS TO COME UP WITH ANY OTHER SUGGESTIONS.	
IV. PATROLLING FOR SPOT FIRES	10A-07-S130-EP
Spot fires are a serious threat to any control effort on a fire and should be given top priority. Considerable line building effort has been wasted because insufficient thought was given to possible spot fires.	
Spot fires are started outside main fire area by wind blown embers and ash, radiant heat, rolling materials, and by rabbits and other wildlife.	
A. Conditions that May Contribute to Spot Fires:	10A-08-S130-EP 10A-09-S130-EP
1. Extremely dry weather	
2. Steep topography	
3. Heavy fuel	

OUTLINE	AIDS & CUES
4. Crown fires	
5. Whirlwinds or dust devils	
6. Torched-out, lone tree	
7. Wind across the fireline	
8. Punky logs and tree roots hidden beneath the fire line in the soil	
9. Snags	
10. Flashy fuels	
B. Searching for Spot Fires	10A-10-S130-EP
EMPHASIZE THAT SPOT FIRES ARE TOP PRIORITY. EACH CREW MEMBER SHOULD WATCH OR LOOK FOR SPOT FIRES, BOTH DURING LINE BUILDING AND WHILE PATROLLING AREAS OUTSIDE THE ESTABLISHED CONTROL LINE.	
1. Inspect an area adjacent to the fire determined by your supervisor.	
2. Select two reference points in that area (such as trees).	
3. Travel between the reference points in a pattern parallel to the fireline, systematically covering that area.	
4. Patrol areas at intervals determined by fuel type.	

OUTLINE	AIDS & CUES
C. If a Spot Fire is Found:	
1. Report it to your supervisor.	
2. Begin initial attack, and suppression.	
3. Flag area of spot fire.	
4. Flag to main fireline, if nearby.	
V. APPLICATION	
GROUP EXERCISE.	
Given a marked area, the students will:	
A. Determine two reference points.	
B. Demonstrate method of search.	
C. Demonstrate or describe how a spot fire would be marked on the ground.	
D. Describe to whom spot fire would be reported.	
VI. EVALUATION	
OPTIONAL: **INSTRUCTOR SHOULD ADMINISTER UNIT QUIZ. AFTER COMPLETION, GRADE QUIZZES AND THEN REVIEW ANSWERS WITH STUDENTS.**	10A-01-S130-IR SW p. 10A.8
REVIEW LESSON OBJECTIVES.	10A-11-S130-EP

FIREFIGHTER TRAINING, S-130
UNIT 10 - Patrolling

UNIT QUIZ WITH ANSWERS
(30 Total Points)

Passing score requires a minimum score of 21 points.

1. Describe four considerations when patrolling a fire. (8 points)
   Purpose of the patrol assignment.
   Coverage of the assigned area.
   Information to be reported.
   Consider working in pairs or in a systematic approach.
   Always know where your safety zones are located and have planned escape routes.

2. Describe five ways to communicate with designated personnel. (10 points).
   Hand signals
   Written messages
   Use of runners
   Mirrors
   Whistles or airhorns
   Two-way radio

3. Describe a systematic method of locating spot fires. (8 points)
   a. **Inspect an assigned area adjacent to the fire, determined by your supervisor.**
   b. **Select two reference points in that area.**
   c. **Travel between the reference points in a pattern parallel to the fireline, systematically covering that area.**
   d. **Patrol areas at intervals determined by fuel types.**

4. Describe how spot fires are marked on the ground. (4 points)
   The fire area is flagged and, if possible, a line flagged back to the main control line.

DETAILED LESSON OUTLINE

COURSE:	Firefighter Training, S-130
UNIT:	10 - Patrolling and Communication
LESSON	B - Radio Communication
TIME:	20 minutes
TESTING METHODS:	Performance evaluation
TRAINING AIDS:	Flipchart or white board, writing utensils, mobile and portable radios, Fireline Handbook
OBJECTIVES:	Upon completion of this lesson, students will be able to:

1. Describe frequencies and how they affect radio communications.

2. List four elements of proper radio use procedures.

3. Transmit a message clearly using proper procedure and language.

4. Describe three radio trouble shooting practices used to improve radio reception or transmission.

5. Describe precautions and care to protect the radio from damage.

OUTLINE	AIDS & CUES
PRESENT LESSON OBJECTIVES AND DISCUSS.	10B-01-S130-EP 10B-02-S130-EP
STUDENTS MUST BE ADVISED THAT THEY WILL BE REQUIRED TO PASS A PERFORMANCE EVALUATION WITH 100% CORRECT PERFORMANCE AT THE COMPLETION OF THIS UNIT. A STUDENT FAILING THE EXAMINATION WILL NEED ADDITIONAL TRAINING AND TESTING UNTIL PROPER PERFORMANCE IS ACHIEVED.	
INSTRUCTOR IS ENCOURAGED TO TIE THIS UNIT IN WITH LCES, THE STANDARD FIREFIGHTING ORDERS, AND THE WATCH OUT SITUATIONS TO SHOW HOW CRITICAL COMMUNICATION IS.	
I. INTRODUCTION	
The two-way radio is one of the most common and basic communication tools. Prompt, dependable communication is a vital part of fire suppression activities. Radio communication is necessary, not only to communicate with other people on or around the fire line, but to provide information to supervisors or the support organization, request reinforcements, order supplies, or ask for medical help in emergencies.	
Radios work by sending out (transmitting) waves of energy. Different radios send out and receive different waves. Radio waves are called frequencies.	
Radio classes:	

OUTLINE	AIDS & CUES
A. Lowband	
1. Utilizes low frequency range.	
2. Travels greater distances.	
3. Waves are more able to bend around mountains, etc.	
4. Used widely in the 1960s, 70s, and 80s.	
B. Very High Frequency (VHF)/Highband	
1. Utilizes upper end of the (FM) range.	
2. Operates from 150-170 frequency range.	
3. Waves travel shorter distance than lowband.	
4. Needs repeater to increase range.	
5. Used frequently in wildland fire operations.	
C. Ultra High Frequency (UHF)	
1. Utilizes the next higher frequency band above VHF/highband.	
2. Radio waves travel distance is short because waves absorbed by vegetative cover, trees, etc.	
3. Used primarily around fire base camp for the logistics section.	

OUTLINE	AIDS & CUES
II. TERMINOLOGY	10B-03-S130-EP SW p. 10B.3
DEMONSTRATE AND EXPLAIN EACH OF THE FOLLOWING, WHERE APPROPRIATE. DISCUSS ANY ADDITIONAL AGENCY SPECIFICS.	
A. Programmable, Hand Carried Radio	
B. Mobile Radio - in Vehicle	
C. Base Station Radio - Permanent Location	
D. Antenna	
E. Microphone	
F. On-off Switch	
G. Volume Control	
H. Squelch Control	
I. Channel Selector	
J. Tone control (optional)	
K. Scanner (optional)	
L. Replacement Batteries and Installation	
III. RADIO USE	10B-04-S130-EP
A. For Official Use Only.	
B. Emergency Traffic has Priority.	

OUTLINE	AIDS & CUES
EMPHASIZE: IN CASE OF SERIOUS INJURY OR FATALITY, THE NAME OF THE PARTY OR EXTENT OF INJURY (CONDITION) IS <u>NOT</u> TO BE MENTIONED ON THE RADIO. REFER TO INJURY/ FATALITIES PROCEDURES IN THE FIRELINE HANDBOOK.	FHB (Firefighter Safety Chapter)
C. Use Clear Speech to Relay Message. No "CB" Talk.	
D. <u>Think</u> <u>Before</u> <u>Pushing</u> <u>the</u> <u>Button</u>. Plan your message in advance to avoid saying "ah," "hum," etc. Make your messages brief, concise, and complete. SPEAK CLEARLY.	
E. Write Down Messages you Receive. Do not rely on memory. Repeat message word for word if necessary.	
LOCAL RADIO PROCEDURES SHOULD BE DISCUSSED. EMPHASIZE: UTILIZING YOUR LOCAL RADIO FREQUENCIES IN DIFFERENT STATES IS PROHIBITED UNLESS THE RADIO FREQUENCIES HAVE BEEN LICENSED BY THE FCC FOR YOUR USE IN THAT STATE.	
IV. PROPER RADIO USE PROCEDURES	10B-05-S130-EP
A. Be Courteous.	
B. Swearing and Obscene Language is Prohibited.	
C. Answer Radio Calls Promptly.	
D. Have Pencil and Note Pad Ready for Messages.	

OUTLINE	AIDS & CUES
E. Be Brief; Radio Channels are Busy.	10B-06-S130-EP
F. To Declare an Emergency Break into the radio traffic and ask for the channel to be cleared for emergency traffic.	
G. Talk Into the Microphone.	
H. Use Normal Tone of Voice.	
V. TRANSMITTING AND RECEIVING A RADIO MESSAGE	
Every effort possible should be made to use a radio correctly. Correct use permits proper understanding of your message and results in prompt action. The proper procedure in transmitting a message is as follows:	
A. Wait until the person using the radio is finished before you start.	
B. When initiating a call, transmit the station name or unit number of the person you are calling first, followed by your station name or unit number.	
C. Microphones should be held 2-4 inches away from your mouth; avoid wind blowing into microphone when speaking.	
D. Wait one full second after pressing the transmit button before speaking.	
E. Answer the radio with your station name or unit number.	

OUTLINE	AIDS & CUES

F. If more than one station or unit calls at the same time, use the procedure for initiating a call to identify who needs to answer.

G. The person who initiates the call closes with the proper identifier.

VI. RADIO TROUBLESHOOTING

Each day you should check your radio to insure it is in proper working order. If you are unable to transmit and your radio is in good working order then one of following may be the problem.

A. Radio Traffic Overloaded

Wait until traffic has cleared.

B. Poor Location

1. For radios not using a repeater, a clear line of sight without obstacles is needed to transmit and receive.

2. For transmission through a repeater, change location if messages are not clear or if there is no repeater key signal.

C. Low Battery

Check your radio to see if it indicates a low battery. Also check to determine if the batteries have been installed correctly.

D. Loose Antenna

See if antenna is properly connected.

OUTLINE	AIDS & CUES
E. Operating on Wrong Channel The channel selector knob may have been bumped and you are no longer operating on the correct frequency.	
VII. RADIO CARE AND MAINTENANCE	
A. Protect the radios from dust, moisture, fire retardant, excessive vibration, dropping, extreme heat, etc.	
B. Keep portables in a protective case.	
C. Do not modify or attempt repairs on any radios. Notify your supervisor or a qualified radio technician so the problem can be fixed.	
D. Do not use the antenna to pull the portable radio from its case.	
VIII. APPLICATION/EVALUATION	
HAVE STUDENTS PRACTICE PREPARING AND OPERATING PORTABLE AND MOBILE RADIOS FOR ROUTINE TRAFFIC.	
PERFORMANCE EVALUATION (GROUP OR INDIVIDUAL EXERCISE): **USING INSTRUCTOR CHECKLISTS, EVALUATE STUDENTS' PERFORMANCE.**	10B-01-S130-IR SW p. 10B.9 thru 10B.11

OUTLINE	AIDS & CUES
ANY ITEM NOT CHECKED AS SUCCESSFULLY COMPLETED, CONSTITUTES FAILURE. ADDITIONAL TRAINING AND TESTING IS NEEDED UNTIL PROPER PERFORMANCE IS ACHIEVED.	
REVIEW LESSON OBJECTIVES.	10B-07-S130-EP

FIREFIGHTER TRAINING, S-130
UNIT 10, LESSON B - RADIO COMMUNICATIONS
PERFORMANCE EVALUATION

Performance evaluation:

INSTRUCTOR CHECKLISTS:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

1. Given a two-way portable radio, demonstrate how to prepare, transmit and receive.

To prepare portable for use:

- ☐ a. Check antenna.
- ☐ b. Turn on radio.
- ☐ c. Adjust squelch: turn knob to the point of garbled noise, then turn back until radio is quiet.
- ☐ d. Select channel to be used.

To transmit:

- ☐ a. Depress microphone key.
- ☐ b. Place microphone two to four inches from mouth.
- ☐ c. Speak distinctly and concisely.
- ☐ d. Release microphone key.

To receive:

- ☐ a. Turn radio on.
- ☐ b. Adjust volume to hear communication.
- ☐ c. Listen.

2. Given a two-way mobile radio, demonstrate how to prepare, transmit and receive.

To transmit:

- ☐ a. Turn on engine in vehicle.
- ☐ b. Turn on radio; adjust volume.
- ☐ c. Adjust squelch.
- ☐ c. Select channel.

To receive:

- ☐ a. Turn on; adjust volume.
- ☐ b. Adjust squelch.

3. Transmit a message clearly using proper procedure and language.

- ☐ Messages should be transmitted in normal, concise language in 30 seconds or less.

THE FOLLOWING TWO TASKS MAY NOT BE OBSERVABLE. IF NOT, THE STUDENT MAY ANSWER ORALLY OR IN WRITING.

4. Demonstrate what to do to improve radio reception and/or transmission.

☐ If a message is broken up, a change in location may be needed in order to receive or transmit.

A message may be broken up if:
- An obstacle stands between the transmitter and receiver.
- You are in a low spot.
- A direct line of sight is absent between two radios that are not using a repeater.

5. Demonstrate precautions needed to protect the radio from damage.

☐ Keep the radio in its carrying case when not in use; protect from dust, moisture, fire retardant, excess vibration, dropping, extreme heat, etc.

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 11- Mopup and Securing the Fireline

TIME: 1½ to 2 hours

TESTING METHODS: Performance evaluation and optional written examination

TRAINING AIDS: "Minimum Impact Suppression Tactics" video, commonly used hand tools and equipment, water source, and flagging tape, flipchart or white board and writing utensils, Fireline Handbook

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Describe and demonstrate how to extinguish burning materials by chopping, scraping, and mixing them with soil and water.

2. Describe precautions to take when applying water to hot materials and demonstrate proper techniques for doing so.

3. Describe a systematic method of mopup and give two reasons for using this method.

4. Describe how four of the senses aid in detecting burning materials.

5. Discuss the importance of breaking up and dispersing machine piles and berms adjacent to the control line.

6. Demonstrate the technique of cold trailing on a simulated fire perimeter.

7. State three factors that determine the amount of additional work required for a water or retardant line.

8. Given a constructed control line, strengthen the line to facilitate holding by rearranging and fireproofing fuels adjacent to the line.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS.	11-01-S130-EP thru 11-04-S130-EP
INSTRUCTOR SHOULD ADVISE STUDENTS THEY WILL BE REQUIRED TO PASS A PERFORMANCE EVALUATION AND A QUIZ (OPTIONAL) ADMINISTERED IN THIS UNIT. SUCCESSFUL COMPLETION OF THIS UNIT REQUIRES 100% CORRECT PERFORMANCE AND A SCORE OF AT LEAST 45 OF 65 POINTS (70%) ON THE UNIT QUIZ (IF INSTRUCTOR CHOOSES TO GRADE THE QUIZ).	
A STUDENT FAILING THE PERFORMANCE EVALUATION AND WRITTEN QUIZ (OPTIONAL) WILL NEED ADDITIONAL TRAINING AND TESTING UNTIL PROPER PERFORMANCE IS ACHIEVED.	
I. INTRODUCTION	
Once a control line has been established around the fire perimeter, the line must be made safe. This action is called securing the control line. Mopup methods must be used to secure the control line. To some extent, mopup should already have begun as the control line was being constructed to provide a more effective control line.	
Mopup is one of the most important phases of fire suppression because any remaining burning debris may rekindle the fire making previous action ineffective.	
Mopup is difficult, dirty, and tiresome. It lacks the excitement of initial control action and it usually starts after a long shift of initial control activity and in the dark. However, this important task may be filled with	

OUTLINE	AIDS & CUES
the safety hazards that exist in initial control action and require use of all personal protective equipment, especially eye protection. <u>Note:</u> One of the four common denominators present on the majority of the tragedy or near miss fires is: most of the fires appeared to be out before the "flare-ups" or problem fire behavior occurred. In some cases, tragedies have occurred in the mopup stage.	FHB (inside front cover)
II. MINIMUM IMPACT SUPPRESSION TACTICS **SHOW MIST VIDEO. INSTRUCTOR SHOULD FOLLOW UP VIDEO WITH A BRIEF DISCUSSION ON HOW MIST AFFECTS THE JOB OF THE BASIC FIREFIGHTER.**	Minimum Impact Suppression Tactics Video
III. METHODS OF MOPUP There are two types of mopup: dry and wet. Both involve separating burning and unburned materials, extinguishing the fire and/or removing burning material along or near the control line according to agency specifications. Hand tools are used for mopup in the following ways: • Scraping • Digging • Stirring • Mixing • Separating • Turning logs and other heavy materials	

OUTLINE	AIDS & CUES
A. Dry Mopup	
Dry mopup is performed using tools with no water, retardant, or other wetting agent. The burning materials are extinguished by using soil and hand tools, or by moving the burning material into the burn area and piling to allow material to burn itself out (follow agency procedures and guidelines).	
1. Boneyarding or bone piling	11-05-S130-EP
a. In an area that has many small limbs and logs not burning, the material can be checked by hand, and then placed in an area inside the burned area that has been checked and is cool.	
b. Safety concerns: picking up hot materials, missing hot areas, and getting a rekindle in a bone pile.	
2. Chunking and piling	11-06-S130-EP
a. In certain cases it is best to allow the material to completely burn itself out, i.e., when in areas where escape is unlikely, in minimum impact areas, or areas where visual impact is a concern.	
b. Safety concerns: open fire for an extended time, spotting potential, handling of burning material.	

OUTLINE	AIDS & CUES
3. Spreading of heavy concentrations of materials near control line or inside burned area to aid in mopup.	
a. A change in fuel arrangement can lower fire intensity and aid in mopup.	
b. Safety concerns: handling of burning fuels, rolling material, potential for flying embers.	
4. Banked fuels - fuels temporarily covered to cool or to protect them from becoming ignited:	
a. Must be uncovered, checked and hot spots scraped out.	
b. Must be marked and included in a briefing for the next operational period.	
c. Safety concerns: smoldering fuels overlooked might cause an ash pit.	
5. Turn logs and material that might roll perpendicular to slope and place a cup trench below it.	11-07-S130-EP
B. Wet Mopup	11-08-S130-EP
Separating and exposing burning materials using hand tools. The burning materials are then extinguished with water or a combination of water and soil.	

OUTLINE	AIDS & CUES
1. Apply water in a fine spray (conserves water and is most effective).	11-09-S130-EP
2. Apply from control line inwards, towards the inside of the burned area.	
3. Apply from the outside of a hot area inward to the center.	
4. Use a straight stream to penetrate or reach a target (i.e., begin at base of tree and work up to the top).	
5. Spray, stir, and spray. Repeat as necessary.	
6. Consider the use of foam or other wetting agent (some environmental concerns).	11-10-S130-EP 11-01-S130-IR SW p. 11.9
7. The use of hand tools is a must for effective mopup.	
8. Hay bales or other concentrations of fuel must be torn apart, sprayed, and spread out for complete mopup.	
C. Safety	
HAVE STUDENTS RECALL INFORMATION PRESENTED IN PREVIOUS UNITS ON SAFETY.	
1. Hazards in the general area include:	11-11-S130-EP
a. Overhanging/leaning trees	11-12-S130-EP

OUTLINE	AIDS & CUES
b. Snags	
c. Broken branches, tree tops, and large loose pieces of bark attached to snags or on the ground	
d. Trees with roots burned away	
e. Trees caught in other trees	
f. Rolling material on steep slopes	
g. Weather	
h. Bees, hornets	
2. Hazards associated with water use include:	
a. Rock and dirt particles, ash, charcoal and mud being blown back when spraying hot rocks, white ash or fire pits, steam from putting water on a hot stump hole.	
b. Slippery footing.	
c. Extensive hose lays.	
d. Potentially spraying others.	
Adjust nozzle from stream to a spray before applying in the direction of other workers.	
3. Always wear personal protective equipment with emphasis on eye protection and fire shelter.	

OUTLINE	AIDS & CUES
INVOLVE THE STUDENTS IN A DISCUSSION ON THE HAZARDS OF APPLYING WATER TO HOT MATERIALS. EMPHASIZE APPROPRIATE WATER USE INCLUDING FINE SPRAY WHEN WATER IS SCARCE.	
IV. SYSTEMATIC MOPUP	
On small fires where adequate resources are available, all burning materials should be extinguished. Fire size or quantity of burning materials may be so large that this is impractical. In this case, systematic/partial or systematic/total mopup must be used. Mopup specifications are found in the Incident Action Plan.	
Process for applying systematic mopup:	11-13-S130-EP
• Start with the hottest area and progress to the coolest.	
• Plan a beginning and an ending point. Keep to the plan and work methodically.	
• Work inward from the control line.	
• Examine the entire assigned area.	
• Make sure instructions are clear. Ask questions.	
• For large burns and/or complicated situations some type of grid (block) system should be implemented. Set priorities and number each block.	

OUTLINE	AIDS & CUES
USE LOCAL EXAMPLES TO MAKE THIS POINT, IF APPLICABLE.	
Example: Frequently, bog fires cover large areas and require complicated mopup with a systematic plan of action. Such a plan should identify priorities and specific assignments. The plan might call for installing a sprinkler system to temporarily contain a hot section, while at the same time flooding another area for 100% mopup. This flooding would probably be done on a block by block basis.	
V. USING FOUR OF THE SENSES TO DETECT HOT MATERIALS	
Hot materials must be found before they can be extinguished.	
A. Sight - look for:	11-14-S130-EP
1. Smoke. Look up as well as down. A treetop may be on fire.	
2. Heat waves.	
3. White ash. White ash indicates great heat; the ash may be covering hot embers.	
4. Stump holes. Care should be exercised around stump holes so that you do not collapse the edge and step into a very hot hole and steam scald your foot.	
5. Steam.	
6. Gnats. They often hover over hot spots.	

OUTLINE	AIDS & CUES
B. Touch	11-15-S130-EP
1. Do not wear gloves. Take care, do not burn yourself.	
2. At first, feel with the back of your hand about 1 inch away, then carefully with direct contact.	
C. Smell	11-16-S130-EP
1. Smoke. Learn the difference between live and old smoke.	
2. Burning materials and the gases that these materials give off.	
D. Hearing - listen for the:	11-17-S130-EP
1. Crack and pop of burning material.	
2. Hiss of water as it hits hot materials.	
VI. COVERED FUELS	
A. Machine Piles	11-18-S130-EP
Dozer piles, pushups, or berms may result when equipment is used to build control line. These must be broken up, dispersed, and all burning materials extinguished. If not, any burning materials within the piles can smolder and later rekindle the fire. This can also be the result of large cup trenches on steep slopes constructed by hand crews.	

OUTLINE	AIDS & CUES
1. Break up and disperse.	
a. Separate fuels and dirt by hand or by machine.	
b. Remove all unburned fuels and throw outside the control line. Scatter fuels - do not make piles near the line.	
c. Remove all burning fuels and throw inside the control line. Either make piles to burn up or scatter fuels to dissipate heat.	
d. Cool all hot material in the pile.	
e. Extinguish any burning fuels.	
2. Hazards in the machine piles include:	
a. Spring poles. Branches or trees under tension as a result of piling.	
b. Unstable footing.	
c. Stepping into hidden hot pockets of coals.	
d. Reduced recognition of hazards and reduced visibility during night operations.	
e. Falling berm and logs.	
f. Crew fatigue.	

OUTLINE	AIDS & CUES
B. Ground Fuels, including:	11-19-S130-EP
1. Coal seams	
• Dig out all burning material, spread out, extinguish all hot spots. • Heavy equipment may be necessary to mop up. • Care must be exercised as not to fall into ash pits.	
2. Peat	
• Bogs	
3. Heavy duff layers in timber	
4. Natural fuel accumulations	
• Wind, insect or disease damaged down timber.	
VII. OTHER AIDS TO ASSIST THE MOPUP PROCEDURE	
A. Infrared Imagery – Aircraft	
• FLIR - Forward looking infrared • FLAME • Phoenix	
B. Infrared Devices (heat detectors) – Handheld	
• Probeye • Thermal scanner • Xedar • Palm IR	

OUTLINE	AIDS & CUES
VIII. STRENGTHENING THE CONTROL LINE	
A. Rearranging Fuel	11-20-S130-EP
1. Limb up trees or eliminate ladder fuels.	
2. Fell snags inside and outside the control line that may pose a danger to the security of the control line or to the safety of fire suppression personnel.	
3. Fell brush and trees that pose a threat to the security of the fireline (inside and outside the control line).	
4. Break open stumps, remove burning materials and extinguish them.	
5. Dig out and remove burning materials from underground roots and extinguish.	
6. Scatter all cut fuels.	
7. Throw all burned and/or charred materials well back into the burn, and/or extinguish the materials.	
8. Scrape duff and other materials into the burn and scatter them.	
B. Trenches	11-21 -S130-EP
Be sure that trenches and/or underslung lines are deep and high and composed solely of mineral soil to insure that no burning material can cross.	

OUTLINE	AIDS & CUES
C. Waterbars	11-22-S130-EP
During mopup, construct or improve existing waterbars according to the specifications in the Incident Action Plan, to reduce erosion.	
IX. FOLLOW UP OF A WET LINE, RETARDANT LINE, OR TREATED AREA	
A. Deficiencies that may occur	
1. Not all fuels in a treated area may be coated.	
2. Skips in application of water or retardant occur.	
3. Evaporation has dried out fuels since application.	
B. Action	
1. Assess the nature of the fuels inside and outside the treated area for:	
• Arrangement • Continuity • Compactness • Loading	
2. Assess the fire activity threatening the treated area for:	
• Smoldering • Creeping • Running	

OUTLINE	AIDS & CUES
• Spotting • Crowning 3. Assess the chances for later burn through the treated area. Look for: a. Parched and/or scorched but unburned fuels near the area. b. Fuels not fully burned out near the treated area. 4. Reinforce the treated area by: a. Constructing a fireline. b. Limbing up nearby trees and brush. c. Fireproofing fuels on the outside of the control line. d. Dropping snags. 5. If safe and practical, burn out areas of unburned fuel near the treated area to prevent a possible slopover or reburn later. X. APPLICATION/EVALUATION **INSTRUCTOR SHOULD DEMONSTRATE THE FOLLOWING TECHNIQUES AND HAVE THE STUDENTS PRACTICE THEM. PRACTICE AND CRITIQUE THESE PROCEDURES UNTIL EACH STUDENT CAN SUCCESSFULLY PERFORM EACH TECHNIQUE.**	

OUTLINE	AIDS & CUES
1. HAVE EACH STUDENT DEMONSTRATE THE FOLLOWING MOPUP TECHNIQUES	
A. Dry Mopup	
• Utilization of hand tools for chopping, scraping, separating burning materials.	
• Mixing burning materials with soil.	
• Use of senses to detect burning materials.	
• Rearranging of fuels adjacent to the control line to facilitate holding the fire.	
B. Wet Mopup	
• Utilization of hand tools for chopping, scraping, separating burning materials.	
• Safe application of water to burning materials.	
• Use of the senses to detect burning materials.	
• Rearranging of fuels adjacent to the control line to facilitate holding of the fire.	
2. HAVE THE STUDENT DEMONSTRATE THE TECHNIQUES FOR COLD TRAILING A FIRE.	
3. IF POSSIBLE SET UP A SIMULATION ALLOWING THE STUDENTS TO DEMONSTRATE THE FOLLOW UP PROCEDURES FOR WETLINE, RETARDANT LINE, OR TREATED AREA.	

OUTLINE	AIDS & CUES
THERE MAY BE AN OPPORTUNITY TO COMBINE THIS EXERCISE/SIMULATION WITH THE APPLICATION EXERCISE/SIMULATION IN UNIT 9 - SUPPRESSION.	
OPTIONAL: **INSTRUCTOR SHOULD ADMINISTER UNIT QUIZ. AFTER COMPLETION, GRADE QUIZZES AND THEN REVIEW ANSWERS WITH STUDENTS.**	11-02-S130-IR SW p. 11.11 thru 11.12
REVIEW UNIT OBJECTIVES.	11-23-S130-EP thru 11-25-S130-EP

Types of Class A Foam

Expansion
1:1

20:1

Foam Solution
- A clear to milky fluid
- lacks bubble structure
- mostly water

Wet Foam
- Watery
- Large to small bubbles
- Lacks body
- Fast drain times

Fluid Foam
- Similar to watery shaving cream
- Medium to small bubbles
- Flows easily
- Moderate drain times

Dry Foam
- Similar to shaving cream
- Medium to small bubbles
- Mostly air
- Clings to vertical surfaces
- Slow drain times

Drainage
Rapid

Slow

FIREFIGHTER TRAINING, S-130
UNIT 11 - MOPUP AND SECURING THE FIRELINE

UNIT QUIZ WITH ANSWERS
(65 Total Points)

A minimum score of 45 is required for a passing grade.

1. Which four senses aid in the detection of burning materials? How? (12 points)

   - **Sight - See smoke, heat waves, white ash, stump holes, steam, gnats.**
   - **Touch - Feel heat with back of hand first.**
   - **Smell - Detect smoke or gases from fire.**
   - **Hearing - Listen for crackling and popping sounds in smoldering fire, and hissing when water hits hot materials.**

2. Describe five precautions or techniques used to safely apply water to hot materials. (10 points)

   - **Wear eye protection to prevent ashes, embers, mud, steam and debris from injuring eyes.**
   - **Direct and apply water from the control line to the inside of the burn.**
   - **Apply water from the outside to the center of a hot area.**
   - **Apply water from the base to the top of burning fuel.**
   - **Choose nozzle setting appropriate to the situation.**
   - **Use hand tools in conjunction with applying water.**

3. Why is it important to break up and disperse machine piles adjacent to the fireline? (3 points)

   Fire may smolder in fuels covered with soil and rekindle later.

4. Describe a systematic method of mopup. (10 points)

- **Start along the control line.**
- **Progress inward from the control line.**
- **Examine entire assigned area.**
- **Use a grid method for extensive mopup.**
- **Identify flood method of mopup: Sprinkler pipes–irrigation system or volume flooding.**

5. Describe the technique of cold trailing on a simulated fire perimeter. (4 points)

Uses sense of touch to detect any burning materials. If burning materials exist, extinguish.

6. Describe what to do when using the following two methods to strengthen the control line. (8 points)

a. Rearrange fuels adjacent to a control line to facilitate holding the fire.

- **Turn logs and secure to prevent them from rolling across fireline.**
- **Scatter fuel accumulations.**
- **Fell trees and brush near control line.**
- **Identify snags that need felling.**

b. Fireproof fuels adjacent to a control line to facilitate holding the line.

- **Cover logs and stumps with soil, rocks, water, or retardant.**
- **Limb up standing trees and brush.**

7. Describe the proper follow up procedures for a wet line, retardant line, or treated area. (10 points)

- **Assess the nature of the fuels inside and outside the treated area.**
- **Assess the fire activity threatening the treated area.**
- **Assess the chances of a later fire in the treated area.**
- **Reinforce the treated area.**
- **Cold trail the treated area.**
- **If safe and practical, burnout where necessary.**

8. Describe the method to extinguish burning materials without the use of water. (4 points)

By chopping and scraping, separate burning materials from non-burning materials and then extinguish by mixing with soil.

9. Describe the method for wet mopup. (4 points)

Burning materials are separated and exposed using hand tools. Burning materials are then extinguished with water or a combination of water and soil.

DETAILED LESSON OUTLINE

COURSE:	Firefighter Training, S-130
UNIT:	12 - Fire Exercise
TIME:	5½ hours
TESTING METHOD:	Performance evaluation
TRAINING AIDS:	Handtools, engines, hose, fittings, radios, flagging, PPE, vehicles, backpack pumps, firing devices, Incident Response Pocket Guide
OBJECTIVES:	Upon completion of this unit, when given a live fire or simulated (flag) fire exercise, the students will be able to:

1. Demonstrate proper travel procedures en route to and from a fire.

2. Demonstrate proper use, handling, and maintenance of handtools.

3. Construct progressive and leap frog handline.

4. Construct simple and progressive hoselays.

5. Use escape routes to promptly retreat to a safety zone.

6. Participate in an “after action review.”

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS.	
DUE TO THE FIELD DESIGN OF THIS UNIT THERE ARE NO POWERPOINT SLIDES.	
INSTRUCTORS WILL HAVE TO ESTABLISH CONDITIONS MOST NEARLY REPRESENTING AN ACTUAL FIRE SITUATION FOR THIS EXERCISE. STUDENTS WILL CONSTRUCT LINE AND LAY HOSE TO CONTAIN THE FIRE. INSTRUCTORS MUST TRY TO MAKE THE EXERCISE AS REALISTIC AS POSSIBLE.	
REFER TO SAMPLE FIELD EXERCISE.	12-01-S130-IR
SUGGESTED TIPS FOR A FLAG FIRE EXERCISE:	
• **SIMULATE A DYNAMIC FIRE ENVIRONMENT BY FREQUENTLY MOVING THE PERIMETER FLAGS TO INCREASE FIRE GROWTH.**	
• **USE PRE-IDENTIFIED COLORED FLAGGING TO REPRESENT SPOT FIRES. PLACE SPOT FIRES OUT IN THE GREEN PRIOR TO THE EXERCISE AND TAKE ADVANTAGE OF LIKELY AREAS WHERE SPOT FIRES WILL OCCUR.**	
• **TAKE ADVANTAGE OF STUDENT MISTAKES (E.G., INCOMPLETE LINE CONSTRUCTION, POOR TRENCHING, ETC.) TO SIMULATE SLOPOVERS.**	

OUTLINE	AIDS & CUES
<u>IT IS THE RESPONSIBILITY OF EACH LEAD INSTRUCTOR TO TAILOR THIS EXERCISE TO MEET THE NEEDS OF THE LOCAL CHARACTERISTICS FOR THEIR PARTICULAR AREA.</u>	
THIS EXERCISE SHOULD INCORPORATE THE BASICS OF FIREFIGHTING AND SHOULD INCLUDE AS MUCH OF THE FOLLOWING AS POSSIBLE:	
• Students receiving a briefing	
• Foot travel procedures (hiking in a line, maintaining safe spacing, etc.)	
• Communicating fireline commands (e.g., - bump, take more, take less, hold and improve, lick and go, reverse tool order, etc.)	
• Maintaining situation awareness and managing risk	
• Calling out hazards	
• Maintaining good communication	
• Using the chain of command	
• Tool inspection and maintenance	
• Method of attack	
• Progressive and leap frog line construction	
• Trenching	

OUTLINE	AIDS & CUES
• Spot fire teams and gridding the green for spot fires	
• Spot fire protocol (i.e., - containing, securing, mopping up, and flagging)	
• Slopover procedures	
• Hotspotting teams	
• Patrolling	
• Cold trailing	
• Securing perimeter after containment	
• Mopup - dry and wet	
• Allowing students to use all the handtools	
• Simple and progressive hoselays and engine use	
• Field discussion and identification of anchor points, escape routes, and safety zones	
• Accident and injury procedures	
• Retardant and water drop procedures	
• Dozer procedures	
• Radio use	
• Practice retreating to a safety zone	
• Shelter deployment practice in the field	
• After action review	

OUTLINE	AIDS & CUES
EACH STUDENT MUST BE EVALUATED ON TOOL USE, HOSELAYS, AND OTHER BASIC FIREFIGHTING TASKS. STUDENTS SHOULD BE CORRECTED ON-THE-SPOT AS NECESSARY. AT THE END OF THE EXERCISE, STUDENTS SHOULD BE ABLE TO SHOW BEGINNING PROFICIENCY IN ALL THE TASKS THE INSTRUCTORS FEEL ARE IMPORTANT. **IT WILL BE NECESSARY TO USE MORE THAN ONE FIELD INSTRUCTOR FOR THIS EXERCISE. THERE MUST BE ENOUGH QUALIFIED INSTRUCTORS TO ENSURE THAT EACH STUDENT IS ADEQUATELY EVALUATED. IT MAY BE NECESSARY TO BREAK THE STUDENTS INTO INDIVIDUAL SQUADS OR CREWS, WITH INSTRUCTORS FILLING SUPERVISORY ROLES.** **REVIEW UNIT OBJECTIVES.**	

SAMPLE

S-130 Final Field Exercise

Sequential order of events

1. Foot travel from classroom to exercise site.
2. Fire briefing/verbal confirmation to see if everyone's pack is fire ready.
3. Begin line construction, trench as necessary.
4. 1st reverse tool order.
5. Squad rotations - spot patrol/protocol; hotspotting; patrolling.
6. 1st set of slopovers/spot fires.
7. 2nd reverse tool order.
8. Retardant drop.
9. 2nd set of slopovers/spot fires.
10. Tie fire in.
11. Hoselay.
12. 3rd reverse tool order/fire shelter deployment.
13. Tool sharpening.
14. After action review.

Additional items to try and incorporate throughout the exercise:

1. Incorporate use of the Incident Pocket Response Guide.

2. Communication and passing commands/hazards up and down the line.

3. Adhering to the chain of command.

4. Maintaining situation awareness and managing risk.

5. Discussion of LCES, 10/18, anchor points, etc.

6. Leap frogging during the slopover exercises.

REMEMBER:

****This is just an introduction class.**

****We cannot teach them everything there is to know in one afternoon.**

****Any experience the students get will be beneficial.**

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 13 - Hazardous Material Awareness

TIME: 2 hours

TRAINING AIDS: Incident Response Pocket Guide, "First on the Scene" video (optional), "Hazardous Material" video (optional)

REFERENCES: Hazardous Materials Chart - DOT Chart 11, DOT Emergency Response Guidebook

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Develop a working definition of hazardous materials.

2. Explain the general guidelines when reacting to a possible hazardous materials emergency.

3. List and explain the six steps in the D.E.C.I.D.E. process.

4. List and explain the six clues for detecting the presence of hazardous materials.

OUTLINE	AIDS & CUES
AT THE INSTRUCTOR'S DISCRETION, THE MATERIAL IN THIS UNIT MAY BE UTILIZED TO SUPPLEMENT LOCAL AGENCY HAZMAT TRAINING . THIS MAY REDUCE THE ACTUAL TIME NEEDED TO PRESENT THIS UNIT.	
IF THE TRAINING COURSE IS BEING PRESENTED IN A CLASSROOM SETTING AND A VIDEO PLAYBACK UNIT IS AVAILABLE, THE FIRST ON THE SCENE AND HAZARDOUS MATERIALS VIDEOS MAY BE USED IN PLACE OF A LECTURE. THE VIDEOS MAY ALSO BE USED TO ENHANCE THE UNIT AS SUPPLEMENTAL MATERIAL IN CONJUNCTION WITH LECTURE.	Hazardous Materials Video First on the Scene Video
PRESENT UNIT OBJECTIVES AND DISCUSS.	13-01-S130-EP 13-02-S130-EP
I. INTRODUCTION	
This unit is designed to enable the student to better assess the hazardous materials threat to people, property, and systems through awareness and how to make a decision as to the type of incident the firefighter has encountered.	
A. Definition of Hazardous Material	
What do the words " hazardous material" mean to you?	
DEVELOP A GENERAL WORKING DEFINITION OF HAZARDOUS MATERIALS FROM STUDENT ANSWERS.	

OUTLINE	AIDS & CUES
• Hazardous Materials: A single material or a combination of several materials that may produce serious health, fire or explosive hazards.	13-03-S130-EP
NOTE: The Chemical Abstract Services lists over 6 million unique substances, only 75% of which are mentioned in hazardous material literature. Of the remaining unique substances, some 50,000 to 60,000 are thought of as being hazardous in some manner.	
To complicate matters, these hazardous materials are known by 183,000 different names, yet the Department of Transportation (DOT) lists only 2400 hazardous material substances.	
B. Their Role in Our Lives	
Hazardous materials:	
• Are used daily.	
• Help preserve food.	
• Produce fiber in our clothes and furniture.	
• Power our car and heat our homes.	
• Are used in medical treatment.	
• Purify our drinking water and treat our sewage.	

OUTLINE	AIDS & CUES
C. Exposure to Hazardous Material	
1. In the event you encounter a hazardous material incident you must ask the following questions:	
• Am I properly trained to handle the situation?	
• Will my action create undo risk to myself or others?	
• Will my involvement favorably change the outcome?	
Involvement of untrained personnel may complicate an already critical situation.	
2. Knowledge is necessary to protect fellow workers, yourself and the surrounding community and environment.	
3. Ability to recognize and identify hazardous materials will help you become part of solutions, not part of the problem.	
4. The problem must be analyzed. Set goals and objectives to minimize the potential harm associated with the release of hazardous materials.	
II. GENERAL GUIDELINES WHEN REACTING TO A POSSIBLE HAZARDOUS MATERIALS EMERGENCY	IRPG (Yellow - All Risk)

OUTLINE	AIDS & CUES
NOTE: Check with your local agency for specific agency guidelines/regulations when suspecting a hazardous materials emergency.	
A. Isolate or Deny Entry	
Without entering the immediate hazard area, do what you can to isolate the area and assure the safety of people and the environment. Move and keep people away from the scene and the perimeter. Allow room enough to move and remove your own equipment.	
B. Identify the Hazards	
1. Placards, container labels, shipping papers and/or knowledgeable persons on the scene are valuable information sources. Evaluate all of them and then consult the recommended guide page (Emergency Response Guidebook) before you place yourself or others at risk.	Emergency Response Guidebook
WALK STUDENTS THROUGH THE GUIDEBOOK.	
2. DOT Emergency Response Guidebook	
a. Designed to assist you in determining what materials may be present and provide a guide on information on the hazard.	
b. Guide sections include:	
• White pages - Basic placards/ colors.	

OUTLINE	AIDS & CUES
• Yellow pages - List hazardous materials by consecutive identification (ID) number.	13-04-S130-EP
• Blue pages - List hazardous materials alphabetically.	13-05-S130-EP
• Orange pages - Give specific information on the hazards associated with the identified chemical.	13-06-S130-EP
• Green pages - Identify evacuation distances and water reactive materials which produce toxic gases upon contact with water.	13-07-S130-EP 13-08-S130-EP
C. Approach Cautiously	
Resist the urge to rush in; you cannot help others until you know what you are facing.	
Approach, upwind, upgrade, upstream.	
D. Obtain Help	
Advise dispatch of the situation. Have them notify and call for assistance from trained experts. (CHEMTREC and the National Response Center).	
Information needed:	
• Location of material	

OUTLINE	AIDS & CUES
• What the material is	
• Amount of material	
• Potential exposures and hazards (targets downwind, persons exposed, safety hazards).	
E. Decide on Site Entry	
Any effort to rescue persons, protect property or environment must be weighed against the possibility of you becoming part of the problem. Enter the area with the appropriate protective equipment.	
Above All do not walk into or touch spilled materials. Avoid inhalation of fumes, smoke and vapors, even if no hazardous materials are known to be involved. Do not assume that gases or vapors are harmless because of lack of a smell (odorless gases or vapors may be harmful).	
III. D.E.C.I.D.E.	
HAND OUT A CLUES AND DECIDE WALLET CARD AND A DO'S AND DON'TS OF HAZMAT CARD TO EACH STUDENT.	Clues and DECIDE wallet card Do's and Don'ts of HazMat card
Once you become aware of a hazardous situation you are faced with a series of decisions that should focus on reducing the harm that could occur.	
The following steps provide a guide for making these decisions.	

OUTLINE	AIDS & CUES
A. Detect Hazardous Materials Present	
Look for clues in the following order:	
1. Occupancy/Location	
2. Container shapes	
3. Markings and colors	
4. Placards and labels	
5. Shipping papers	
6. Your senses - could be deadly	
IF YOU CAN SMELL IT - YOU ARE TOO CLOSE!	
B. Estimate Likely Harm - determine extent of problem; predict the behavior of the material.	
C. Choose Response Objective	
1. Stay away from area of concern.	
2. Notify authorities.	
3. Keep others out of suspected area.	
"IF YOU DON'T KNOW, DON'T GO, IT MIGHT BLOW!"	

OUTLINE	AIDS & CUES
D. Identify Action Options	
1. Notify authorities. Evacuate areas down-wind.	
2. Secure area.	
3. Withdraw immediately.	
E. Do Best Option	
1. Observe the effect of your decision.	
2. Follow-up, making sure your action decisions are working.	
3. Feedback from:	
• Residents	
• Fellow workers/crewmembers	
• Dispatch center	
F. Evaluate Your Progress	
1. Use agency policy to determine whom to call.	
2. Know your community hazardous materials authority.	

OUTLINE	AIDS & CUES
IV. APPLICATION	
USING THE PLACARD SLIDE OR INSTRUCTOR REFERENCE PAGE, HAVE STUDENTS REFERENCE THE EMERGENCY RESPONSE GUIDEBOOK TO DETERMINE:	13-09-S130-EP 13-01-S130-IR SW p. 13.5
1. WHAT THE MATERIAL IS (YELLOW SECTION) ***1219, ISOPROPYL ALCOHOL***	
2. WHAT CLASS IT IS IN (WHITE SECTION) ***3 - FLAMMABLE LIQUID***	
3. WHAT THE POTENTIAL HAZARDS MIGHT BE (ORANGE SECTION) ***GUIDE 129***	
REVIEW UNIT OBJECTIVES.	13-10-S130-EP

Hazardous Material Placard

13-01-S130-IR

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 14 - Wildland/Urban Interface Safety

TIME: 1 hour

TRAINING AIDS: Flipchart or white board, writing utensils, Incident Response Pocket Guide

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Identify the wildland/urban interface watch out situations.
2. Identify personnel safety concerns in wildland/urban interface fires.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS.	14-01-S130-EP 14-02-S130-EP
INSTRUCTOR SHOULD RELATE INTERFACE EXPERIENCES THROUGHOUT THIS UNIT TO REINFORCE THE LECTURE.	
I. INTRODUCTION	
Wildland/urban interface - the "zone where human-made improvements intermix with wildland fuels."	
Improvements can range from expensive homes to declining outbuildings. As more and more people move into rural interface areas, wildfires are threatening and destroying structures each fire season at an alarming rate.	

OUTLINE	AIDS & CUES
This has resulted in:	
• Firefighters being placed in unfamiliar positions for which they are not properly trained or equipped.	
• An increased exposure to hazardous materials.	
• Dramatic shifts in the focus of wildland fire suppression strategies and tactics.	
With continuing firefighting activities in the wildland/ urban interface, wildland firefighters must maintain awareness of this hazardous fire environment in which they are increasingly being involved.	
Three categories of tactical plans in the interface:	14-03-S130-EP
A. Defensive Mode	
Protect structures but make little direct effort to contain the wildland fire. This may be the only option, but firefighters should not get stuck in a defensive mode when other options are possible.	
B. Offensive Mode	
Control the wildland fire before it reaches the structures.	

OUTLINE	AIDS & CUES
C. Combined Mode Holding a portion of the wildland fire edge to reduce the number of structures threatened. Firing out from control lines at the structure perimeter or holding the fire at the structure or road may actually control a significant portion of the fire. **EMPHASIZE THE FOLLOWING CONCEPTS TO THE STUDENTS.** • Fire in the wildland/urban interface will nearly always dictate a shift in tactical priorities. • Firefighting in the wildland/urban interface presents many additional safety concerns on top of those normally found on wildland fires. • Structure defense is an unfamiliar role to many wildland firefighters. • Firefighters tend to place themselves at greater risk when battling wildland/urban interface fires in an effort to save homes. • Regardless of the values at risk, safety for life is most important and is adhered to by the use of the risk management process, Standard Firefighting Orders, Watch Out Situations, and applying LCES.	

OUTLINE	AIDS & CUES
INSTRUCTOR SHOULD MENTION TO THE STUDENTS THAT THERE IS AN ENTIRE COURSE, S-215, FIRE OPERATIONS IN THE URBAN INTERFACE DEDICATED TO THIS TOPIC.	
II. DISCUSSION OF THE WILDLAND/URBAN WATCH OUT SITUATIONS	
HAVE STUDENTS REFERENCE THE INCIDENT RESPONSE POCKET GUIDE FOR THE "WILDLAND/URBAN WATCH OUTS".	IRPG (Green - Operational)
A. Wooden Construction and Wood Shake Roofs	14-04-S130-EP
1. Easy targets for firebrands and burning fuel adjacent to structures.	
2. Typically not treated with flame-resistant compounds.	
3. Fireline intensity is frequently high enough where radiant heat can preheat the structure until it reaches combustion temperatures.	
4. Openings in buildings provide entry points for fire. Check eaves, roof, roof vents, and decks for smoldering or flames.	
5. Remove combustible furniture and objects from decks. Place them inside the structure.	
6. Do not remove anything from a burning, or at risk, structure because of legal constraints.	

OUTLINE	AIDS & CUES
7. Structure situations to avoid:	
a. Structure windows are bulging and the roof has not been vented. Hot gases exist in a closed environment within the structure, a sudden influx of oxygen can lead to a backdraft.	
b. Structure windows are black or smoked over which is an indication that the interior is burning.	
c. When more than 1/4 of the roof is directly involved in windy conditions, the situation is usually considered hopeless.	
B. Poor Access and Narrow Congested One-Way Roads	14-05-S130-EP
Problems associated with the use of roads in the wildland/urban interface:	
1. Traction can be compromised when road bed material is made of parent material or loose gravel, loosely compacted rock base material and sand, decomposed granite, and clay.	
These road beds can deteriorate creating road hazards: i.e., washouts, washboards and large potholes. Such hazards can delay egress and threaten your safety.	

OUTLINE	AIDS & CUES
2. Road width Narrow and winding roads become obscured during smoky conditions. Driving becomes dangerous because the driver is not able to see the edge of the road or oncoming traffic. A narrow road creates congestion by vehicles not being able to pass. This can be compounded when residents are trying to evacuate and large Type 1 Structural Engines are trying to get to the fire. A good safety practice is to secure the road by controlling traffic at each end with common communications. Many times this will be the responsibility of law enforcement agencies. 3. Position on slope Roads built in the middle or upper slopes are exposed to convective and radiant heat. These are often poor barriers to stop fire spread and hence a bad place to be located when a fire front passes. 4. Adjacent fuels Be aware of fuel characteristics such as: fuel types, fuel moisture, loading and arrangement along the roadway. When burning, these fuels could block your egress. However, some fuels may be an advantage for burning out along roads to secure a safety zone.	

OUTLINE	AIDS & CUES
5. Roads in the wildland/urban interface are often:	
a. Private roads with one way in and one way out.	
b. Less than 16 feet wide.	
c. Have a road grade between 10-20%.	
d. Dead end roads or cul-de-sacs.	
e. Have driveways that provide poor access and turn-arounds for fire vehicles. Do not allow vehicles to block an egress.	
f. Contain bridges or culverts that cannot support the weight of fire equipment such as an engine.	
C. Inadequate Water Supply	14-06-S130-EP
1. The amount of water available is always a critical factor. It must be constantly evaluated for flow and total amount available.	
2. The flow at hydrants can be interrupted or experience a serious decrease in pressure resulting from heavy use of fixed water supplies. Be especially wary during power outages which can occur at any time during interface fires.	

OUTLINE	AIDS & CUES
3. Do not waste water by wetting down roofs or ground fuels too far in advance of a fire front.	
4. Know your pump capacity and hose complement setup.	
5. Know the limits of your water supply, and top off your tank at every opportunity.	
6. A rule is to keep a reserve of 100 gallons in your tank for your own protection.	
D. Natural Fuels 30 Feet or Closer to Structures	14-07-S130-EP
Fuels that surround or are downslope of a structure present a situation where structure survivability is low and firefighter risk is high.	
1. Beware when there is no <u>defensible space</u> (an area large enough to safely defend a structure) around the structure and no safety zone for personnel. If you do not have the ability to establish a safety zone, your location should be re-evaluated.	
2. <u>Always</u> position engines and/or vehicles facing out the driveway for easy egress.	
3. Watch out for the common practice by residents of stacking highly flammable firewood next to structures. Pre-treat firewood with foam if possible and time allows.	

OUTLINE	AIDS & CUES
4. If time allows, remove fuel away from the structure with power and hand tools. Be aware that there may be times when residents try to stop firefighters from doing this.	
E. Extreme Fire Behavior	14-08-S130-EP
This behavior has been responsible for major losses of life and property within the wildland/ urban interface.	
1. Conditions contributing to extreme fire behavior development:	
a. Fuels are dry and plentiful.	
b. The atmosphere is either unstable or has been unstable for hours, and possibly days, prior to the fire.	
c. Topography is aligned with wind and aspect during the peak burning period.	
d. The eye level wind speed is greater than 15 miles per hour.	
Note: Dangerous and erratic fires have also burned at low wind speeds.	

OUTLINE	AIDS & CUES
2. Characteristics of extreme fire behavior are: a. High rates of spread. b. Crown fire development. c. Long and short distance spotting. d. Fire whirls. e. Intense burning. 3. Extreme fire behavior will create a complex and dangerous fire situation. Factors that create safety hazards and limit the effectiveness of firefighting resources are: a. Safe egress of personnel may be in jeopardy if conditions worsen. b. The risk of being overrun may be high. c. When winds become gusty and erratic, the use of air attack becomes null. d. When fire behavior is increasing before peak burning conditions have arrived.	

OUTLINE	AIDS & CUES
Firefighting efforts should be kept mobile and flexible. Resources should not be committed to a single water source. Do not allow other vehicles to block your escape routes. *Firefighters must know when it is time to pull back to a safety zone. If necessary, the inside of a structure can be used as a safety zone while the fire front passes.*	
F. Strong Winds	14-09-S130-EP
1. Increase rates of spread.	
a. The head and flanks will become more active.	
b. Both ground and aerial fuels may be involved resulting in crown fire development.	
c. Firebrands can be transported longer distances.	
2. The angle of the flame in relation to fuel is closer enhancing convective heat transfer.	
3. Increased air velocity supplies oxygen to fire which will increase fireline intensity.	
4. Create indrafts on one or both flanks or entire fire area.	

OUTLINE	AIDS & CUES
G. Evacuation of Public (Panic)	14-10-S130-EP
The basic reason for evacuation is to guarantee residents a safe and orderly egress from a fire threatened area, prior to the arrival of the fire front. This allows fire personnel to concentrate on fire operations and personal safety. Evacuation is usually handled by law enforcement agencies.	
1. Evacuation is controversial. Law enforcement agencies are disinclined to force residents to evacuate. During initial attack, minimal lead time creates more of a panic flight than an evacuation.	
2. During large fire scenarios with a command structure, contingency plans are prepared before evacuations. The Incident Management Team holds briefings about the fire situation for the general public.	
3. During evacuations be aware that many law enforcement personnel lack the training and personal protective equipment for firefighting. They should have common communications and may also have to evacuate themselves during extreme fire situations.	
H. Structures Located in Chimneys, Box or Narrow Canyons, Saddles, or on Steep Slopes (30% or more) in Flashy Fuels	14-11-S130-EP

OUTLINE	AIDS & CUES
Homes in these conditions have the lowest survivability and present the highest safety risk to firefighting personnel. Multiple Watch Out Situations may exist due to the nature of topography and the potential for erratic fire behavior. 1. Chimneys are a path of least resistance for heat, smoke, and lethal gases. 2. Box or narrow canyons a. Winds normally get channeled upslope in narrow canyons resulting in rapid rates of spread. b. Radiant heat transfer from one slope to another is great. Fire easily spots across the canyon. 3. Steep slopes in flashy fuels a. Accelerated rate of spread due to increased heat transfer through radiation and convection. b. Spot fires can out flank the main fire. c. Burning materials can roll downhill. 4. Personnel safety concerns a. Chances of entrapment are extremely high.	

OUTLINE	AIDS & CUES
b. Egress problems.	
c. Extreme fire behavior.	
d. Lack of good safety zones.	
e. Fire can make several runs at structures from different directions.	
I. Bridge Load Limits	14-12-S130-EP
1. Fire vehicles may exceed the weight limits of many rural bridges.	
2. Construction of bridges may be wooden beams and cross members, weakened by environmental conditions, age, or by the fire itself.	
3. Bridge width may not be adequate.	
III. WORKING AROUND POWER LINES	
EMPHASIZE TO THE STUDENTS THAT THERE HAVE BEEN NUMEROUS FATALITIES ASSOCIATED WITH POWERLINES.	
HAVE STUDENTS REFER TO THE POWERLINE SAFETY SECTION OF THE INCIDENT RESPONSE POCKET GUIDE.	IRPG (Green - Operational)
The following powerline safety issues are extremely important and must be adhered to:	
• Beware of water or liquids pooled or running along the surface. Liquids are good conductors of electricity.	

OUTLINE	AIDS & CUES
• Downed conductor (line) on vehicle: DON'T leave vehicle until power company arrives. If the vehicle is on fire or fire is near, jump clear, DON'T hang on, keep feet together and bunny hop away. • DON'T operate heavy equipment under powerlines. • DON'T use powerline rights-of-way as a jump or cargo drop spot. • DON'T drive under powerlines with long antennas. • DON'T fuel vehicles under powerlines. • DON'T stand near powerlines during retardant or helicopter bucket drops. • DON'T park under powerlines. • DON'T apply straight stream to powerlines. • DON'T go near or move downed lines. • DON'T stand or work in dense smoke near power lines. The potential for arcing is high. ***Always assume that all powerlines are charged.*** IV. HAZARDOUS MATERIAL All of these can be hazardous to your health by their flammability or toxicity of their fumes.	

OUTLINE	AIDS & CUES
A. Petroleum or Propane Tanks 1. Many rural home sites have liquefied petroleum gas (LPG) for heating. 2. Check all storage tanks for LPG and check for 30 foot clearance of vegetation around storage tanks. Clear vegetation if necessary and time allows. 3. Check outbuildings, barns for flammable liquid storage. B. Garages and sheds can contain many of the following: • Paint • Cleaning materials • Pesticides • Gas cans • Ammunition and explosives • Plastics and synthetic material • Vehicles C. Drug Labs, e.g., meth labs Can be very common in certain rural areas. D. Identify and mark all hazards with flagging or other warning devices. Post a lookout. Keep your supervisor informed of hazards. Avoid breathing hazardous fumes without proper protection at all costs.	

OUTLINE	AIDS & CUES
V. SUMMARY	
A. Structure Defense and Safety to Personnel and Equipment	
1. Consider the orientation and size and activity of the fire front as it moves toward the structure.	
2. Consider access and escape routes.	
3. Try to estimate the length of time an engine will be committed at one location. A rough guide is 10 to 15 minutes minimum commitment time.	
4. The vulnerability of a structure depends on the fire intensity and on the placement and construction of the structure itself.	
5. Building openings provide entry points for fire.	
6. After assessing the fire you should know:	
a. An estimated time before the fire hits.	
b. The distribution of structures.	
c. The number and vulnerability of structures.	
d. The estimated time that units will need to be committed to a site.	

OUTLINE	AIDS & CUES
e. Access and escape routes; potential problem areas.	
f. Which firefighting techniques will likely work (i.e., amount of prep work required, where to place hoselays, location of water sources, etc.).	
7. Have adequate communications with all agencies involved.	
8. Adhere to a command system; know who you are working for.	
9. Think about public evacuation if necessary.	
10. Follow your Standards for Survival.	
11. *Safety is of primary importance - life number one, property or natural resources number two.*	
B. Hopeless Situations	
1. Fire is making significant runs.	
2. Spot fires are igniting faster than they can be put out.	
3. Water supply is running out or is gone.	
4. Safety is in jeopardy, escape route is being cut off.	

OUTLINE	AIDS & CUES
5. More than 1/4 of the roof is involved in windy conditions.	
6. Interior rooms are involved, windows are broken in windy conditions, and other structures are threatened or involved.	
C. DOs and DON'Ts in Protecting Structures in the Interface	
1. DO wear full personal protective equipment.	
2. DO keep at least 100 gallons of water in reserve.	
3. DO have a protective line for personnel and vehicles.	
4. DO back vehicles in for quick egress.	
5. DO use 1-1/2 inch hose when possible.	
6. DO post lookouts as necessary.	
7. DON'T park in saddles or chimneys.	
8. DON'T enter burning buildings without proper training and equipment.	
REVIEW UNIT OBJECTIVES.	14-13-S130-EP

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 15 - Pump Operations (Optional)

TIME: 1 hour

TESTING METHODS: Performance evaluation

TRAINING AIDS: Incident Response Pocket Guide

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Identify the two common types of pumps.
2. Identify the responsibilities and personal protective equipment of the portable pump operator.
3. Demonstrate the proper setup and operation of a portable pump.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS. **DUE TO THE FIELD DESIGN OF THIS UNIT THERE ARE NO POWERPOINT SLIDES.** **SEE UNIT 7, P. 7.1 AND 7.2 FOR ADDITIONAL INFORMATION ON THE PRESENTATION OF THIS UNIT.** I. INTRODUCTION Prior to discussing portable pumps it is important to understand the power heads (engines) that supply the energy to the pump.	

OUTLINE	AIDS & CUES
Two basic types of engines • two-cycle • four-cycle Most portable pumps could be attached to either of the two engines. It is important to know what type of engine is powering the pump that you are operating since fuel and maintenance procedures differ between engines. II. TYPES OF PORTABLE PUMPS There are two commonly used pumps for wildland fire suppression. A. Positive Displacement Pumps 1. Rotary gear pump • Constructed of two shafts with impellers attached enclosed in an aluminum case. • The shafts have gears on the case end. • The lower shaft (drive shaft) is connected to the engine. • Both the gears and the impellers have very close tolerances allowing the pump to create a partial vacuum and vertically draft water 15-20 feet.	

OUTLINE	AIDS & CUES
• The partial vacuum and the pressure on the outside water source cause water to enter the case. • The teeth of the impellers force the water around and out. • Pressure relief valve in the system is required. • The discharge capacity is directly proportional to the number of revolutions of the pump per minute. • Water must be as clean as possible because any sand or dirt entering the chamber will damage the case and result in small passages that decrease the pump's airtight capacity. 2. Piston pump • Works on the same principle as a two-cycle engine. • Cylinder is taking in and discharging water instead of a combustion mixture and expelling exhaust gases. • Water is drawn into the cylinder as the piston starts its downward movement. • As the piston starts its upward movement the water is discharged.	

OUTLINE	AIDS & CUES
3. Advantages	
• Drafts water higher than a centrifugal pump–15-20'.	
• Higher pressures can usually be produced with less power.	
• Priming not required unless pump is worn.	
• Does not require a foot valve on the suction hose.	
4. Disadvantages	
• Pump cannot be started with head pressure; i.e., uphill hoselay.	
• Damaged by dirty water.	
• Relief valve required.	
• Fixed output and PSI not easily changed.	
• Refill performance is low.	
• Rarely field maintained.	
B. Centrifugal Pump	
1. Most commonly used pump in fire suppression.	

OUTLINE	AIDS & CUES
2. Consists of one to four devices called impellers. As these impellers spin on a shaft, they use gravity to force water from the center opening (suction) to the outside edge. As the impeller turns faster the force is created. It is not as effective as the positive displacement pump, thus the distance which a centrifugal pump can draft is shorter. The short arms, sometimes called vanes, inside the impeller are primarily responsible for direction and motion of water. As the water is thrown off the end of these arms, it is sent into an open cavity around the impeller and sucked down into the center of the next impeller and out through its arms.	
3. Advantages	
• Nozzle can be shut off for short periods while pump in running.	
• Pressure can be changed by adjusting R.P.M.	
• Relief valves not required, but recommended.	
• Dirty water and small particles can be passed without damage.	
• Refill performance good.	
• Less maintenance cost. Can often be field repaired.	

OUTLINE	AIDS & CUES
• Pump can be started with head pressure.	
4. Disadvantages	
• Should have a foot valve with a suction strainer.	
• More power required for higher pressures.	
• Priming usually required.	
• Cannot draft water as high as a positive displacement pump.	
• To avoid heating bypass required when no water is moved.	
REVIEW TYPES OF PUMPS WITH THE STUDENTS.	
III. DELIVERY SYSTEM FOR PORTABLE PUMPS	
A. Pacific Mark 3 Centrifugal Pump	
1. Two cycle engine, air cooled, mixed gas ½ pint per gallon. 16:1 ratio (unless specified otherwise by manufacturer guidelines.)	
2. 4-stage centrifugal pump	
3. Weight = 55 pounds; horse power = 8.5	

OUTLINE	AIDS & CUES
4. Maintenance • Fuel consumption approximately 1.2 gallons per hour. • Pump should be lubed after 30 hours of use. B. Wajax-Pacific/Halprin™ Wildfire Mark 3 Pump 1. Commonly called a Mark 3 pump. 2. Efficient and unit designed to meet the requirements of all fire control techniques. 3. Performance range makes it possible to use the pump for filling tanks and suppressing forest fires. 4. Suitable for rural and municipal fire protection or wherever a large volume of water is needed. 5. Two-cycle, single cylinder, 8.5 hp, rotex air-cooled engine. 6. Fuel must be mixed with oil (covered in detail later in the course). 7. The starter cord and handle is a spring-loaded rewind unit. In case of a rewind failure, remove outer case, put the rope on the crankshaft pulley and start the engine.	

OUTLINE	AIDS & CUES
8. Some pumps are equipped with a decompressor switch which releases pressure from the combustion chamber to make starting easier. Close it as soon as the engine starts to prevent damage to the engine.	
9. Use stop switch to shut off the engine after a cool down period, or in an emergency. Hold down until the engine has completely stopped.	
10. The air filter is located inside the metal shroud connecting to the carburetor.	
11. The choke lever is a flip type that closes the butterfly in the carburetor for a richer fuel mixture when starting a cold engine.	
12. The throttle control is labeled and should be set according to directions on the label.	
13. The automatic cutoff switch stops the engine and eliminates overspeeding when the pump runs out of water or loses prime. The reset rod on the automatic cutoff switch may not work if the throttle is set half way, as the engine RPM may not be high enough to trip the reset.	
14. The Mark 3 engine is coupled with a four-stage centrifugal pump.	
15. The fuel tank holds five gallons of mixed fuel and attaches to the pump engine using a quick connect fitting.	

OUTLINE	AIDS & CUES
IV. PACIFIC MARK 3 PUMP SUPPLEMENTAL INFORMATION	
A. Pump Parts Identification	
1. Starter	
• Mounted on the end of the pump.	
• Consists of the cord and handle, spring and clutch, and the housing.	
• When starting the pump do not extend the starter cord to full length or allow it to snap back to the returned position.	
2. Muffler	
• Located on the right side of the pump, when viewed from the pump end.	
• Muffles the engine noise, and serves as a spark arrestor.	
B. Motor Protection	
1. Equipped with an automatic cutoff switch that will stop the engine and prevent damage should overspeeding occur.	
2. Conditions that could cause the unit to shut down include:	
• Pump not fully primed	

OUTLINE	AIDS & CUES
• Leaking suction hose connections • Defective suction hose • Loose cap on primer opening • Foot valve leaking or not completely submerged • Air locks in the suction hose Do not attempt to restart the engine until the problem has been located and corrected. DO NOT, for any reason bypass the automatic cutoff switch. C. Ignition Checks To check the ignition spark: • Do not remove the spark plug wire while cranking or running the engine. This may increase the electrical load in the coil enough to short out the windings. • Remove the plug from the engine or use a spare plug. Attach the spark plug to the plug wire, ground the plug body to the cylinder head and then crank the engine. A spark across the normal spark plug gap will not damage the coil.	

OUTLINE	AIDS & CUES
V. PUMP STORAGE, CARE, AND MAINTENANCE	
A. Storage	
If the pump is to be out of service for an extended period of time or being removed from an incident, the following steps must be followed:	
1. Push the throttle control lever to the "stop" position. Let the engine idle for one minute.	
2. Disconnect the fuel line from the fuel tank, assuring an adequate cooling down time. Also, the fuel line will be empty at this time.	
3. Disconnect the fuel line from the engine fuel connect.	
4. Work the choke lever back and forth when the engine begins to sputter, eliminating all gas in the carburetor to keep it from suffering varnish buildup. This is a buildup of residue from old gas left in a carburetor over a long period of time.	
B. Care and Maintenance	
1. Cleanliness plays an important role in the efficient operation.	
2. Regular maintenance is a schedule of continuous systematic maintenance designed to prevent frequent or major	

OUTLINE	AIDS & CUES
breakdowns before they occur. Maintenance in a pump head should not be done on the fire line.	
3. Check your pump unit immediately after use so that it will be ready for the next fire.	
VI. ROLE OF THE PUMP OPERATOR	
The pump operator plays a key role in utilizing the components of a pump kit to properly set up a portable pump operation and maintain a constant water supply.	
A. Safety	
1. RADIO contact is a must.	
2. Have a warm coat.	
3. Hard hat and gloves.	
4. Ear plugs – do not stand too close.	
5. Watch your step around the pump and fuel line, and for wet footing.	
6. Watch for hot manifold and exhaust.	
7. Lighting for night should be rigged early.	
8. Do not wear loose clothing.	
9. Get prepared ahead of time.	
10. Know what equipment you are going to need.	

OUTLINE	AIDS & CUES
11. Store extra gas and equipment in a safe area.	
12. Do not go to sleep.	
B. Pump Kit Components	
1. The basic components for a pump kit needed to successfully pump water are:	
• Pump	
• Fuel can	
• Fuel supply line. Line should be compatible with the pump and fuel can. You must check to ensure that fuel line, tank, and pump match.	
2. Check the rest of your kit to ensure that you have the following:	
• A tool kit	
• Spare gaskets	
• Proper fuel for the type of engine that is operating your pump.	
• Suction hose and foot valve/strainer of the proper size for your pump.	

OUTLINE	AIDS & CUES
C. Pump Site Select pump site carefully. Choose a site that is relatively flat and on firm ground. The site should not be more than 2 to 3 feet above the surface of the water source. Scout the area to find the best site to set up causing the least environmental damage and still be a safe area. Set pump on a good firm base. This may need to be built out of small logs in sandy or muddy areas. Place a piece of plastic over the base, then set pump on the plastic. This will help keep mud and dirt out of the cooling fins and electrical system. If the pump must be placed on a slope, tie it down to prevent it from sliding down the slope or dig out a shelf. Listen to how the running pump sounds. The tone of the pump will change with the opening and closing of the nozzles up the hose line. As nozzle operators open their nozzles, the tone deepens. As they close their nozzles, it will have a higher pitch. The most important job of a pump operator is to maintain a consistent, adequate supply of water and pressure to the nozzle operators.	

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The best way for a pump operator to maintain contact with the nozzle operator(s) is to have radio communication. If radios are not available the water use hand signals are a method to communicate (see unit 8). Four hand signals are used to communicate how much water is in a tank. Three signals are used to inform the pump operator to start delivering water to the nozzle or to change the water pressure. Three signals indicate more hose, broken hose, and roll up hose. One signal indicates to shut down the operation.	IRPG (White - Guides)
VII. APPLICATION/EVALUATION	
USING THE CHECKLIST, DEMONSTRATE THE SETUP AND OPERATION OF THE MARK 3 PUMP. THEN EVALUATE STUDENTS AS THEY DEMONSTRATE THE SETUP AND OPERATION OF THE PUMP. IF USING THE FIELD EXERCISE WITH UNITS 7 AND 8, USE THE CHECKLIST TO EVALUATE PERFORMANCE AT STATION 3.	15-01-S130-IR SW p. 15.7 thru 15.11
REVIEW UNIT OBJECTIVES.	

FIREFIGHTER TRAINING, S-130
UNIT 15 - PUMP OPERATIONS
PERFORMANCE EVALUATION

Performance evaluation:

Demonstrate the proper setup and operation of a portable pump.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

Pump Setup

☐ 1. Foot valve strainer assembly checked and attached to suction hose.

☐ 2. Suction hose and foot valve strainer assembly attached to suction end of pump.

☐ 3. Foot valve strainer assembly placed in water supply properly.

☐ 4. Pump primed (1 of 2 methods).

☐ 5. Fuel mixed in correct proportions.

☐ 6. Fuel system connections checked and cleaned.

☐ 7. Fuel hose attached to fuel can and pump.

☐ 8. Fuel supply valve opened.

☐ 9. Air vent on fuel can opened.

☐ 10. Correct fittings hooked on to discharge side of pump.

☐ 11. Discharge hose hooked to pump on discharge side.

☐ 12. Nozzle hooked up.

☐ 13. All connections on suction side of pump checked and tightened with proper tools.

☐ 14. Pump set near water source in a firm and level position.

☐ 15. Proper safety equipment used.

☐ 16. Needed tools and supplies readily available for use.

☐ 17. Check equipment.

Priming

☐ 1. First and preferred method

Attach the hand priming pump to the discharge side of the pump head. Water is drawn past the foot valve through the suction hose and into the pump case, filling all four cavities of the pump head. Some water will squirt from a small hole located on the handle end of the priming pump when the pump is primed.

OR

☐ 2. Second method

Remove the priming inlet cap on top of the pump case and pour water directly into the pump head. When the pump case is full, shake the suction hose to clear the hose of air. Add more water until pump case is full, replace inlet cap and tighten.

OR

☐ 3. Third method

Remove the priming inlet cap and take hold of the suction hose working it back and forth in the water source with quick jabbing motions. This will force water past the foot valve and into the pump head. When water flows out of the priming port, replace and tighten the pumping cap.

Starting

☐ 1. Fuel tank positioned near pump.

☐ 2. Pull the decompressor switch out until it comes to a “click” stop. Model year 1983 and newer models of Mark 3 pumps are equipped with the decompressor switch.

☐ 3. Close the choke shutter if the engine is cold.

☐ 4. Move the throttle lever to the “start and warm up” position.

☐ 5. Check the reset rod on the automatic cutout switch; it should be pushed in.

☐ 6. Pull the starter cord with short smooth pulls; do not fully extend the cord.

☐ 7. Push the decompressor switch fully in as soon as the engine starts.

☐ 8. Open the choke slowly after the engine has started.

Operation

☐ 1. Allow the engine to warm up for at least two minutes before using full throttle. Failure to do so may lead to piston scuffing and more serious damage.

☐ 2. Check the spark plug for cleanliness and check fuel mixture ratio. Do not perform any field adjustment on the carburetor.

☐ 3. Connections on suction side of pump checked for leaks.

☐ 4. Foot valve strainer assembly checked for proper placement.

Shutdown

☐ 1. First method

☐ a. Move the throttle lever to the “stop” position.

☐ b. Allow the unit to run for approximately one minute with the throttle in this position.

☐ c. Press and hold the stop switch until the engine is fully stopped.

☐ 2. Second method (Used when the pump is left in place and not expected to operate for several hours).

☐ a. Move the throttle to the “stop” position.

☐ b. Older model fuel tanks - the fuel supply valve located in the recess of the tank is turned off.
Newer model fuel tanks - pull the male end of the fuel line quick-connect from the base of the tank.

The engine will run at a low idle and have ample time to cool down and will stop due to the lack of fuel.

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 16 - Map Reading and Use of the Compass (Optional)

TIME: 2 hours

TESTING METHODS: Performance evaluations and optional written examination

TRAINING AIDS: Local administrative maps, U.S. Geological Survey (USGS) topographic maps, flipchart or white board and writing utensils, compass (one for every student if possible), Fireline Handbook

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Identify the symbols depicted on a locally used map with legend.

2. Name and describe the land survey system used locally.

3. Locate a legal description of a point on a map.

4. Identify major topographic features, both in the field and on a map.

5. Demonstrate the ability to read and shoot an azimuth (bearing) off a compass.

6. Explain the importance of knowing the proper declination of an area.

7. Determine one's walking pace on flat and sloped ground in one chain and 100 foot intervals.

8. Given a compass with proper declination and a local map, determine an azimuth, distance, and be able to navigate through wildland terrain between two points.

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PRESENT UNIT OBJECTIVES AND DISCUSS.

DUE TO THE FIELD DESIGN OF THIS UNIT THERE ARE NO POWERPOINT SLIDES.

THIS UNIT IS OPTIONAL. OTHER OPTIONS AVAILABLE FOR TEACHING THIS INFORMATION INCLUDE LOCALLY DEVELOPED MATERIAL AND "MAP AND COMPASS FOR FIREFIGHTERS", NFES 2554.

I. INTRODUCTION

This unit is designed to teach you the basics of how to read a map and use a compass. As a beginning fire-fighter, your supervisor will normally be responsible for locating fires and verifying the position of your crew. However, you may find yourself in a position to have to use a map to find your own location or that of a fire.

II. TYPES OF MAPS

A map is a graphic representation of the earth's surface and is similar to an aerial view of a portion of the earth. Types of maps are specifically designed for the user. Some examples are:

A. Highway Map

Has few features other than showing towns and highway route numbers which meet a driver's needs.

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B. Aeronautical Chart Has information needed by pilots. These can usually be found in the local dispatch office for use in air space management. C. Military Map Although these are detailed maps with information useful to military personnel, they may lack information needed by firefighting agencies. D. USGS Topographic Map Is the most popular map used by fire agencies because it shows most of the information needed, such as terrain, roads, improvements, etc. E. Geographical Information System (GIS) Maps Local maps, such as Geographical Information System (GIS) Maps, are other maps which have specific uses. **PROVIDE THE STUDENTS WITH EXAMPLES OF MAPS, E.G., USGS TOPOGRAPHIC. USE THESE MAPS AS EXAMPLES FOR HANDS ON IDENTIFICATION WHENEVER POSSIBLE THROUGHOUT THIS UNIT.**	

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III. FEATURES OF TOPOGRAPHIC MAPS	
A. General Information	
1. North arrow is normally pointed towards the top of the map.	
2. Map scale is usually found at the bottom of the map. One unit on the map represents a certain number of units on the ground, i.e., 1:24,000 reads as: one inch on the map equals 24,000 inches on the ground; or one inch on the map equals 2,000 feet on the ground.	
MAP CONVERSION FACTORS AND EXAMPLES OF DISPLAY SYMBOLS USED FOR FIRE MAPPING CAN BE FOUND IN APPENDIX A OF THE FIRELINE HANDBOOK.	FHB (Appendix A)
3. Quad size is usually found at the upper right corner of the map. This indicates how many minutes of latitude are contained within a particular map. Common map quads are 7-1/2 and 15 minutes. Map scale for 7-1/2 minute quads is normally 1:24,000, scale for 15 minute quads is normally 1:62,500.	
4. Declination is usually found at the bottom of the map.	
5. Contour interval is usually found at the bottom of the map.	
6. Map name is usually found at the bottom right of the map.	

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7. Road classification is usually found at the bottom right of the map.	
8. Colors - (reminder: most maps you get on fires are black and white)	
• Black - constructed features	
• Green - vegetation	
• Blue - water	
• Brown - relief features such as contour lines	
• Red - roads	
• Purple - updated revisions	
9. Various scales are located around the perimeter of the map representing latitude/ longitude, UTM, etc.	
10. Map symbols show detail of landscape in the following areas:	
• Human-made features - city limits, political boundaries, roads, structures, orchards, surveying benchmarks, microwave towers	
• Water features - lakes, streams, oceans, intermittent streams	
• Vegetation features - forest, brush	
• Elevation features	

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B. Contour Lines	
Actual lines on a map along which every point is at the same height above sea level.	
1. The <u>contour interval</u> of a map is the vertical distance, or difference in elevation, between adjacent contour lines.	
2. Common contour intervals used on topographical maps are 40, 80, and 200 feet.	
3. The <u>index contour</u> is an accentuated interval line which is heavier than the others and is numbered with the elevation on the line.	
The distance between each index contour is divided by five to get the contour interval. For example: if the distance between two index contour lines is 200 feet then the contour interval between all the contour lines is 40 feet.	
HAVE STUDENTS IDENTIFY EXAMPLES OF THE FOLLOWING PROPERTIES ON THE TOPOGRAPHIC QUADRANGLE MAP IN THEIR SW.	16-01-S130-IR SW p. 16.9
C. Properties of Contour Lines	
1. Each contour line must close upon itself either on or off the map. A contour line cannot dead end.	
2. When crossing a stream, contour lines form V's pointing upstream.	

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3. When crossing a ridge, contour lines form U's pointing down the ridge.	
4. Contour lines cannot cross or meet, except in the unusual cases of waterfalls, or overhanging cliffs.	
5. Closed contours represent either a summit or a depression. Inspection of the index contours will indicate which it is. (Depressions will have tick marks on the inside of the closed contour.)	
6. Contour lines tend to parallel streams.	
7. A contour cannot branch or wye into two contours.	
8. Contour lines are perpendicular to the direction of the maximum slope.	
9. Uniformly spaced contour lines represent uniformly sloping ground.	
10. Irregularly spaced contour lines represent rough, rugged ground.	
11. Contour lines are not drawn through buildings or other constructed objects.	
Common terrain features depicted by contour lines are:	
• Peaks • Ridges • Saddles	

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• Draws, valleys, and canyons • Depressions	
HAVE STUDENTS COMPLETE THE EXERCISE IN THEIR SW. PROVIDE ANSWERS AND DISCUSS WITH THE ENTIRE CLASS.	16-02-S130-IR SW p. 16.10
IV. LAND SURVEY SYSTEMS	
There are two systems in use.	
A. Metes and Bounds System	
1. Most states east of the Mississippi are surveyed in metes and bounds.	
2. These are used primarily by surveyors and are lengthy descriptions in surveyor's terminology.	
3. These are of little use to firefighting agencies.	
B. Public Land Survey System	
1. Used to describe legal land locations, i.e., Township, Range and Section, for property boundaries.	
2. Used by surveyors, land management agencies, and people using maps who need legal land descriptions.	
C. Other Methods to Describe Map Locations	
1. Latitude and longitude	

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2. Local map grid system	
3. Military grid	
4. Universal Traverse Mercator grid	
COVER THE PORTIONS OF THE FOLLOWING SECTION THAT HAVE LOCAL APPLICATION. DEMONSTRATE EACH METHOD THAT IS USED LOCALLY.	
V. METHODS FOR IDENTIFYING AND DESCRIBING LOCATIONS ON MAPS	
A. Local Grid System Method	
Lines superimposed on maps by the users such as:	
1. Local agency GIS map with a grid for reference.	
2. Incident Action Plan map that has grid for fire planning purposes.	
INSTRUCTOR IS ENCOURAGED TO PROVIDE A MAP WITH A GRID FROM AN INCIDENT ACTION PLAN IF AVAILABLE.	
B. Latitude and Longitude	16-03-S130-IR SW p. 16.11
Measured in degrees, minutes and seconds.	
1. Latitude lines	

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a. Imaginary lines that run east and west around the earth parallel to the equator.	
b. The equator is 0°.	
c. Lines of latitude are numbered in degrees to show how far they are north or south of the equator.	
d. Degrees alone are too large for a precise location, so they are subdivided into minutes and seconds.	
(1) One degree of latitude equals 60 minutes or 69 miles.	
(2) One minute of latitude equals 60 seconds or 1.15 miles. (A 7-1/2 minute quad shows 8.625 miles of latitude.)	
(3) One second of latitude equals 100 ft.	
2. Longitude lines	
a. Imaginary lines that run north and south through the geographic poles.	
b. Lines of longitude denote the distance in degrees east or west of the prime meridian (0°) which runs through Greenwich, England.	

OUTLINE	AIDS & CUES
c. All longitude lines intersect at the poles. Therefore, they are not parallel and have no set distance value.	
d. Like latitude, longitude is measured in degrees, minutes and seconds.	
e. The farther north or south of the equator, the smaller the value of degrees in miles between lines of latitude. An example is one degree of longitude at the equator = 67 miles; at Boise, Idaho = 53 miles.	
3. When giving a latitude/longitude, latitude is always given first.	
GIVE THE STUDENTS AN EXAMPLE OF WHAT THE LATITUDE/LONGITUDE IS FOR A WELL KNOWN NEARBY LOCATION.	
C. Township and Range from the Public Land Survey System	
REFER TO ILLUSTRATIONS IN THE SW TO ENHANCE INSTRUCTION IN THIS SECTION.	16-04-S130-IR SW p. 16.13 thru SW p.16.15
1. <u>Initial point</u>: Most states west of the Mississippi and north of the Ohio Rivers were surveyed after the 1796 Public Land Survey law. Thirty-five initial points were established by astronomical observations.	
2. <u>Baseline</u>: Extends east and west through each initial point.	

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3. Principal Meridian: Extends north and south through each initial point.	
4. Township subdivision: Land is divided into “townships” by “range lines” running north-south (equivalent to longitude) and “township lines” running east-west (equivalent to latitude, note the difference between “township lines” and “townships”).	
a. Townships are approximately thirty six square miles.	
b. Township numbers are located on the sides of maps. These numbers measure the distance north or south from the baseline. Example: T3N or T12S.	
c. Range numbers are located on the tops and bottoms of maps. These numbers measure the distance east or west from the principle meridian. Example: R36E or R2W.	
d. Townships are identified by their relationship north or south and east or west of the initial point. Example: T3N, R36E or T12S, R2W. Township is always stated before range.	

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5. <u>Sections</u>: Townships are divided into 36 equally numbered "sections." Sections are always numbered in same the sequence. a. Each section equals one square mile or 640 acres. There are 80 chains on each side of a section (one chain equals 66 feet). b. Township and sections are often larger or smaller where survey corrections have been made. 6. Section subdivision: sections can be divided into "quarter sections" which equal 160 acres and measure 40 chains on each side. These are referred to their location in relation to the middle of the section. Example: NW1/4. a. These are not shown on field maps. b. Quarter sections can be further subdivided into "quarter of a quarter sections" which equal 40 acres and measure 20 chains on each side. They are referred to in the same way quarter sections are. Example: SW1/4 of the NW1/4. 7. A location is identified by township, range, section, and quarter section information. Example: NW1/4, S6, T3S, R12E.	

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VI. APPLICATION	
OPTIONAL EXERCISE USING LOCAL TOPOGRAPHIC MAPS, DESIGN AN EXERCISE FOR STUDENTS WHERE THEY IDENTIFY PROMINENT TERRAIN FEATURES (SUCH AS THOSE IN 16-01-S130-IR AND 16-02-S130-IR) GIVEN LEGAL DESCRIPTIONS (I.E., TOWNSHIP, RANGE, SECTION, AND QUARTER SECTION).	
VII. COMPASS INTRODUCTION	
This unit will familiarize students with the use of the compass in fire operations. The Silva compass is discussed in this lesson because it is the type most commonly used.	
PROVIDE THE STUDENTS WITH AT LEAST ONE COMPASS (SILVA COMPASSES IF POSSIBLE) FOR EVERY TWO STUDENTS. USE HANDS ON AS MUCH AS POSSIBLE THROUGHOUT THIS SECTION. INSTRUCTORS WILL HAVE TO ADAPT THE MATERIAL IF ANOTHER TYPE OF COMPASS IS USED.	
VIII. PARTS OF THE COMPASS	
INSTRUCTOR SHOULD ILLUSTRATE THE PARTS OF THE COMPASS AND HOW TO USE THEM THROUGHOUT THE SECTION. HAVE THE STUDENTS IDENTIFY THE PARTS OF THE COMPASS AS THE INFORMATION IS PRESENTED.	
A. Travel arrow: located at the top of the compass and indicates direction of travel on the ground (note luminous point).	

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B. Various scales: located on the top and the sides of the compass and normally correspond with typical topographic map scales.	
C. Magnifying glass: located just below the travel arrow.	
D. Dial: revolving housing which is divided into 360 degrees. The dial rim is marked with the four cardinal directions, north, east, south, and west. Each mark represents two degrees, every 20th degree is marked with a number from 20 to 360. Zero and 360 degrees are the same.	
E. Index pointer: white mark on the dial where the bearing is read. Corresponds to the travel arrow.	
F. Magnetic needle: free swinging suspended needle located inside the dial. Red side always points toward magnetic north (note luminous point).	
G. Orienting arrow: located inside the dial and always points toward north on the dial as the housing is revolved (note luminous points). Will point toward the degree of declination if declination can be adjusted.	
H. Orienting lines: located inside the dial and are parallel to the orienting arrow.	
I. Aid lines: located above the dial on each side of the magnifying glass and are parallel to the travel arrow.	
J. Declination scale: located inside the dial and denotes magnetic declination from true north.	

OUTLINE	AIDS & CUES
IX. DETERMINING AN AZIMUTH	
Azimuths (also called bearings) are horizontal angles fixing a direction in respect to north, and are expressed in degrees.	
A. Cardinal Directions	
1. Consist of the four basic directions on dial, each of which corresponds to a degree. Examples: north = 0/360, east = 90, south = 180, west = 270; NE = 45, SE = 135, SW = 225, NW = 315.	
2. Knowledge of these directions is useful but insufficient for describing or finding an exact location.	
3. In addition to the above eight directions, the 360 degree marks on the dial can be used to find more precise locations.	
B. Reading an Azimuth	
An azimuth is <u>always</u> read at the index pointer. The magnetic needle and orienting arrow do <u>not</u> influence where an azimuth is read.	
C. Shooting an Azimuth/bearing (example 140 degrees)	

OUTLINE	AIDS & CUES
THERE MAY BE DIFFERENT METHODS ON HOW TO SHOOT AN AZIMUTH. INSTRUCTOR SHOULD EXPLAIN A METHOD THEY ARE COMFORTABLE WITH WHICH WILL BE STRAIGHT FORWARD FOR THE STUDENTS TO FOLLOW IF THE METHOD BELOW IS NOT USED.	
HAVE STUDENTS STAND UP AND PRACTICE SHOOTING AN AZIMUTH.	
1. Holding the compass level, turn the dial to where 140 lines up with the index pointer.	
2. Rotate your entire body slowly, compass and all, until the red side of the magnetic needle lines up with the orienting arrow (north on the dial).	
3. You are now facing 140 degrees at the travel arrow.	
4. Compasses must be kept away from metallic objects (i.e., gates, vehicles, etc.) when shooting azimuths. Metal will influence the magnetic needle and may result in an inaccurate azimuth.	
MAKE SURE THE STUDENTS KNOW TO HOLD THE COMPASS LEVEL WITH THE TRAVEL ARROW POINTING AWAY FROM THEM.	
D. Determining Back Azimuth	
1. A <u>back azimuth</u> is the opposite of an azimuth and is useful to know when retracing your steps.	

OUTLINE	AIDS & CUES
2. A back azimuth is 180 degrees from the direction of travel.	
3. If the direction of travel is less than 180 degrees, then add 180 to the azimuth to determine the back azimuth. Example: 140 + 180 = 320 degrees.	
4. If the direction of travel is greater than 180 degrees, then subtract 180 from the azimuth to determine the back azimuth. Example: 320 - 180 = 140 degrees.	
IT IS IMPORTANT THAT EACH STUDENT IS ABLE TO SHOOT A BEARING BEFORE MOVING ON TO DECLINATION.	
X. DECLINATION (ALSO CALLED VARIATION)	
EXPLAIN TO THE STUDENTS THAT DECLINATION IS REALLY ONLY NECESSARY TO KNOW WHEN USING MAPS. AS AN EXAMPLE, IF A FIREFIGHTER CAN SEE SMOKE AND NEEDS TO NAVIGATE THROUGH FORESTED TERRAIN WHERE THE VIEW OF THE FIRE IS OCCASIONALLY BLOCKED, THEY COULD JUST SHOOT A BEARING ON THAT SMOKE USING AN ANGLE FROM MAGNETIC NORTH.	
A. True North versus Magnetic North	
1. The red side of the magnetic needle on a compass is attracted by the magnetic field of the earth and therefore <u>always</u> points toward “magnetic north.”	

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2. "True north" is the direction to the North Pole. Maps are laid out in relation to true north, therefore the north arrow on a map points toward the North Pole.	
3. The angle or distance on a map or the compass dial between true north and magnetic north is called "magnetic declination" or sometimes, simply "declination."	
4. Declination changes with location across the United States. Declination can either be east or west of true north depending on one's location.	
INSTRUCTOR SHOULD REVIEW WHERE THE TRUE AND MAGNETIC NORTH ARROWS AND DECLINATION ARE FOUND ON A LOCAL TOPOGRAPHIC MAP.	
EXPLAIN THE IMPORTANCE OF KNOWING THE DECLINATION IN A PARTICULAR AREA. (USE THE LOCAL DECLINATION AS AN EXAMPLE.) EVEN A FEW DEGREES OF DECLINATION WILL AFFECT THE LINE OF TRAVEL. THE ERROR WILL BECOME GREATER THE FARTHER ONE TRAVELS FROM THEIR STARTING POINT.	
B. Setting Declination on a Compass	
1. There are several ways to set declination on a compass.	

OUTLINE	AIDS & CUES
a. Permanent marking can be made by making a scratch at the local declination on the compass dial and filling in with red ink. b. Temporary marking can be made by covering the local declination on the compass dial with transparent tape, marking with a felt tip pen, and then covering with a second layer of tape. c. Some compass models (i.e., Silva Ranger) have an adjustable scale that can be set to a local declination. *This will move the orienting arrow and it will no longer point to north on the dial. Instead it will point to the degree of declination.* d. Another method is to simply remember the declination for an area and always adjust an azimuth for declination from a map (by either adding or subtracting it) on to the compass when reading that azimuth. **DEMONSTRATE TO THE CLASS A PREFERRED WAY TO ADJUST COMPASSES FOR DECLINATION.** 2. After marking the declination, read all azimuths from a map to the compass from that declination point.	

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a. Example: if the local declination is 10 degrees east, and the desired direction of travel on a map is 140 degrees, then the actual direction of travel read on the compass should be 130 degrees (east declinations are <u>subtracted</u> from the map azimuth).	
b. Example: if the local declination is 10 degrees west, and the desired direction of travel on a map is 140 degrees, then the actual direction of travel read on the compass should be 150 degrees (west declinations are <u>added</u> from the map azimuth).	
c. *Remember the desired direction of travel is 140 degrees from true north, <u>not</u> 140 degrees from magnetic north.*	
REINFORCE TO STUDENTS THAT WHEN THEY ARE USING MAPS, ALL AZIMUTHS SHOULD BE SHOT IN RELATION TO TRUE NORTH WHICH IS <u>NOT</u> WHERE THE MAGNETIC NEEDLE WILL BE POINTING. THIS IS WHY THE DECLINATION ADJUSTMENT MUST BE MADE.	
C. Compare True and Magnetic North Azimuths on the Compass	
1. For compasses with a movable scale where the declination can be adjusted.	

OUTLINE	AIDS & CUES
a. Adjust compass for local declination (the orienting arrow should be lined up with the declination).	
b. Turn the dial until the 0/360 degree North mark lines up with the index pointer.	
c. Rotate your entire body slowly, compass and all, until the red side of the magnetic needle lines up in the same direction as the orienting arrow.	
d. The magnetic needle is pointing toward magnetic north (as always), the index pointer is now pointing toward true north.	
2. For compasses without a movable scale where the declination cannot be adjusted, or for those who wish just to remember what the local declination is (the orienting arrow will remain pointing at north on the compass dial).	
a. Turn the dial until the local declination lines up with the index pointer.	
b. Rotate your entire body slowly, compass and all, until the red side of the magnetic needle lines up in the same direction as the declination at the index pointer.	

OUTLINE	AIDS & CUES
c. The magnetic needle is pointing toward magnetic north (as always), the orienting arrow is pointing toward true north.	
XI. USING A COMPASS WITH A MAP	
EACH STUDENT SHOULD BE ABLE TO DEMONSTRATE THEIR ABILITY TO USE A COMPASS WITH A MAP AT THE END OF THIS SECTION.	
A. Orienting a Map Toward North	
1. For compasses with a movable scale where the declination can be adjusted.	
a. Adjust the compass for declination.	
b. Turn the compass dial until north lines up with the index pointer and travel arrow.	
c. Place compass on map with the travel arrow pointing toward the top (north) of the map.	
d. Rotate map and compass together until the red side of the magnetic needle lines up with the orienting arrow.	
e. The map is now oriented toward true north.	

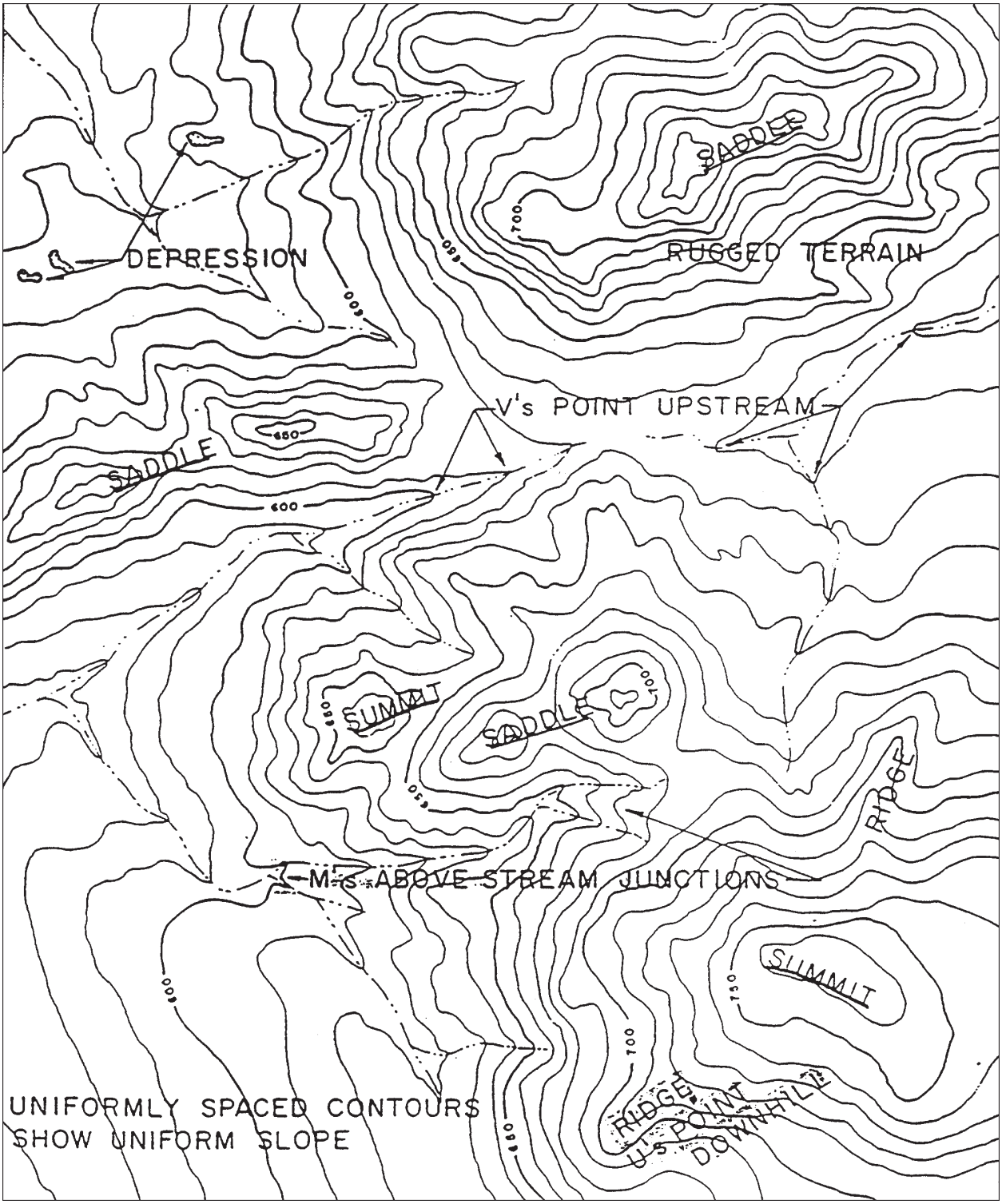
OUTLINE	AIDS & CUES
2. For compasses without a movable scale where the declination cannot be adjusted, or for those who just remember what the local declination is (the orienting arrow will remain pointing at north on the compass dial).	
a. Turn the compass dial until north lines up with the index pointer and travel arrow.	
b. Place compass on map with the travel arrow pointing toward the top (north) of the map.	
c. Rotate map and compass together until the red side of the magnetic needle lines up with the local declination on the dial.	
d. The map is now oriented toward true north.	
B. Shooting an Azimuth on a Map	
1. Orient the map to true north.	
2. Place a compass edge or ruler between two points on the map (i.e., your location and a desired destination such as a reported smoke).	
3. Draw a line connecting those points.	

OUTLINE	AIDS & CUES
4. Place the compass edge along that line and turn the compass dial until north on the dial lines up with the orienting arrow (on a compass set for declination) or with the known local declination on the dial (on a compass that is not set for declination).	
5. Read the bearing at the index pointer to obtain the azimuth (direction of travel) in relation to true north. It is a good idea at this time to determine your back azimuth in case you need to find your way back to your original location.	
6. Follow the direction of travel until arriving at the desired location. It may be necessary to repeat the process during your travel to ensure you do not stray off course.	
Distances can be figured right off the compass edge by using the scales to measure and compare to the legend on the map. These are horizontal distances and not true ground distances.	
Distance can also be calculated in the field based on pacing. This will covered during the field evaluation.	
XII. APPLICATION	
INSTRUCTORS WILL HAVE TO DESIGN THIS EXERCISE TO ADAPT TO THE LOCAL AREA.	

OUTLINE	AIDS & CUES
DIVIDE THE STUDENTS INTO PAIRS, PROVIDE A LOCALLY USED TOPOGRAPHIC MAP, AND TWO LEGAL DESCRIPTIONS (TOWNSHIP, RANGE, SECTION, AND QUARTER SECTION). HAVE STUDENTS:	
1. LOCATE THE TWO POINTS ON THEIR MAPS. ONE POINT SHOULD BE THEIR CURRENT LOCATION, THE OTHER POINT SHOULD BE WHERE THERE IS A REPORTED SMOKE.	
2. ACCOUNT FOR LOCAL DECLINATION AND ORIENT THEIR MAPS TO TRUE NORTH. USE THE COMPASS TO DETERMINE THE BEARING OF TRAVEL BETWEEN THE TWO POINTS. STUDENTS SHOULD ALSO DETERMINE THE DISTANCE AND DESCRIBE THE TERRAIN FEATURES ALONG THEIR TRAVEL ROUTE AND AT THE LOCATION OF THE SMOKE.	
XIII. FIELD EVALUATION	
INSTRUCTORS SHOULD ATTEMPT TO DO AS MANY OF THE FOLLOWING EXERCISES AS POSSIBLE IN THE FIELD. DEPENDING ON TIME, COURSE LOCATION, WEATHER, AND LOCAL TERRAIN, NOT ALL THE EXERCISES MAY BE POSSIBLE. EXERCISES SHOULD BE TAILORED TO MEET LOCAL AND/OR AGENCY NEEDS.	
CONSIDER SETTING UP STATIONS AND HAVE THE STUDENTS ROTATE THROUGH EACH EXERCISE IN GROUPS.	

OUTLINE	AIDS & CUES
SETTING UP THESE EXERCISES WILL REQUIRE CONSIDERABLE EFFORT ON THE PART OF THE INSTRUCTORS, BUT THIS EFFORT WILL RESULT IN AN ENHANCED LEARNING EXPERIENCE FOR THE STUDENTS. IF POSSIBLE MEASURE ALL DISTANCES WITH TAPES.	
1. MARK OUT ONE CHAIN AND 100 FOOT DISTANCES ON LEVEL GROUND AND ON SLOPED GROUND. HAVE STUDENTS DETERMINE THEIR WALKING PACE FOR ONE CHAIN AND 100 FEET. (THIS SHOULD BE A MANDATORY EXERCISE TO MEET LESSON OBJECTIVES.)	
2. GIVE THE STUDENTS 5-6 MAGNETIC BEARINGS (THEY SHOULD ALL BE SHOT FROM THE SAME POINT) AND HAVE THEM DESCRIBE THE TOPOGRAPHICAL FEATURE EACH BEARING IS POINTING AT.	
3. GIVE EACH STUDENT A COPY OF A LOCAL TOPOGRAPHIC MAP (TOPOGRAPHIC OR HUMAN-MADE) WITH 5-6 PROMINENT LAND FEATURES IDENTIFIED ON THEM. FROM A COMMON POINT, HAVE THE STUDENTS ADJUST THEIR COMPASSES FOR DECLINATION, ORIENT THE MAP TO TRUE NORTH, AND DETERMINE THE PROPER AZIMUTH TO TRAVEL TO THOSE POINTS IN RELATION TO TRUE NORTH.	
4. GIVE EACH STUDENT A NUMBER AND A BEARING. STARTING FROM A COMMON POINT, HAVE EACH STUDENT FOLLOW THAT BEARING AND FIND A PIECE OF	

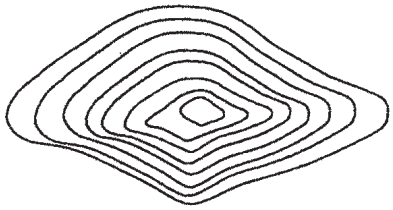
OUTLINE	AIDS & CUES
FLAGGING ALONG THAT LINE OF TRAVEL WITH THEIR NUMBER. FLAGGING SHOULD BE PLACED IN A WAY WHERE IT CAN ONLY BE SEEN IF THE STUDENTS ARE ACCURATELY FOLLOWING THE CORRECT BEARING.	
5. GIVE THE STUDENTS 5-6 DISTANCES AND BEARINGS AND HAVE THEM NAVIGATE AN OPEN TRAVERSE FROM A COMMON STARTING POINT. THIS CAN BE DONE WITH OR WITHOUT MAPS. STUDENTS CAN MARK THEIR END LOCATION USING WOODEN STAKES. COMPARE HOW EACH STUDENT DID IN RELATION TO WHERE THEY SHOULD HAVE ACTUALLY ENDED UP.	
EMPHASIZE THE IMPORTANCE OF THEM BEING IN THE GENERAL AREA OF THE TARGETED POINT VERSUS TRYING TO FIND THE EXACT POINT. EXPLAIN SOME OF THE COMMON DIFFICULTIES FIREFIGHTERS HAVE WHEN TRYING TO LOCATE A REPORTED SMOKE.	
STUDENTS FAILING TO DEMONSTRATE PROFICIENCY IN ANY OF THE EXERCISES WILL REQUIRE ADDITIONAL TRAINING UNTIL EXERCISE IS SUCCESSFULLY COMPLETED.	
REVIEW UNIT OBJECTIVES.	


SADDLE
RUGGED TERRAIN
DEPRESSION
V's POINT UPSTREAM
SADDLE
SUMMIT
SADDLE
RIDGE
M's ABOVE STREAM JUNCTIONS
SUMMIT
RIDGE
U's POINT DOWNHILL
UNIFORMLY SPACED CONTOURS
SHOW UNIFORM SLOPE

Match the profile (A-F) with the contour lines (1-6)

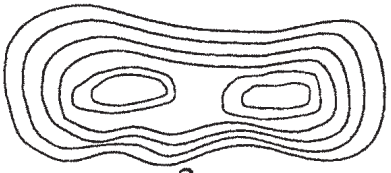
1

A



2

B



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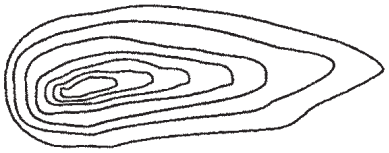
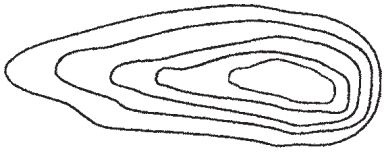
C



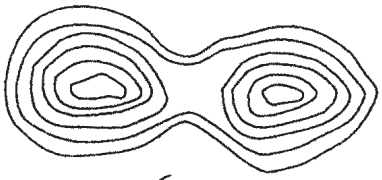
4

D



5

E



6

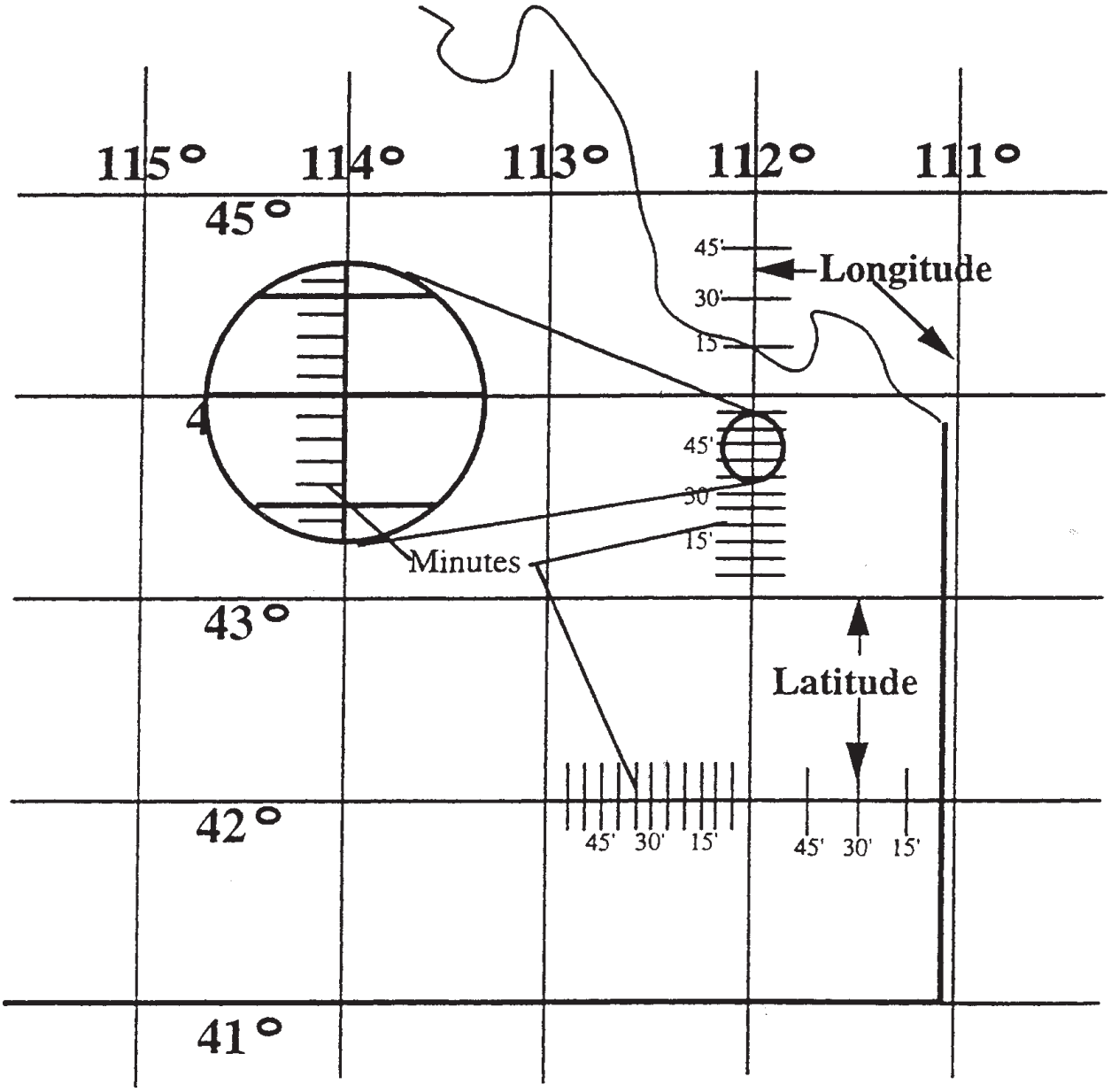
F

1. _____ 4. _____

2. _____ 5. _____

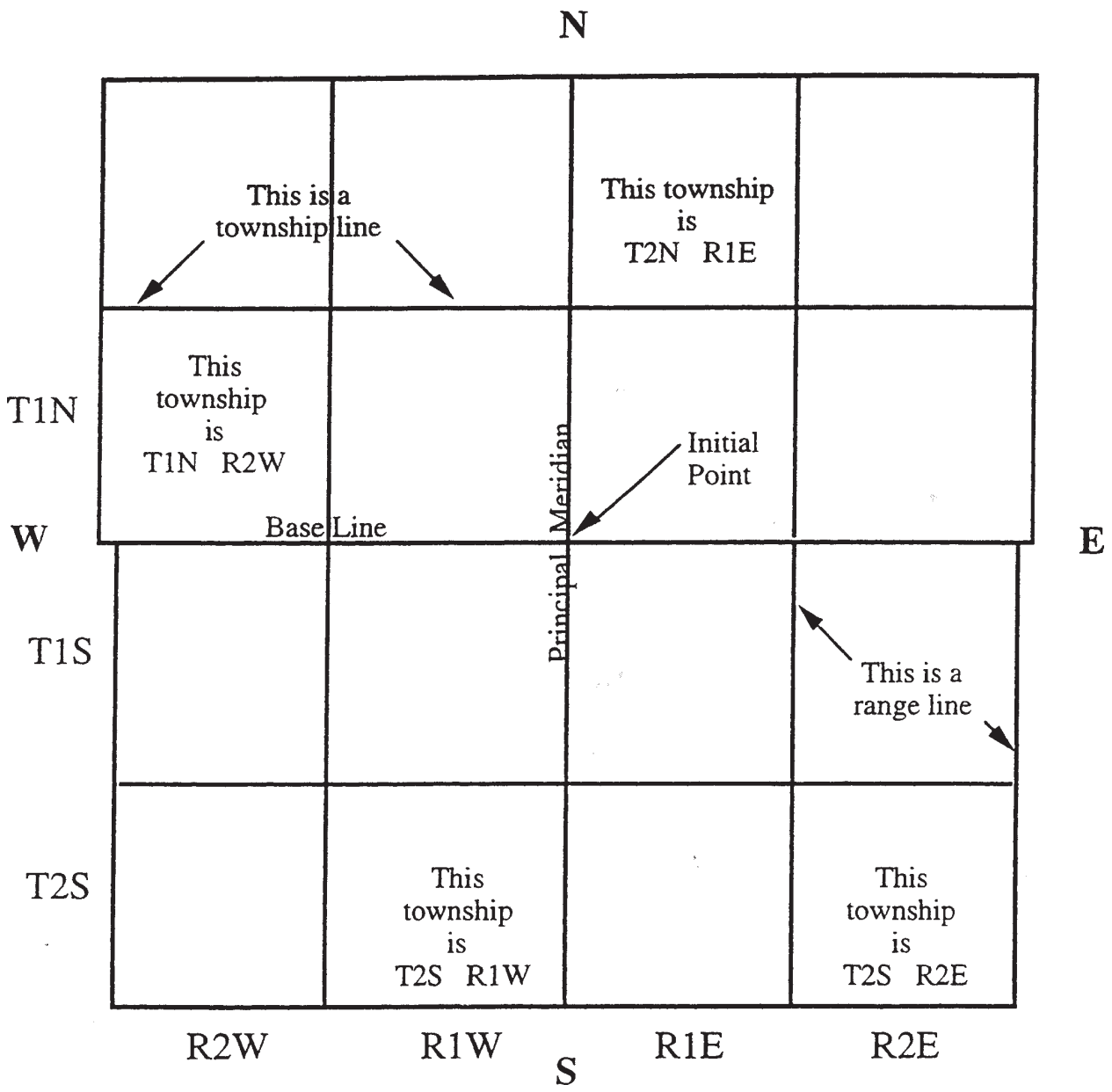
3. _____ 6. _____

Latitude and Longitude

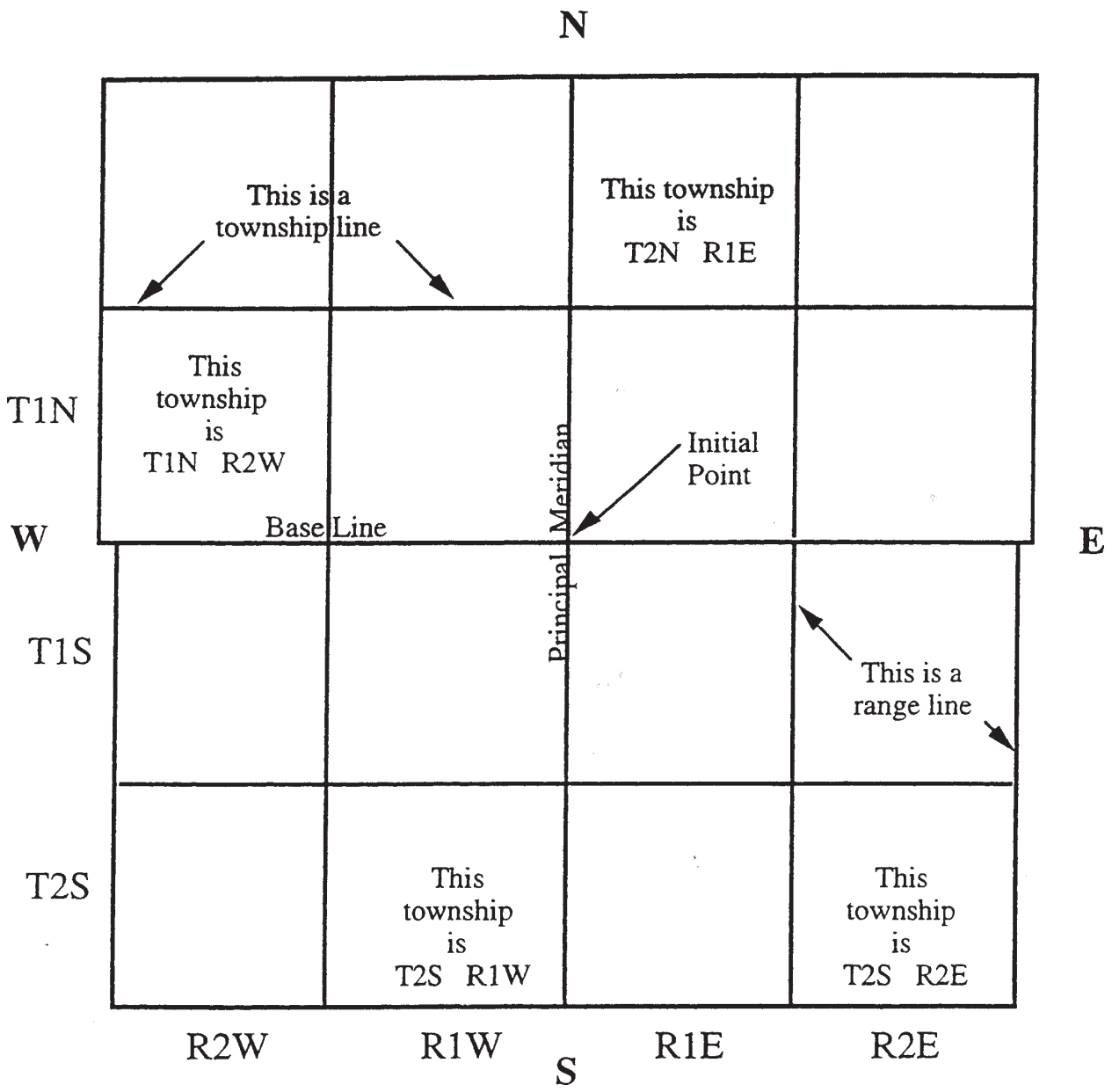


16-03-S130-IR

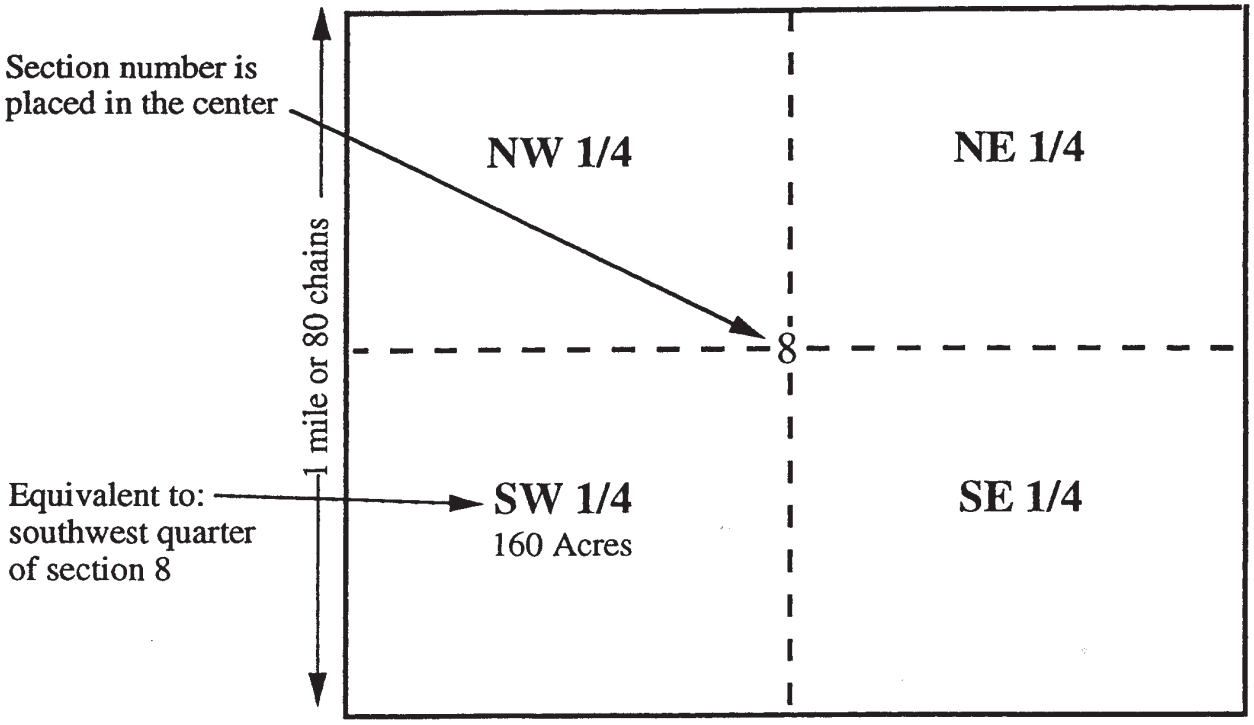
Township and Range Reference



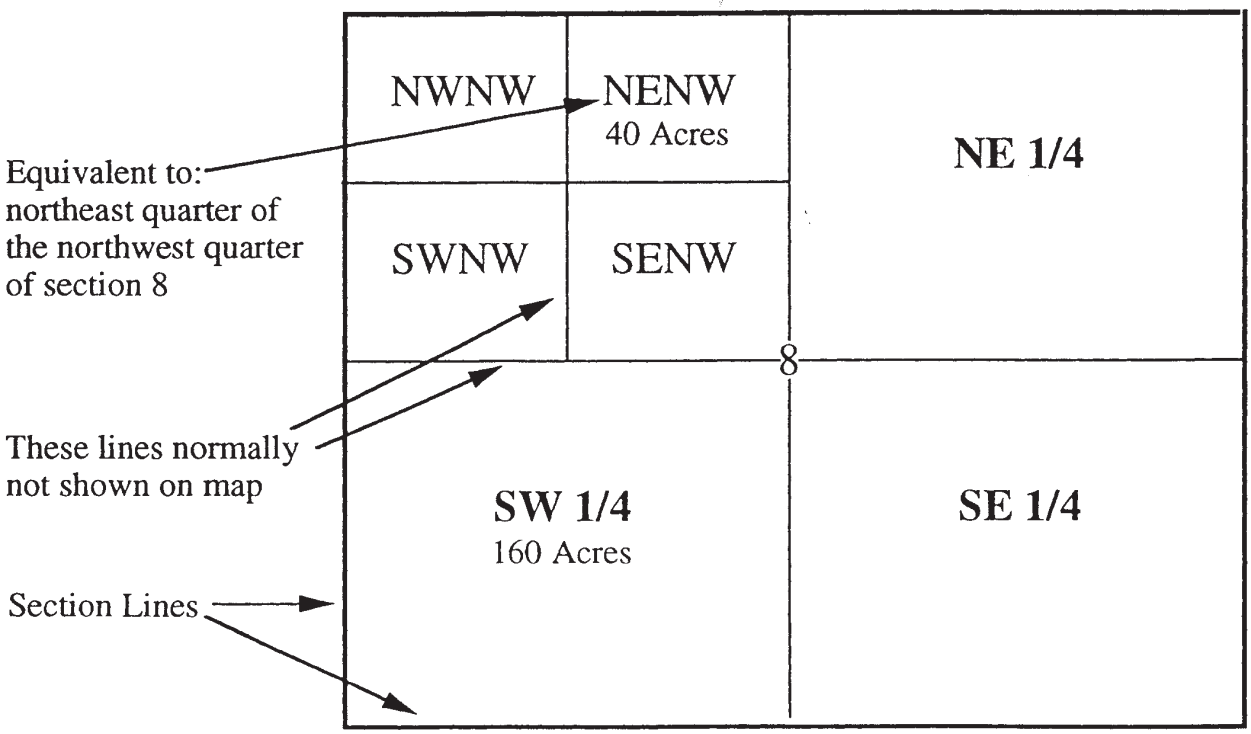
Township and Range Reference



Subdivision of Sections



Subdivision of Quarter Sections



DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 17 - Wildland Fire Investigation (Optional)

TIME: ½ hour

TESTING METHODS: Written and/or performance evaluation

TRAINING AIDS: Paper, notebook, pencil, hand tools, flagging tape, and rolled toilet paper, Incident Response Pocket Guide

REFERENCES: NWCG Wildfire Cause Determination Handbook

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Describe items to watch for when traveling to, arriving at, and during initial attack that might show the origin and/or cause of the fire.

2. Given a simulated situation, record and report all information that will help in determining fire cause and origin.

3. Given a simulated fire situation, designate and protect the area of fire origin.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS.	17-01-S130-EP 17-02-S130-EP
I. INTRODUCTION	
Accurately determining fire cause is the first step in a successful fire investigation, and successful fire investigations are necessary in preventing unwanted wildland fires. Proper observation and protection of the origin area during initial attack can more accurately pinpoint fire causes and can preserve valuable evidence that would otherwise be destroyed by suppression activities.	
If the fire is human caused the protective measures used can preserve evidence that may lead to civil or criminal convictions.	
Actual wildfire investigation should be conducted by qualified fire investigators.	
II. FIRE OBSERVATION AND ORIGIN AREA PROTECTION RESPONSIBILITIES	
As a member of an initial attack crew, you will have the opportunity to observe many possible causes of wildland fires. Your ability to observe, record, and report information may determine the accuracy of a fire investigation report.	
A. Observe	17-03-S130-EP
1. While traveling to the fire notice:	
• Vehicles speeding away from the fire area.	

OUTLINE	AIDS & CUES
• (If after dark) a vehicle without lights. • Vehicles parked in unlikely spots. • Children leaving the fire area. • Gates or fences down or damaged. • Power lines down or damaged. 2. After arriving at the scene, observe: • Tire or footprint impressions leading to the fire origin. • Suspicious-looking people (sometimes trying to help). • Conversations of on-lookers (who, what, where, when, and how). • Power lines down (also a hazardous condition for firefighters). • General area of origin, what is burning, color of smoke, where burning, etc. • Any objects that are foreign to the natural or normal surroundings. • Signs of a campfire or debris burning.	

OUTLINE	AIDS & CUES
3. During initial attack note and immediately report any ignition devices observed in the area of origin, such as: • Matchbooks • Candles • Road flares/fusees Items like matches and cigarette butts are common along roadsides and in high public use areas.	
B. Record the: 1. License numbers of vehicles, type, color, style, age, condition (such as dents and missing parts). 2. Description of people: sex, height, weight, age, clothing, hair, and any unusual characteristics. 3. Time when you witness any activity that you are recording and reporting.	Incident Response Pocket Guide (White - Guides) 17-04-S130-EP
C. Report to a responding fire investigator or your supervisor all items that you believe may be important in determining the cause of the fire.	17-05-S130-EP
D. Protecting the point of origin and approaches to it are the most important jobs of the initial attack crew. Often the first suppression action destroys all possibility of determining the fire cause, and responsible party.	17-06-S130-EP

OUTLINE	AIDS & CUES
1. Don't:	
• Walk through the suspected origin area.	
• Apply water or cut a fireline through the area.	
• Drive vehicles over the origin area.	
2. Do:	
• Use flagging tape, rope, or rolled toilet paper to protect a larger area.	
• Keep others away from the suspected area by posting guards, if necessary.	
• Protect origin by placing hand tools around a suspected small area.	
III. APPLICATION	
SUGGESTIONS:	
• **HAVE STUDENTS LOOK FOR MATCHES AND CIGARETTE BUTTS AS WELL AS FOOT AND TIRE IMPRESSIONS ALONG A MAJOR ROADWAY WHILE EN ROUTE TO TRAINING SITE OR SIMILAR AREA.**	
• **INSTRUCTOR MAY WISH TO IGNITE SMALL AREA OF GRASS WITH MATCH OR DEVICE TO SHOW STUDENTS RESIDUE.**	

OUTLINE	AIDS & CUES
IV. EVALUATION	
THE TEST QUESTIONS CAN BE ANSWERED THROUGH GROUP DISCUSSION OR BY OBSERVATION AND DISCUSSION GENERATED THROUGH A SIMULATED EXERCISE. SIMULATED EXERCISE MAY BE HYPOTHETICAL INDOORS SITUATION OR A HANDS-ON FIELD EXERCISE.	17-01-S130-IR SW p. 17.5
REVIEW UNIT OBJECTIVES.	17-07-S130-EP

FIREFIGHTER TRAINING, S-130
UNIT 17 - WILDLAND FIRE INVESTIGATION
TEST QUESTIONS WITH ANSWERS

1. What are some items to watch for that might show the origin and/or cause when:

   a. Traveling to fire.

      - **Vehicles speeding away from the fire area.**
      - **Vehicles parked in areas where parking might not be normal.**
      - **Children leaving the area.**
      - **Gates (locked, unlocked, forced open) and/or fences knocked down or broken.**
      - **Power lines down or damaged.**

   b. Arriving at the fire.

      - **Tire or footprint impressions leading to the site.**
      - **Suspicious-looking people (sometimes trying to help).**
      - **Conversation about the cause from on-lookers.**
      - **Power lines down.**
      - **General area of origin.**
      - **Campfire or burning debris.**
      - **Any objects that are foreign to the natural or normal surroundings.**

c. Conducting initial attack.

- **Ignition devices in area of origin: matchbooks, candles, road flares, or fusees, etc.**

- **No observable items or people.**

2. Describe the methods used to designate and protect the area of origin.

- **Use of hand tools (for small area).**

- **Use of flagging tape, rope, or rolled toilet paper (for large area).**

- **Posting firefighters as guards to protect area.**

DETAILED LESSON OUTLINE

COURSE: Firefighter Training, S-130

UNIT: 18 - Cultural Resources (Optional)

TIME: ½ hour

TRAINING AIDS: Flipchart or white board, writing utensils

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Define the phrase "Cultural Resources."
2. Describe the effects of fire and fire management activities on cultural resources.
3. Describe the steps to protect cultural resources during fire management activities.

OUTLINE	AIDS & CUES
PRESENT UNIT OBJECTIVES AND DISCUSS.	18-01-S130-EP 18-02-S130-EP
I. INTRODUCTION	
Fire managers today are involved in developing programs to accomplish objectives far more complex and difficult than ever before. In meeting these objectives they must ensure the protection of many very significant resource values. One important challenge and obligation for fire managers is to identify, understand, and protect cultural resources.	

OUTLINE	AIDS & CUES
It is important for fire suppression personnel to become knowledgeable in fire suppression actions that may affect cultural resources and to become familiar with cultural resources and methods for protecting them.	
II. CULTURAL RESOURCES - DEFINITIONS AND TERMINOLOGY	18-03-S130-EP
A. Cultural Resource	
A cultural resource is any surviving material that is a potential resource for understanding the past and has significance for inclusion in the National Record of Historic Places (NRHP).	
Generally, on public lands and on Indian reservations the buildings, sites, areas, architecture, memorials, and objects having scientific, historic, religious, or social values comprise a non-renewable resource relating to past human life.	
Cultural resources differ from natural resources in that cultural resources are non-renewable. Once a cultural resource is destroyed, the information the resource could provide is lost forever. Do not remove any artifact whether it is significant or not.	
B. Types of Archaeological/Cultural Resources	18-04-S130-EP
1. Artifact: A portable material object made or modified by humans.	
2. Feature: Non-portable artifact such as a rock alignment or post mold.	

OUTLINE	AIDS & CUES
3. Site: An area utilized or occupied by humans as indicated by the presence of cultural resources. Typical examples are habitation sites, quarry sites, gathering sites and trails.	
4. Context: The context is defined as the locations and relationships of artifact structures within a site. This is important because only when all contextual data is analyzed do we get the most complete picture of past peoples and their environments. When artifacts are displaced these data are lost.	
III. HISTORICAL OVERVIEW	
It is only within the past twenty years or so that serious consideration has been given to assessing the effects of fire management activities on cultural resources. The Pacific Southwest Forest Fire Laboratory has begun extensive monitoring of the effects of wildfire and prescribed fire on soils and archaeological sites but most of the current information is derived from observations in the aftermath of wildfires.	
The following are examples of fires that brought forth the importance of protecting cultural resources from the impacts of fire management activities.	
A. Little Moccasin Canyon Fire, Mesa Verde National Park, 1972, 1,080 acres. Impacted masonry pueblos and surface ceramics. Legislation was clear in making cultural resource protection of paramount importance, but the impacts of this fire made it clear that resource	

OUTLINE	AIDS & CUES
management planning did not adequately address the potential for damage that might result from catastrophic fire and associated suppression efforts.	
B. Custer Battlefield National Monument Fire, 1983, 800 acres. Resource damage was caused primarily by suppression activities. A headstone was jarred loose by a truck trying to escape the fire's head, and several were discolored. However, the fire had a positive attribute. The fire exposed locations on the battlefield which were tested by archaeologists revealing some original remains of the soldiers who died there. These resources and the historic landscape were those for which the monument was expressly set aside to interpret and protect.	
C. La Mesa Fire, Bandelier National Monument, 1977, 15,000 acres. Affected numerous cultural sites containing artifacts dating back to the early 1100 - 1200's. For the first time archaeologists assisted fire suppression personnel as line locators. Many sites were saved as a result of this action.	
IV. LEGAL RESPONSIBILITIES	
Because of concern over the loss of cultural resources due to widespread development activities, indiscriminate digging, vandalism and commercial exploitation, Congress has enacted numerous laws to protect historical and cultural resources on pubic lands.	

OUTLINE	AIDS & CUES
Two acts that address these concerns are:	18-06-S130-EP
A. National Historic Preservation Act (NHPA) of 1966	
Directs federal agencies to inventory, evaluate, and protect significant cultural resources under their jurisdiction.	
B. Archaeological Resources Protection Act (ARPA) of 1979	
Prohibits the unauthorized excavation or removal of any archaeological resources from federal land and strengthens civil and criminal penalties for illegal excavation or collection of artifacts even if the site is not found to be significant.	
V. EFFECTS OF FIRE MANAGEMENT ACTIVITIES ON CULTURAL RESOURCES	
A. Positive impacts from fire and fire suppression activities:	
1. Identifying previously unknown artifacts/ sites.	
2. Reduce vegetation so areas can be surveyed.	
B. The most severe impacts to cultural resources occur during fire suppression and rehabilitation activities.	

OUTLINE	AIDS & CUES
Three major types of damage have been identified:	18-07-S130-EP
1. Destruction of architecture and associated information.	
2. Displacement of artifacts since it alters context.	
3. Destruction of the artifacts.	
C. Impacts from Fire Suppression	
1. Fireline construction with mechanical equipment.	
a. Dozer blades and tracks cause damage in and around sites by cutting deep into the soil, destroying architecture, and displacing artifacts. During night shift, even with lights, dozers can crush structures and unseen surface artifacts.	
b. Engines, water tenders and vehicles can crush cultural material. Foam may protect certain structures.	
c. Water pressure can cause erosion to sites or chip away the integrity of structures and displace artifacts.	

OUTLINE	AIDS & CUES
2. Handline and helispot construction: a. Can result in exposure of subsurface deposits and potentially affect structural sites by loading them with discarded vegetation. b. Causes displacement or destruction of artifacts. 3. Aerial applications a. Damage from retardant on structure walls could cause corrosion and contamination of subsurface and surface materials. b. High velocity retardant hitting structures and causing damage. c. Careful consideration must be given during air operations in and around cultural resource sites. 4. Concentration of people in and around sites. Trampling generally occurs in patterns by creating definite path (fireline) and non-path areas; this displaces artifacts either vertically and/or horizontally. 5. Stockpiling and collecting of artifacts by fire suppression personnel. DON'T DO IT!	

OUTLINE	AIDS & CUES
CHECK WITH LOCAL AGENCIES TO DETERMINE WHAT THEIR POLICY IS FOR INFORMING AND EDUCATING FIRE PERSONNEL TO THE IMPORTANCE OF LEAVING ARTIFACTS IN PLACE.	
D. Impacts from Mopup Activities	
1. Engines and other vehicles moving around inside the burned area crushing or displacing cultural materials.	
2. Dragging hoses across sites and material which can cause breakage, artifact displacement, or structural damage to features such as burials, pithouses and hearths.	
3. Digging and tillage of the soil, straight stream water application, digging roots and stump holes	
E. Impacts from Prescribed Fire	
Generally, the conditions under which most prescribed fires are designed to burn would not impact cultural materials. Impacts to significant cultural resources during prescribed burning can occur and in many cases are similar to those that occur during fire suppression activities. Some of these are:	
1. The impact of installing control lines.	
2. The actual physical impact of fire on structures, pottery, and stone artifacts, and archaeological sites.	

OUTLINE	AIDS & CUES
3. The loss of ground cover can lead to erosion and vandalism. Positive impacts are the same as described for fire suppression.	
VI. STEPS TO PROTECT CULTURAL RESOURCES DURING WILDFIRE SUPPRESSION AND PRESCRIBED BURNING ACTIVITIES	
A. Be Aware	18-07-S130-EP
1. Incident Action Plans should contain clear and specific instructions for suppression activities around cultural values. Incident Management Teams are usually made aware of existing cultural values at risk during the Line Officer's Briefing and may be assigned a resource advisor(s).	
INSTRUCTOR MAY WANT TO DEFINE AND DISCUSS THE DELEGATION OF AUTHORITY AND THE LINE OFFICER'S BRIEFING.	
2. Brief all burn personnel of sites needing attention and alternatives to ignition patterns and holding activities.	
B. Avoid Significant or Unknown Eligibility Sites	
1. Don't disturb a site. Practice avoidance by protecting the site from the fire. Mark it and make it known.	
2. Be aware of the penalties of removing artifacts from any site.	

OUTLINE	AIDS & CUES
C. Report	
1. When personnel come across archaeological sites and materials, inform your supervisor. If possible, make notes of the site for your Cultural Resource Specialist.	
2. Be sure that personnel understand that when they encounter a site they leave it alone and send for a Cultural Resources Specialist.	
REVIEW UNIT OBJECTIVES.	18-08-S130-EP

APPENDIX A

COURSE ORDERING INFORMATION

COURSE ORDERING INFORMATION

Firefighter Training, S-130 is available for purchase through:

National Interagency Fire Center
Attn: Great Basin Cache Supply Office
3833 South Development Avenue
Boise, Idaho 83705

Consult the latest NWCG, National Fire Equipment System Catalog, Part 2: Publications, NFES 3362, (http://www.nwcg.gov/pms/pubs/pubs.htm) to obtain current ordering procedures and prices.

Necessary components for presentation of the course include:

NFES 1510	S-130 Instructor Guide
NFES 2731	S-130 CD-ROM (course visuals and materials)
NFES 2732*	S-130 Risk Management, video, VHS (Unit 4A)
NFES 2733*	S-130 Risk Management, DVD (Unit 4A)
NFES 2388**	S-130 decal, Standard Firefighting Orders and Watch Out Situations (100/pg)
NFES 2389**	S-130 card, Standard Firefighting Orders and Watch Out Situations (100/pg)
NFES 2639**	S-130 card, Spanish, Standard Firefighting Orders and Watch Out Situations (100/pg)
NFES 2734**	S-130 decal, Spanish, Standard Firefighting Orders and Watch Out Situations (100/pg)
NFES 2397	S-134 decal, LCES (100/pg)

Each student will need:

NFES 2730	S-130 Student Workbook
NFES 0065	Fireline Handbook, PMS 410-1
NFES 1077	Incident Response Pocket Guide, PMS 461
NFES 2225	Common Denominators of Fire Behavior pamphlet, PMS 407
NFES 2652	L-180, Human Factors on the Fireline video, VHS (Unit 4D)
NFES 2708	Minimum Impact Suppression Tactics video, VHS, PMS 467 (Unit 11)
NFES 2727	S-134, LCES video, VHS (Unit 4B)

Unit 4C addresses fire shelter use and deployment. Depending upon the type of shelter used at the home unit, order the appropriate materials for presentation of the information:

NFES 1570**	Your Fire Shelter: 2001 edition pamphlet, PMS 409 (order one for each student)
NFES 2653**	Su Refugio De Proteccion Edicion 2001, Spanish pamphlet, PMS 409 (order one for each student)
NFES 1568	Using Your Fire Shelter video, VHS, PMS 409
NFES 2407	Practice fire shelter(s)
OR	
NFES 2710	The New Generation Fire Shelter pamphlet, PMS 411 (order one for each student)
NFES 2711*	The New Generation Fire Shelter video, VHS, PMS 411
NFES 2712*	The New Generation Fire Shelter DVD, PMS 411
NFES 2678	M2002, Training Fire Shelter(s)

* The video and DVD contain the same program. Order the appropriate program.

** The Your Fire Shelter 2001 edition pamphlet and the Standard Firefighting Orders and Watch Out Situations cards and decals are available in English and Spanish. Order the appropriate materials.

Optional videos:

NFES 2145	Hazardous Materials video, VHS, PMS 418 (Unit 13)
NFES 2146	First on the Scene video, VHS, PMS 418 (Unit 13)

Instructor references:

NFES 2147	DOT Chart 12 Hazardous Materials Marking, Labeling, Placarding (Unit 13)
NFES 2150	DOT Emergency Response Guidebook

Reference lesson outlines for additional equipment and supplies that may be needed for this course.

APPENDIX B

ELECTRONIC PRESENTATION THUMBNAILS

Course Objectives

1. Explain what the LCES (Lookouts, Communications, Escape Routes, and Safety Zones) system is and how it relates to the Standard Firefighting Orders.
2. Construct fireline to required standards using various methods.
3. Strengthen, reinforce, and use holding actions on a fireline.

Course Objectives

4. Extinguish the fire with or without the use of water.
5. Complete assigned tasks in a safe and efficient manner.
6. Given an assignment in a wildfire environment, describe factors in that environment which could impact safety.

Unit 0B

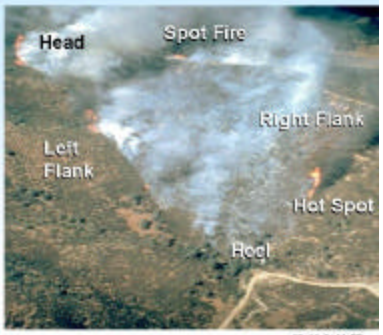
Basic Terminology

Unit 0B Objectives

1. Identify nine parts of a fire.
2. Define nine fire behavior terms.
3. Discuss five other useful firefighter terms.

Parts of the Fire

- Origin
- Head
- Flank
- Rear/Heel
- Perimeter
- Finger
- Pocket
- Island
- Spot Fire



Fire Behavior Terms

- Spread
- Smoldering
- Creeping
- Running
- Backing
- Spotting
- Torching
- Crowning
- Blowup

EB-04-0130-EP

Other Useful Terms

- Control Line
- Fireline
- Anchor Point
- Mopup
- Class of Fire

EB-05-0130-EP

Review Unit 0B Objectives

1. Identify nine parts of a fire.
2. Recognize nine fire behavior terms.
3. Recognize five other useful firefighter terms.

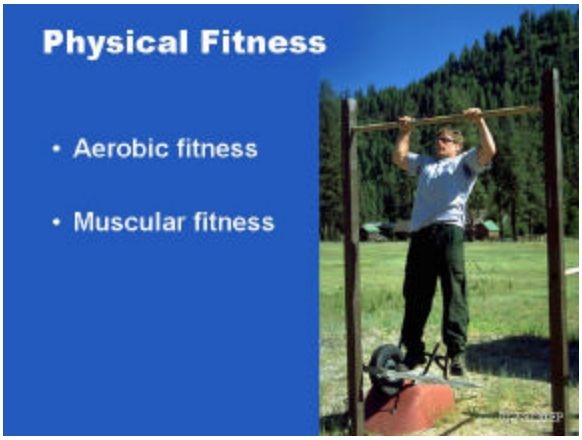
EB-06-0130-EP

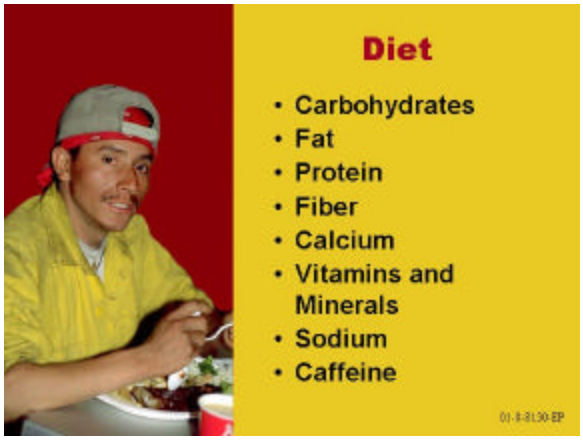
Unit 1 Objectives

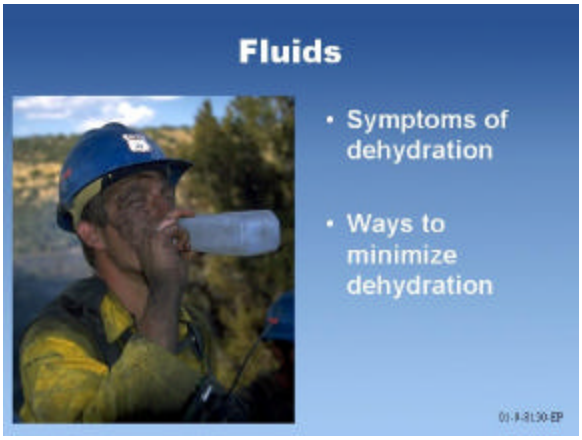
1. Explain the importance of the proper use and maintenance of their assigned Personal Protective Equipment (PPE).
2. Develop a list of personal gear needed for an extended period away from their home station.
3. Explain the firefighter's accountability for personal and agency property.

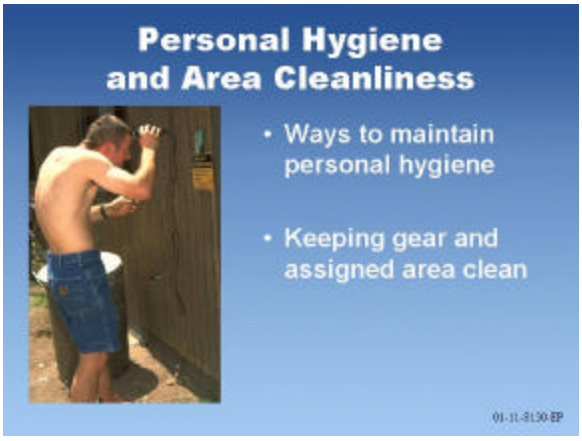
Unit 1 Objectives

4. List the benefits of maintaining a high level of physical fitness and health.
5. Explain how eating well and staying hydrated can reduce firefighter fatigue.
6. Explain the importance of keeping personal gear and the assigned area in fire camp clean and organized.









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6. Explain the importance of keeping personal gear and the assigned area in fire camp clean and organized.

01-13-3130-EP

Unit 2 Objectives

1. Describe the firefighter's chain of command.
2. Define an incident and describe how the incident management structure is organized.
3. Describe the general responsibilities of each section in the Incident Command System (ICS).
4. Name the two positions above the firefighter in the chain of command.

What Is the Incident Command System (ICS)?

- Management tool for responding to emergency situations. Establishes chain of command.
- Adaptable to many types of incidents (flood, hurricane, wildfire, search and rescue).
- Adaptable to size of incident. It can grow to meet the needs of the incident while maintaining span of control.

"Chain of Command"

The line of authority through which decisions are made, recommendations offered, and work assignments are given.

Incident Commander
↕
Firefighter/s

Small Fire Organization

90% of all wildland fires are suppressed during the initial attack phase, with a small organization.

Incident Commander
|
Firefighter/s

Standard 20-Person Crew Organization

Crew Boss

Squad Boss	Squad Boss	Squad Boss
Firefighters (4 to 6)	Firefighters (4 to 6)	Firefighters (4 to 6)

Some wildland fires require a larger management organization.
Incident Commander
Engine Boss
Engine Crew
Crew Boss
Engine Boss
Engine Crew
Dozer Boss
Dozer Operator
Engine Boss
Engine Crew
Squad Boss
Squad Boss
Squad Boss
Firefighters (4 person, Saw squad)
Firefighters (6 person, diggers)
Firefighters (6 person, diggers)

COMMAND
OPERATIONS
PLANNING
LOGISTICS
FINANCE
Incident Command System
ICS

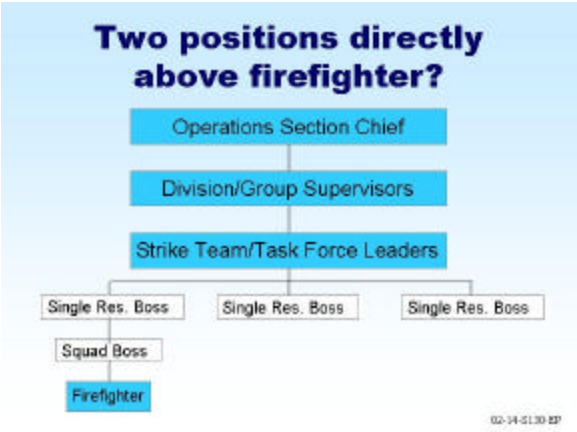
What is an "Incident?"
An emergency response situation such as...
• structure fire
• search and rescue
• flood
• hurricane response
• hazardous material spill
• vehicle accident
• wildland fire
• national emergency

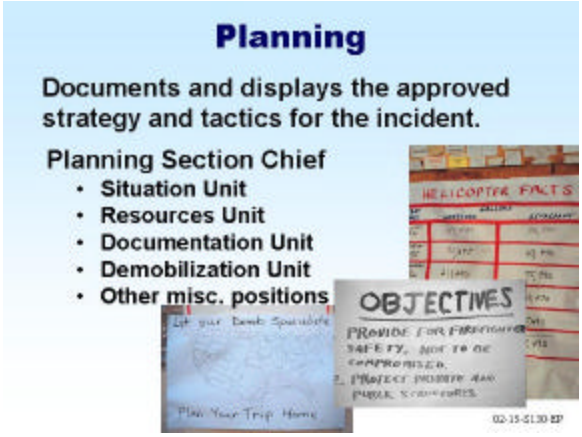
Command
Overall responsibility and decision-making for the incident.
Incident Commander
• Safety Officer
• Information Officer
• Liaison Officer

Operations
Develops and implements the strategy and tactics.

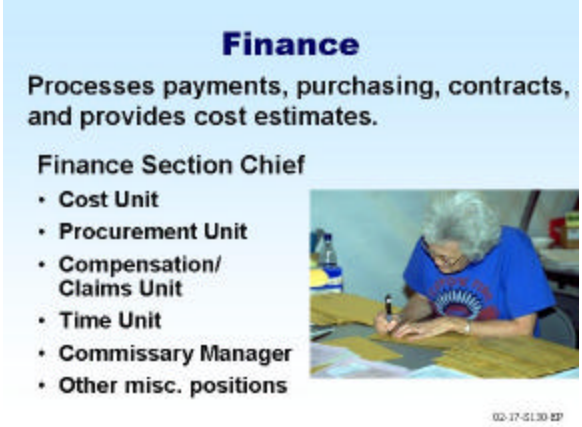
Operations Organization
Operations Section Chief
Ops. Branch Director
Air Operations Branch Director
Division Supervisor
Group Supervisor
Strike Team Leader
Task Force Leader
Single Resource Boss
Advanced Firefighter/Squad Boss

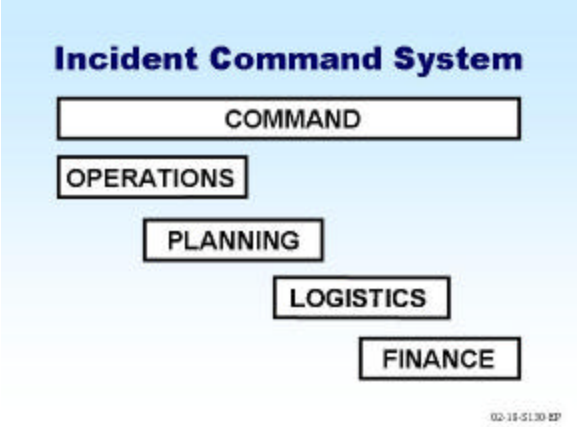
To maintain span of control, operations may be divided geographically.
Division B
Division C
Division A


Two positions directly above firefighter?
Operations Section Chief
Division/Group Supervisors
Strike Team/Task Force Leaders
Single Res. Boss
Single Res. Boss
Single Res. Boss
Squad Boss
Firefighter


Planning
Documents and displays the approved strategy and tactics for the incident.
Planning Section Chief
• Situation Unit
• Resources Unit
• Documentation Unit
• Demobilization Unit
• Other misc. positions
OBJECTIVES

Logistics
Provides support and service for all incident personnel.
Logistics Section Chief
• Communications Unit
• Supply Unit
• Medical Unit
• Food Unit
• Facilities Unit
• Ground Support Unit
• Other misc. positions

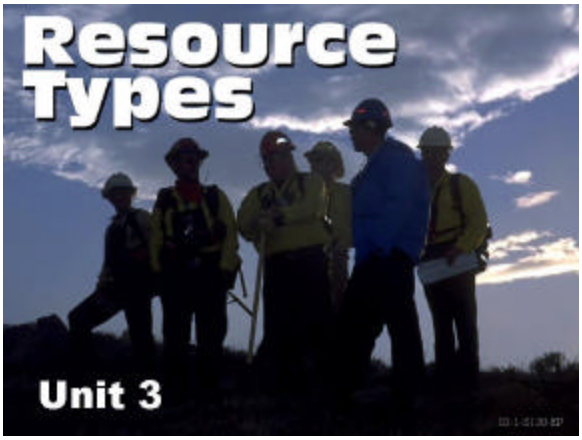

Finance
Processes payments, purchasing, contracts, and provides cost estimates.
Finance Section Chief
• Cost Unit
• Procurement Unit
• Compensation/ Claims Unit
• Time Unit
• Commissary Manager
• Other misc. positions


Incident Command System
COMMAND
OPERATIONS
PLANNING
LOGISTICS
FINANCE

Review Unit 2 Objectives

1. Describe the firefighter's chain of command.
2. Define an incident and describe how the incident management structure is organized.
3. Describe the general responsibilities of each section in the Incident Command System (ICS).
4. Name the two positions above the firefighter in the chain of command.

02-19-0130 RP



Unit 3 Objectives

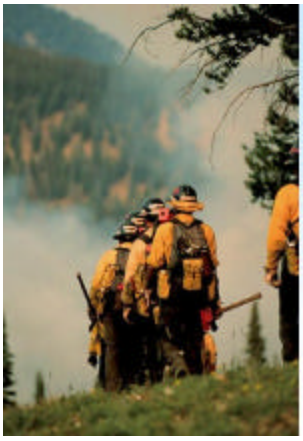
1. Explain different types of crew organizations commonly used in initial attack and extended attack.
2. Explain the importance of respecting cultural differences in terms of food, standards of behavior, dress, and customs.

Duties & Responsibilities

A firefighter is the basic resource used in control and extinguishment of wildland fires and works either as an individual or as a member of a crew under the supervision of a highly qualified individual. (Fireline Handbook)

Crew Organization

What are the benefits of organizing crews?



Type 1 Hand Crews

Type 2 Hand Crews

Engine Crews

Helitack Crews

Dozer Crews

Tractor Plow Crews

Areas of Cultural Differences

1. Food or dietary needs of any cultural/ethnic group
2. Housing
3. Dress
4. Religion

Conclusion

- Be respectful and courteous.
- Your behavior as an individual will be reflected in the crew you are working with.
- BE PROFESSIONAL!

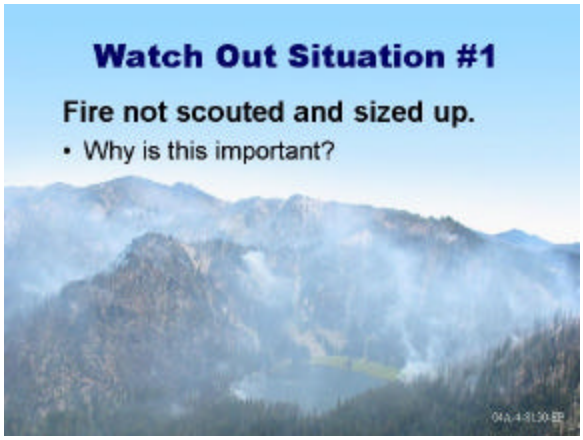
Review Unit 3 Objectives

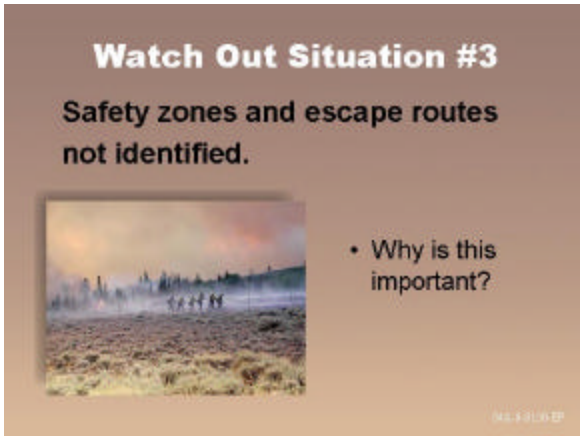
1. Explain different types of crew organizations commonly used in initial attack and extended attack.
2. Explain the importance of respecting cultural differences in terms of food, standards of behavior, dress, and customs.

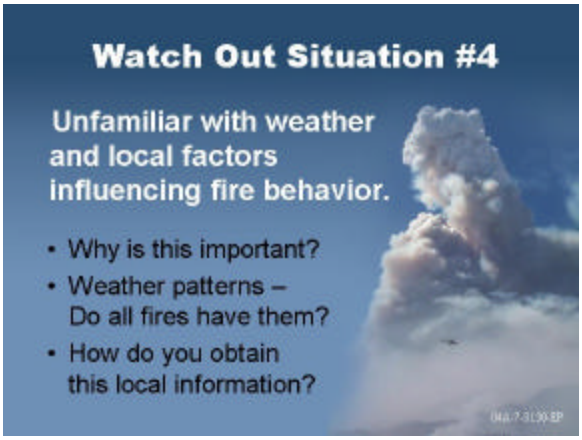
Unit 4A Objectives

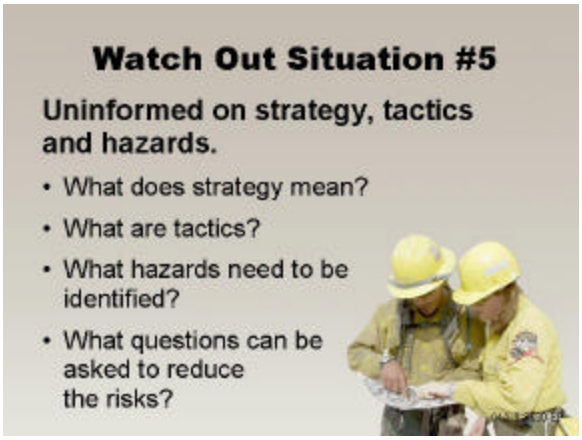
1. Identify the common denominators on tragedy fires.
2. Given a scenario, identify the appropriate Watch Out Situations.
3. Apply the appropriate Standard Firefighting Orders to minimize the potential for serious injury or death.

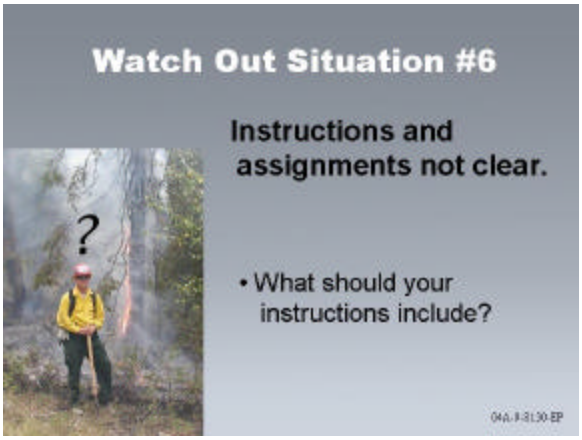
04A-3-SL30-EP

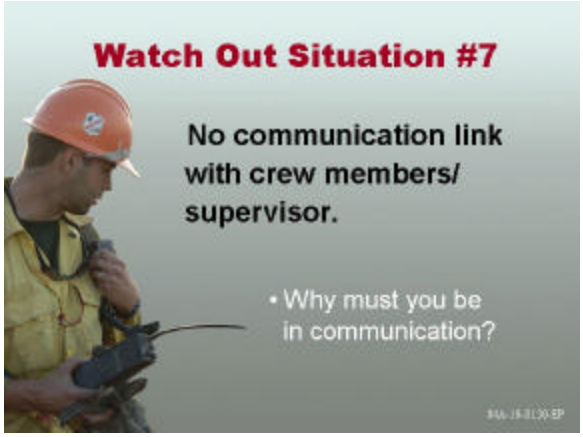


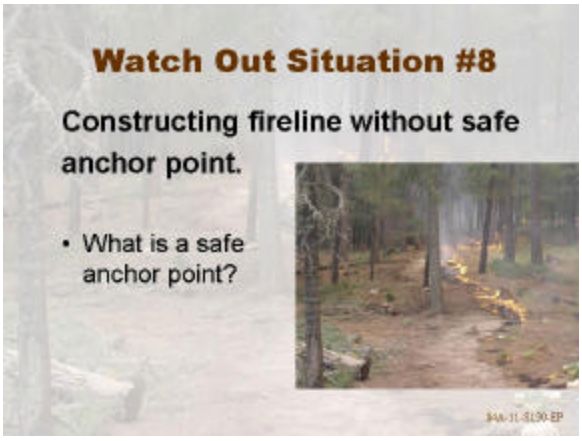


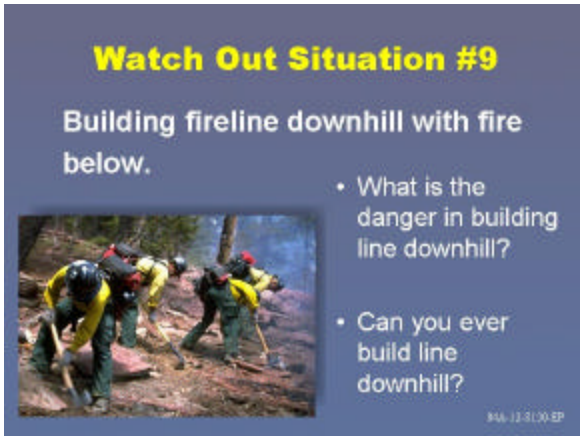

Watch Out Situation #4
Unfamiliar with weather and local factors influencing fire behavior.
• Why is this important?
• Weather patterns – Do all fires have them?
• How do you obtain this local information?

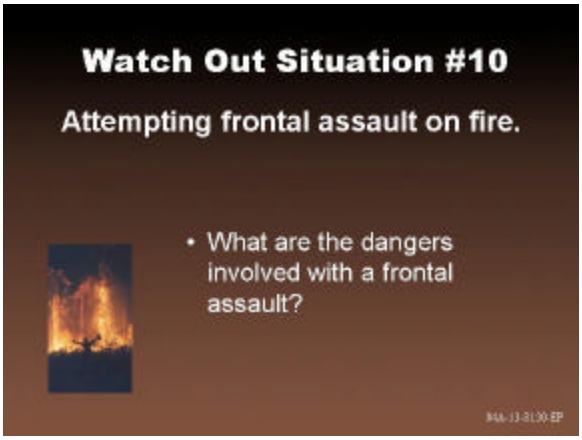

Watch Out Situation #5
Uninformed on strategy, tactics and hazards.
• What does strategy mean?
• What are tactics?
• What hazards need to be identified?
• What questions can be asked to reduce the risks?

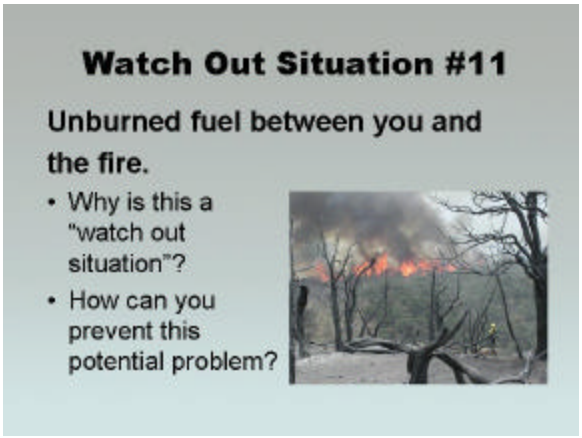

Watch Out Situation #6
Instructions and assignments not clear.
• What should your instructions include?

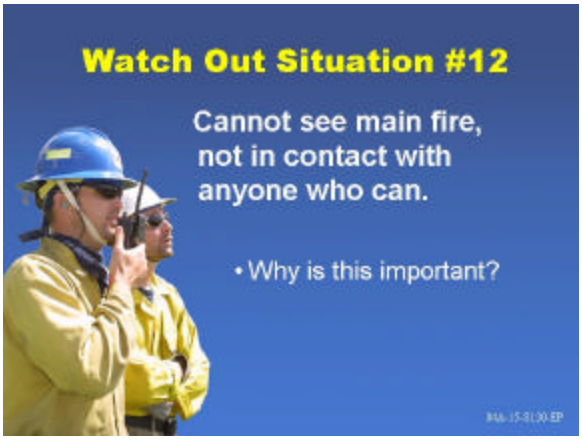

Watch Out Situation #7
No communication link with crew members/ supervisor.
• Why must you be in communication?

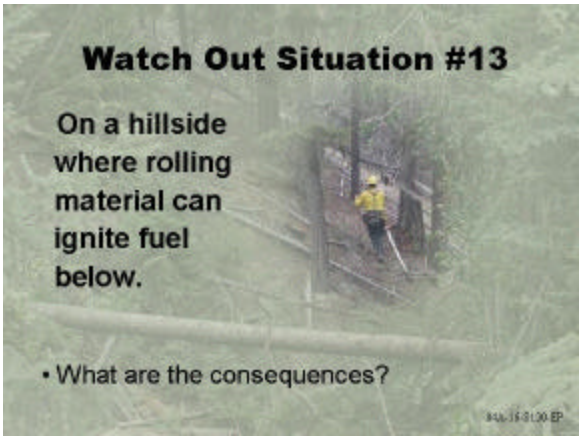

Watch Out Situation #8
Constructing fireline without safe anchor point.
• What is a safe anchor point?

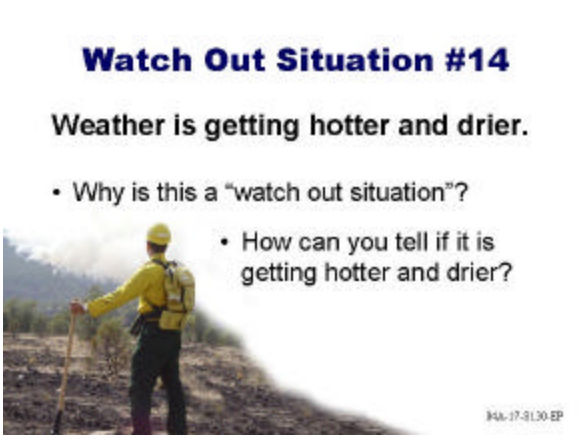

Watch Out Situation #9
Building fireline downhill with fire below.
• What is the danger in building line downhill?
• Can you ever build line downhill?

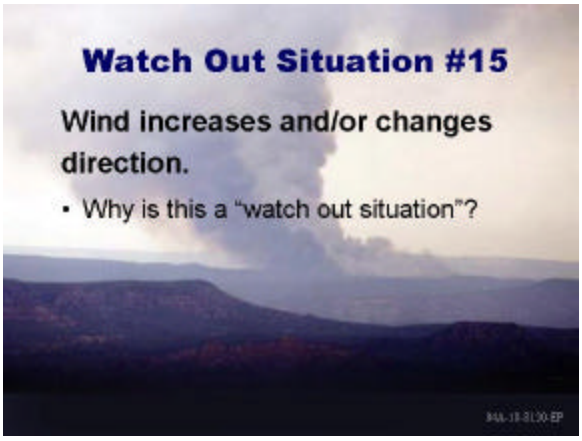

Watch Out Situation #10
Attempting frontal assault on fire.
• What are the dangers involved with a frontal assault?


Watch Out Situation #11
Unburned fuel between you and the fire.
• Why is this a "watch out situation"?
• How can you prevent this potential problem?


Watch Out Situation #12
Cannot see main fire, not in contact with anyone who can.
• Why is this important?


Watch Out Situation #13
On a hillside where rolling material can ignite fuel below.
• What are the consequences?


Watch Out Situation #14
Weather is getting hotter and drier.
• Why is this a "watch out situation"?
• How can you tell if it is getting hotter and drier?


Watch Out Situation #15
Wind increases and/or changes direction.
• Why is this a "watch out situation"?

Watch Out Situation #16

Getting frequent spot fires across line.

- What are the consequences of spot fires?

Watch Out Situation #17

Terrain and fuels make escape to safety zones difficult.

- Why is this a "watch out situation"?

Watch Out Situation #18

Taking a nap near the fireline.

- Although this is a convenient place what danger might there be?

Standard Firefighting Orders

FIRE BEHAVIOR

1. Keep informed on fire weather conditions and forecasts.
2. Know what your fire is doing at all times.
3. Base all actions on current and expected behavior of the fire.

Standard Firefighting Orders

FIRELINE SAFETY

4. Identify escape routes and safety zones, and make them known.
5. Post lookouts when there is possible danger.
6. Be alert. Keep calm. Think clearly. Act decisively.

Standard Firefighting Orders

ORGANIZATIONAL CONTROL

7. Maintain prompt communications with your forces, your supervisor and adjoining forces.
8. Give clear instructions and insure they are understood.
9. Maintain control of your forces at all times.

Standard Firefighting Orders

OVERALL INTENT

10. Fight fire aggressively, having provided for safety first.

Unit 4A Objectives

1. Identify the common denominators on tragedy fires.
2. Given a scenario, identify the appropriate Watch Out Situations.
3. Apply the appropriate Standard Firefighting Orders to minimize the potential for serious injury or death.

Unit 4B Objectives

1. Describe how LCES is related to the 10 Standard Firefighting Orders.
2. Define escape route, escape time, and safety zone.
3. Identify travel barriers that will affect escape time.
4. List the 3 types of safety zone categories and describe one example of each.

Unit 4B Objectives

5. Describe a general guideline for determining safety zone size to avoid radiant heat injury.
6. Identify the limitations of utilizing the Incident Response Pocket Guide safety zone guidelines.
7. Describe the difference between deployment sites and safety zones.

What About LCES?

- **Is LCES all you need to know?**
  LCES is one part of the Rules of Engagement.
- **How does LCES relate to the Fire Orders?**
  L, C, E, and S are the key operational actions that are in the Fire Orders.
- **What role does LCES have in the Risk Management Process?**
  LCES is the minimum level of hazard control that must be in place before making the decision to engage a fire.

The Burn: Good Black

Natural: Meadow

Natural: Ridge Top

Natural: Sparse Vegetation

Constructed: Black Line

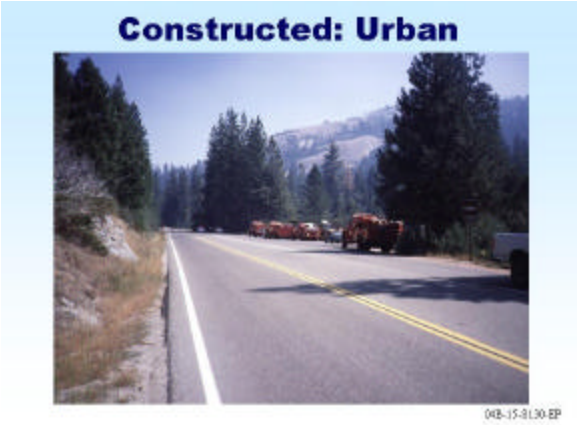
Constructed: Fire Operations

Constructed: Helispot

Constructed: Agricultural

Constructed: Agricultural

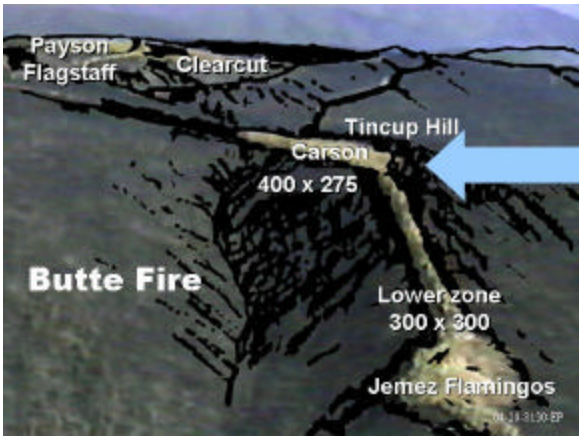
Agricultural: Clear Cuts


Constructed: Urban

Constructed: Urban

Thirtymile Fire
Road
Chewuch River
Point of Fire Origin
Spot Fires
N

Thirtymile Fire



Natural: Ridge Top

Natural: Meadow

Review Unit 4B Objectives

1. Describe how LCES is related to the 10 Standard Firefighting Orders.
2. Define escape route, escape time, and safety zone.
3. Identify travel barriers that will affect escape time.
4. List the 3 types of safety zone categories and describe one example of each.

Review Unit 4B Objectives

5. Describe a general guideline for determining safety zone size to avoid radiant heat injury.
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7. Describe the difference between deployment sites and safety zones.

Unit 4C Fire Shelter

04C-1-S130-EP

Unit 4C Objectives

1. Explain the two most important functions of the fire shelter.
2. Discuss the inspection and care of the fire shelter.
3. Discuss the last resort survival options.
4. Define entrapment and deployment site.
5. Demonstrate the correct deployment procedures for the fire shelter in 25 seconds or less.

04C-2-S130-EP

Most Important Functions of a Fire Shelter

1. To reflect radiant heat.
2. To provide cooler, breathable air to protect your lungs and airway.

04C-3-S130-EP

Mandatory Carrying

Fire shelter will be carried by…

- all fireline personnel during fire suppression and prescribed fire operations.
- all fire support personnel who may be required to enter a fire area.

04C-4-S130-EP

Items to Wear/Take into Fire Shelter

1. Gloves
2. Radio
3. Hard hat
4. Water

04C-5-S130-EP

Care & Handling

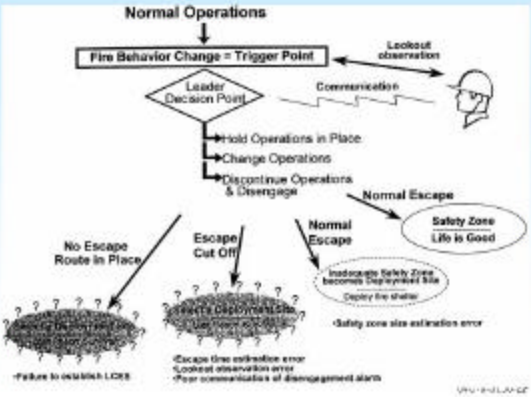
1. Keep shelter away from sharp objects.
2. Do not load heavy objects on top of shelter.
3. Avoid rough handling.
4. Do not lean against objects when wearing shelter.

04C-6-S130-EP

Care & Handling

5. Do not sit on shelter or use as a pillow.
6. Carry in polyethylene liner.
7. Carry where you can reach; NEVER inside your pack.
8. Treat your fire shelter with respect.

04C-7-S130-EP



Survival Options

1. Stay alert, keep calm, think clearly and act decisively. DON'T PANIC!
2. Wear all PPE.
3. Protect your airway.
4. Escape if possible.
5. Note survivable deployment sites throughout the work day.
6. Don't plan on sharing a shelter.

04C-8-S130-EP

Survival Options

1. If entrapment is imminent, but there is time to prepare…
2. If there is no time for preparation, and the fire is on you…

04C-10-S130-EP

Heat Barrier Options

1. Vehicles as barriers
2. Dozers, tractor plows, and water-tenders as barriers
3. Structures as barriers

04C-11-S130-EP

The Standard Firefighting Orders, LCES, their operational component, and the Watch Out Situations are tools that must be used on every assignment. If they are used properly, the LAST RESORT SURVIVAL techniques should not be needed.

LEARN TO USE THEM!

04C-12-S130-EP

Review Unit 4C Objectives

1. Explain the two most important functions of the fire shelter.
2. Discuss the inspection and care of the fire shelter.
3. Discuss the last resort survival options.
4. Define entrapment and deployment site.
5. Demonstrate the correct deployment procedures for the fire shelter in 25 seconds or less.

Unit 4D Objectives

1. Define safety.
2. Define Situation Awareness and describe why it is important.
3. State the five communication responsibilities.
4. Identify potential hazards in the fire environment.
5. Define the Risk Management Process and describe why it is important.
6. Describe actions that foster teamwork.

Hazards

1. Fire Environment Hazards
2. Human Related Hazards
3. Other Environmental Hazards
4. Biological Hazards
5. Equipment Hazards
6. Vehicle Hazards

Hazards, Continued

7. Aircraft Hazards
8. Base Camp Related Hazards
9. Wildland/Urban Interface Hazards
10. Tree and Snag Hazards

Risk Management Process

Step 1 – Situational Awareness
Step 2 – Hazard Assessment
Step 3 – Hazard Control
Step 4 – Decision Point
Step 5 – Evaluate

Teamwork

1. What are some successful teams you have seen or been involved with prior to today?
2. What were some characteristics of successful teams you have seen or been involved with?
3. What are some characteristics of unsuccessful teams you have seen or been involved with?
4. Why is teamwork so important to firefighting?

04D-7-9(130-EP

Review Unit 4D Objectives

1. Define safety.
2. Define Situation Awareness and describe why it is important.
3. State the five communication responsibilities.
4. Identify potential hazards in the fire environment.
5. Define the Risk Management Process and describe why it is important.
6. Describe actions that foster teamwork.

04D-8-9(130-EP

Unit 5 Objective

Develop a list of three safety procedures to follow when traveling by each of the following:

- Vehicle
- Boat
- Helicopter
- Fixed-wing aircraft
- On foot

05-02-01/30-EP

Vehicle Travel

- Loading
- Riding
- Unloading

05-03-01/30-EP

Boat Travel

- Loading
- Riding
- Unloading

05-04-01/30-EP

Helicopter Travel

- Loading
- Riding
- Unloading

05-05-01/30-EP

Fixed-Wing Aircraft Travel

- Large transport aircraft
- Smaller aircraft

05-06-01/30-EP

Foot Travel
• Supervisor will set pace and select route.
• Crew members MUST stay together.
• Maintain proper distance between crew members.
• Hazards

Review Unit 5 Objective
Develop a list of three safety procedures to follow when traveling by each of the following:
• Vehicle
• Boat
• Helicopter
• Fixed-wing aircraft
• On foot

Unit 9 Objectives

1. Describe three methods for breaking the fire triangle.
2. Describe three methods of attack on a fire.
3. List three suppression techniques and describe their uses.
4. Describe the blackline concept.
5. Describe four kinds of fire control line.

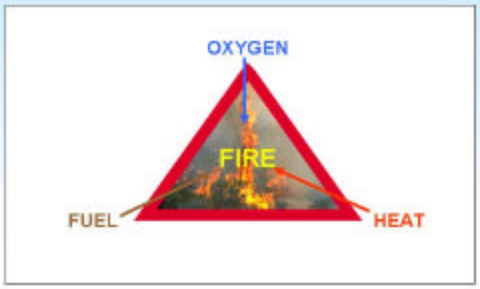
Unit 9 Objectives

6. Name four threats/hazards to an existing control line when fire is burning inside the line.
7. Describe the proper follow-up procedures for a dozer or tractor plow fireline.
8. Describe two kinds of coordinated crew techniques used for fireline construction and with at least four additional personnel, construct a fireline using these techniques.

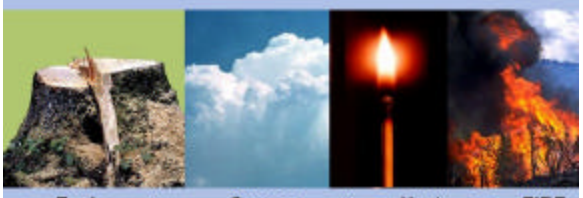
Unit 9 Objectives

9. Describe safety procedures to follow when in an area where retardant/water drops are being made.
10. Describe five safety procedures to follow when working around engines, tractor plows, and dozers.
11. Demonstrate the proper use of appropriate hand tools during fire suppression activities.
12. Demonstrate the construction of a cup trench on a steep slope.

The Fire Triangle



The Fire Triangle



Fuel + Oxygen + Heat = FIRE

Remove one or more of these elements and the fire is extinguished

by cutting a line removing the fuel | by spraying water or throwing dirt | by hot spotting cooling with water or dirt | = NO FIRE

Fireline Construction Standards

- Influencing Factors
  - Fuel type
  - Fuel moisture
  - Continuity and arrangement of fuel
  - Temperatures
  - Wind

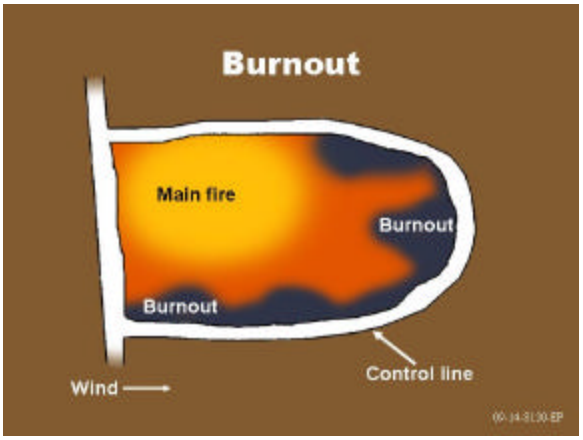
Methods of Attack

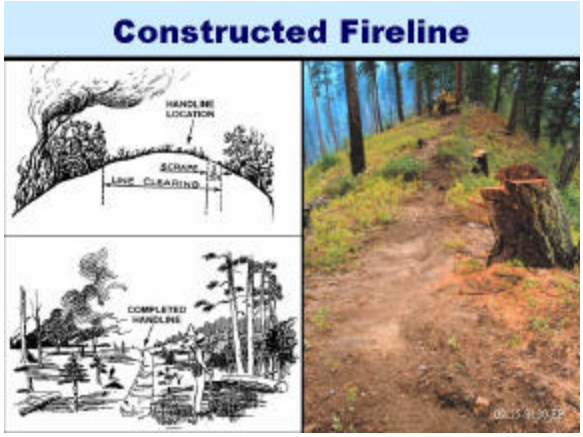
- Direct Attack
- Indirect Attack
- Flanking/Parallel Attack

Hotspotting

Cold Trailing

Burning Out


Burnout
Main fire
Burnout
Burnout
Control line
Wind


Constructed Fireline
HANDLINE LOCATION
SCRAPE
LINE CLEARING
COMPLETED HANDLINE

Cup Trench

Natural Control Line
• Cold fire edge
• Fuel break
• Previously constructed barriers

Threats to
Existing Control Line
• Spotting
• Rolling Debris
• Creeping
• Radiant Heat

Dozer or Tractor Plow Follow Up

- Clean up
- Break up machine piles and berms
- Fireproof needed areas
- Prepare and burn out control line
- Secure the control line
- Mop up the interior
- Patrol the control line

09-19-S130-EP

Coordinated Crew Techniques

09-20-S130-EP

Retardant/Water Drop Safety Procedures

09-21-S130-EP

Safety Procedures

- Engine
- Tractor Plow and Dozer

09-22-S130-EP

Unit 9 Objectives

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09-23-S130-EP

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09-24-S130-EP

Unit 9 Objectives

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11. Demonstrate the proper use of appropriate hand tools during fire suppression activities.
12. Demonstrate the construction of a cup trench on a steep slope.

09-15-9130-EP

Unit 10A Objectives

1. Describe five ways to communicate with designated personnel.
2. Describe a systematic method of locating spot fires.
3. Describe four considerations when patrolling a fire.

10A-3-3130-EP

Methods of Communication

- Hand signals
- Written messages
- Use of runners
- Mirrors
- Whistles or airhorns
- Two-way radios

10A-4-3130-EP

Identify a Communication Plan with Supervisor

May include:

- What type of communication to use.
- How often you must report.
- What kind of information to report.
- What types of signals to use if necessary.
- Having a backup plan.

10A-5-3130-EP

Things to Consider when Patrolling

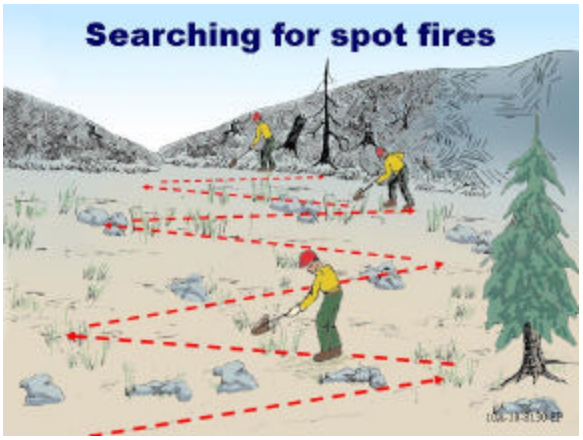
- Purpose of the patrol assignment?
- Coverage of the assigned area?
- Information to be reported?
- Working in pairs or a systematic approach?
- Safety zones and escape routes?

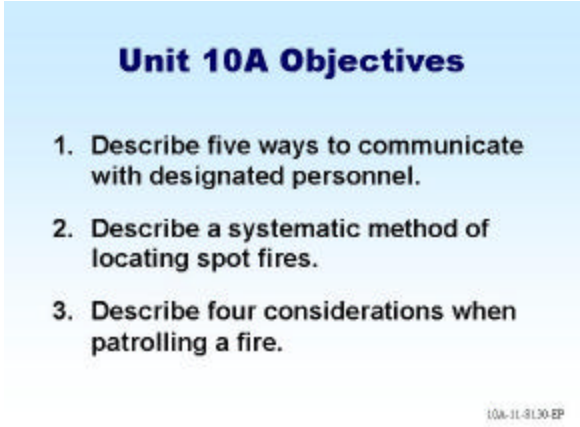
10A-6-3130-EP

Patrolling for Spot Fires

Conditions Contributing to Spot Fires
• Extremely dry weather
• Steep topography
• Heavy fuel
• Crown fires
• Whirlwinds or dust devils

Conditions Contributing to Spot Fires
• Torched-out, lone tree
• Wind across the fireline
• Punky logs and tree roots hidden beneath the fireline in the soil
• Snags
• Flashy fuels


Searching for spot fires


Unit 10A Objectives
1. Describe five ways to communicate with designated personnel.
2. Describe a systematic method of locating spot fires.
3. Describe four considerations when patrolling a fire.

Unit 10B

Radio Communication

Unit 10B Objectives

1. Describe frequencies and how they affect radio communications.
2. List four elements of proper radio use procedures.
3. Transmit a message clearly using proper procedure and language.
4. Describe three radio troubleshooting practices used to improve radio reception or transmission.
5. Describe precautions and care to protect the radio from damage.

Radio Control and Functions

Radio Use

1. For official use only.
2. Emergency traffic has priority.
3. Use clear speech to relay message. No "CB" talk.
4. Think before pushing the button.
5. Write down messages you receive.

Proper Radio Use Procedures

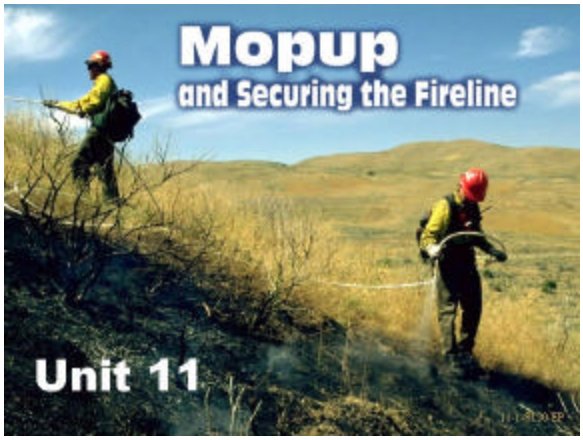
- Be courteous.
- Swearing and obscene language is prohibited.
- Answer radio calls promptly.
- Have pencil and note pad ready for messages.

Proper Radio Use Procedures

- Be brief; radio channels are busy.
- To declare an emergency, break into the radio traffic and ask for the channel to be cleared for emergency traffic.
- Talk into the microphone.
- Use normal tone of voice.

Review Unit 10B Objectives

1. Describe frequencies and how they affect radio communications.
2. List four elements of proper radio use procedures.
3. Transmit a message clearly using proper procedure and language.
4. Describe three radio troubleshooting practices used to improve radio reception or transmission.
5. Describe precautions and care to protect the radio from damage.



Unit 11 Objectives

1. Describe and demonstrate how to extinguish burning materials by chopping, scraping, and mixing them with soil and water.
2. Describe precautions to take when applying water to hot materials and demonstrate proper techniques for doing so.
3. Describe a systematic method of mopup and give two reasons for using this method.

11-2-S130-EP

Unit 11 Objectives

4. Describe how four of the senses aid in detecting burning materials.
5. Discuss the importance of breaking up and dispersing machine piles and berms adjacent to the control line.
6. Demonstrate the technique of cold trailing on a simulated fire perimeter.

11-3-S130-EP

Unit 11 Objectives

7. State three factors that determine the amount of additional work required for a water or retardant line.
8. Given a constructed control line, strengthen the line to facilitate holding by rearranging and fireproofing fuels adjacent to the line.

11-4-S130-EP

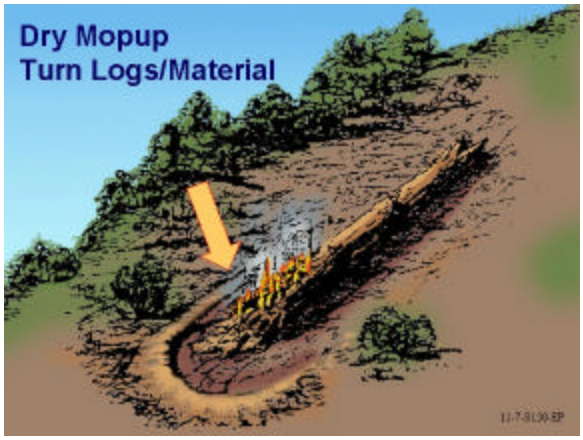
Dry Mopup
Boneyarding or Bone Piling

11-5-S130-EP

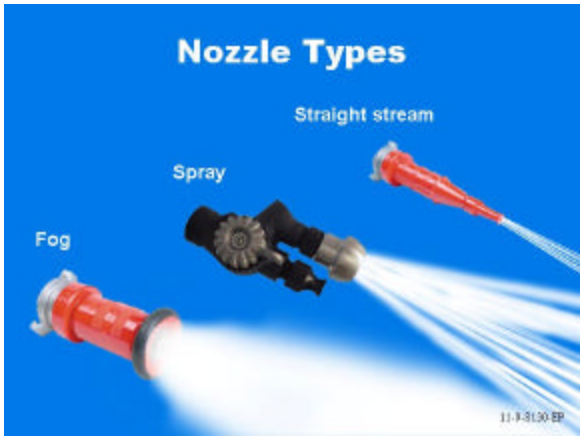
Dry Mopup

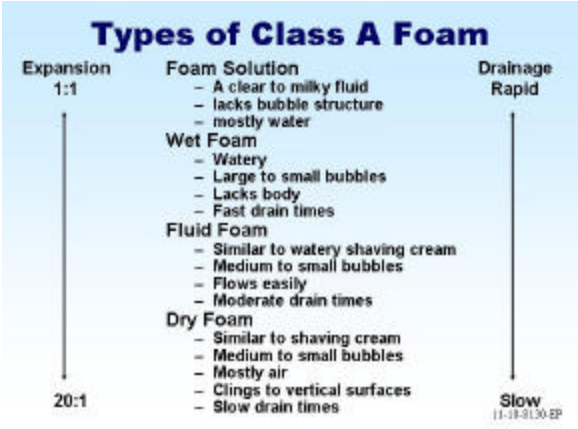
- Chunking and piling
- Spreading of heavy concentrations of materials near control line or inside burned area.
- Banked fuels

11-6-S130-EP


Dry Mopup
Turn Logs/Material

Wet Mopup


Nozzle Types
Straight stream
Spray
Fog

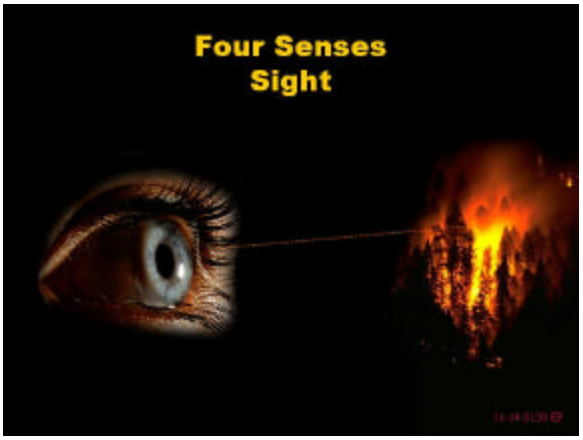

Types of Class A Foam
Expansion
1:1
20:1
Foam Solution
– A clear to milky fluid
– lacks bubble structure
– mostly water
Wet Foam
– Watery
– Large to small bubbles
– Lacks body
– Fast drain times
Fluid Foam
– Similar to watery shaving cream
– Medium to small bubbles
– Flows easily
– Moderate drain times
Dry Foam
– Similar to shaving cream
– Medium to small bubbles
– Mostly air
– Clings to vertical surfaces
– Slow drain times
Drainage
Rapid
Slow

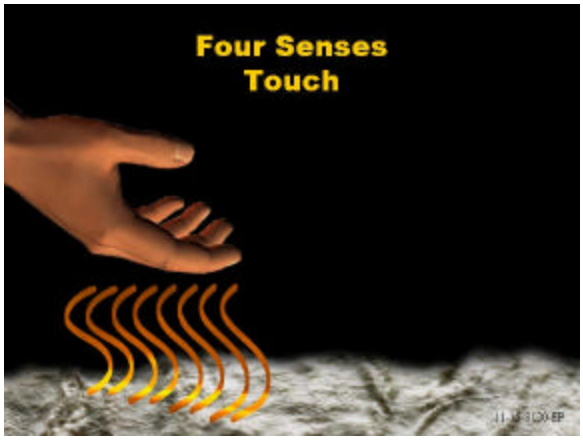
Safety Hazards

Low-hanging limbs can spread fire across fireline

Systematic Mopup

- Work from hottest to coolest area.
- Plan a beginning and ending point.
- Work inward from control line.
- Examine entire assigned area.
- Obtain clear instructions.
- Use a grid system if necessary.





Four Senses Hearing

Covered Fuels Machine Piles

- Break up and disperse
- Hazards in machine piles include:
  - spring poles
  - unstable footing
  - hidden pockets
  - reduced recognition and visibility at night
  - falling berm and logs
  - fatigue

Covered Fuels Ground

- Coal seams
- Peat
- Heavy duff layers in timber
- Natural fuel accumulations

11-19-S130-EP

Strengthening Control Line Rearrange Fuel

11-20-S130-EP

Strengthening Control Line Waterbars

11-22-S130-EP

Review Unit 11 Objectives

1. Describe and demonstrate how to extinguish burning materials by chopping, scraping, and mixing them with soil and water.
2. Describe precautions to take when applying water to hot materials and demonstrate proper techniques for doing so.
3. Describe a systematic method of mopup and give two reasons for using this method.

11-23-S130-EP

Review Unit 11 Objectives

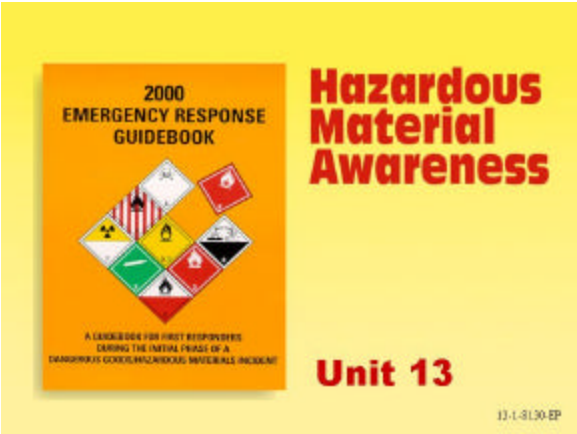
4. Describe how four of the senses aid in detecting burning materials.
5. Discuss the importance of breaking up and dispersing machine piles and berms adjacent to the control line.
6. Demonstrate the technique of cold trailing on a simulated fire perimeter.

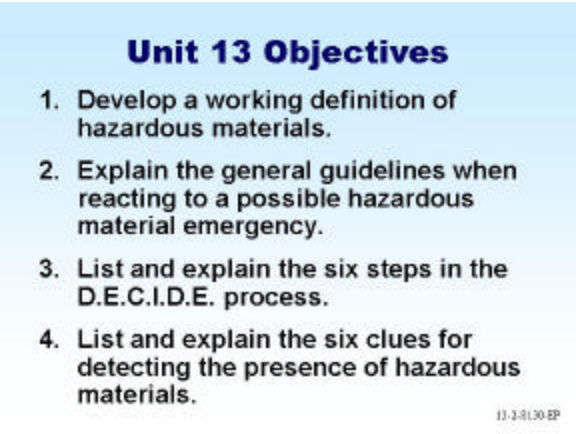
11-24-S130-EP

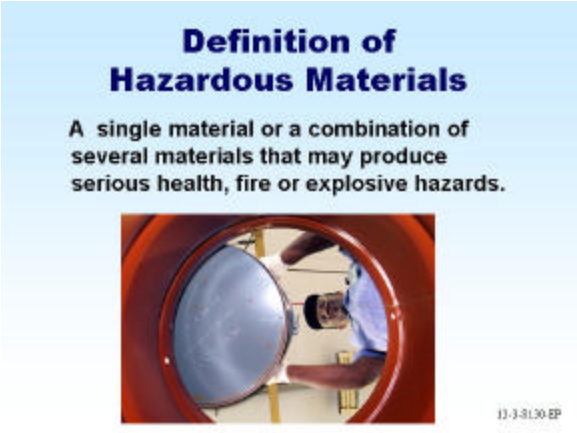
Review Unit 11 Objectives

7. State three factors that determine the amount of additional work required for a water or retardant line.
8. Given a constructed control line, strengthen the line to facilitate holding by rearranging and fireproofing fuels adjacent to the line.

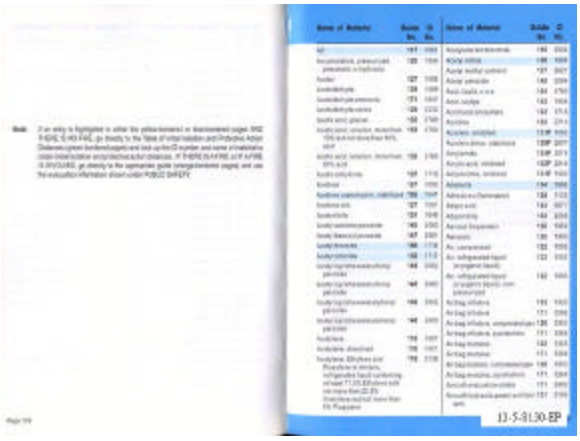
11-35-9130-EP

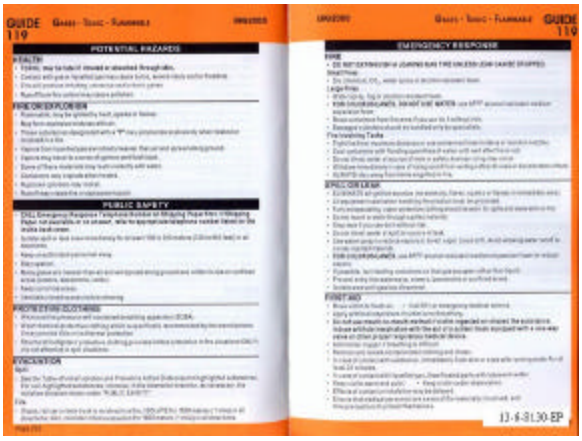

2000
EMERGENCY RESPONSE
GUIDEBOOK
Hazardous
Material
Awareness
Unit 13
13-1-R130-EP


Unit 13 Objectives
1. Develop a working definition of hazardous materials.
2. Explain the general guidelines when reacting to a possible hazardous material emergency.
3. List and explain the six steps in the D.E.C.I.D.E. process.
4. List and explain the six clues for detecting the presence of hazardous materials.
13-2-R130-EP


Definition of
Hazardous Materials
A single material or a combination of several materials that may produce serious health, fire or explosive hazards.
13-3-R130-EP

13-4-R130-EP


13-5-R130-EP


GUIDE 119
POTENTIAL HAZARDS
PUBLIC SAFETY
EMERGENCY RESPONSE
13-6-R130-EP

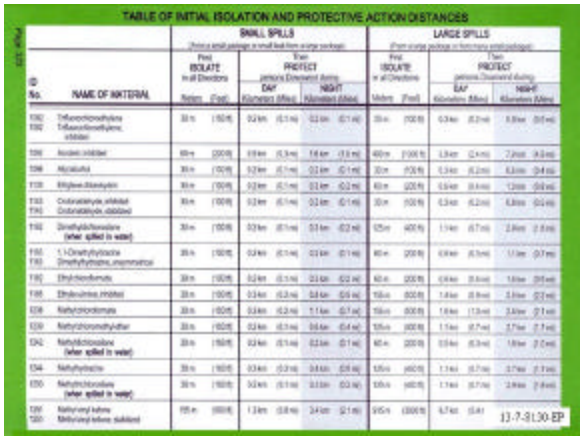
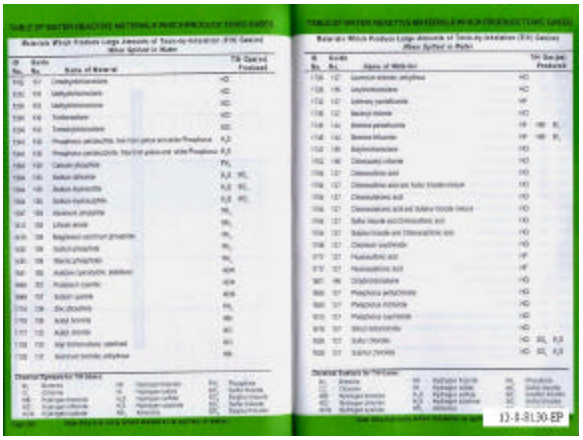
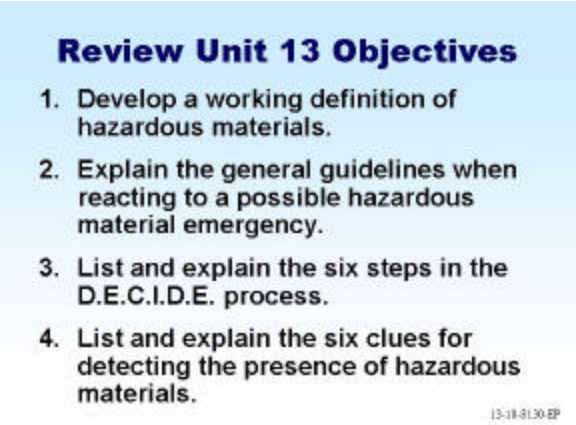


TABLE OF INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES
SMALL SPILLS
LARGE SPILLS
13-7-S130-EP


13-8-S130-EP

Hazardous Material Placard
1219
3
13-9-S130-EP


Review Unit 13 Objectives
1. Develop a working definition of hazardous materials.
2. Explain the general guidelines when reacting to a possible hazardous material emergency.
3. List and explain the six steps in the D.E.C.I.D.E. process.
4. List and explain the six clues for detecting the presence of hazardous materials.
13-10-S130-EP

Unit 14 Objectives

1. Identify the wildland/urban interface watch out situations.
2. Identify personnel safety concerns in wildland /urban interface fires.

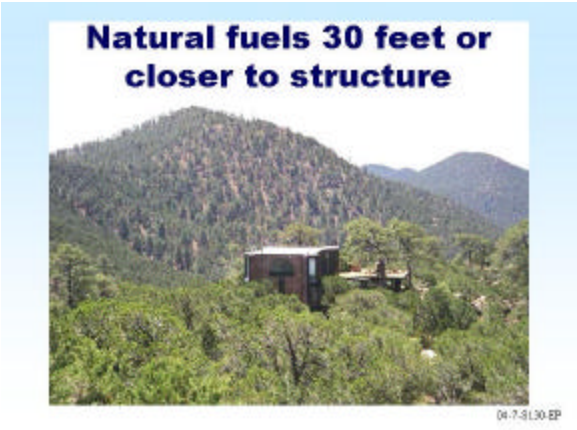
Three Categories of Tactical Plans

1. Defensive Mode
2. Offensive Mode
3. Combined Mode

Wooden Construction and Wood Shake Roofs

Poor Access and Narrow, Congested One-way Roads

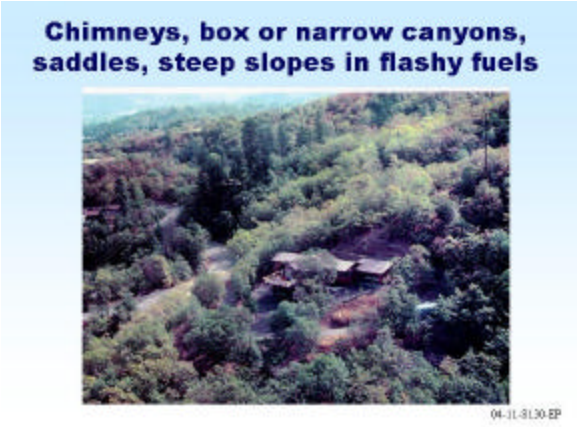
Inadequate Water Supply


Natural fuels 30 feet or closer to structure

Extreme Fire Behavior

Strong Winds

Evacuation of Public


Chimneys, box or narrow canyons, saddles, steep slopes in flashy fuels

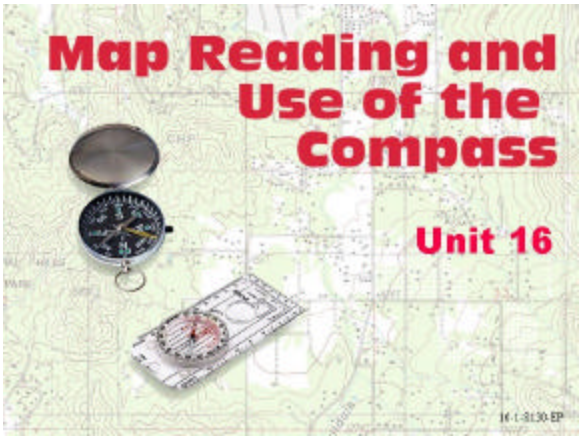
Bridge Load Limits
467

Review Unit 14 Objectives

1. Identify the wildland/urban interface watch out situations.

2. Identify personnel safety concerns in wildland /urban interface fires.

04-13-S130-EP



Unit 16 Objectives

1. Identify the symbols depicted on a locally used map with legend.
2. Name and describe the land survey system used locally.
3. Locate a legal description of a point on a map.
4. Identify major topographic features, both in the field and on a map.
5. Demonstrate the ability to read and shoot an azimuth (bearing) off a compass.

16-2-3(130-EP

Unit 16 Objectives

6. Explain the importance of knowing the proper declination of an area.
7. Determine one's walking pace on flat ground and sloped ground in one chain and 100 foot intervals.
8. Given a compass with proper declination and a local map, determine an azimuth distance, and navigate through wildland terrain between two points.

16-3-3(130-EP

Unit 17 Objectives

1. Describe items to watch for when traveling to, arriving at, and during initial attack that might show the origin and/or cause of the fire.
2. Given a simulated situation, record and report all information that might help in determining fire cause and origin.
3. Given a simulated fire situation, designate and protect the area of fire origin.

17-2-8(130-EP

Observe

- While traveling to the fire
- After arriving at the scene
- During initial attack

Record

- License numbers
- Descriptions of people
- Time

Protect

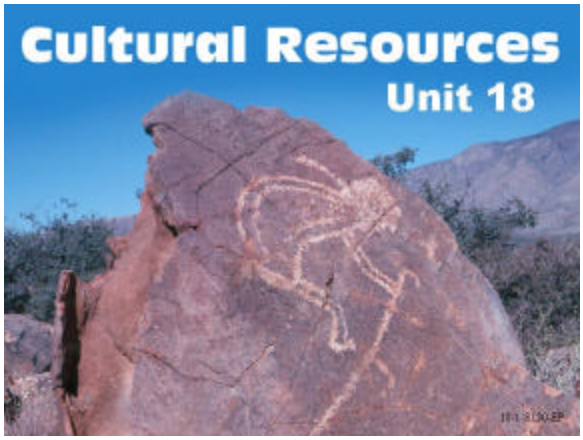
- Point of origin
  - DON'T: Walk through the area, apply water or cut line through the area, or drive vehicles over the area.
  - DO: Use flagging tape, rope or rolled toilet paper to protect larger area; keep others away from the area; place hand tools around a suspected small area.

17-4-8(130-EP

Review Unit 17 Objectives

1. Describe items to watch for when traveling to, arriving at, and during initial attack that might show the origin and/or cause of the fire.
2. Given a simulated situation, record and report all information that might help in determining fire cause and origin.
3. Given a simulated fire situation, designate and protect the area of fire origin.

17-7-9130-EP



Unit 18 Objectives

1. Define the phrase "Cultural Resources."
2. Describe the effects of fire and fire management activities on cultural resources.
3. Describe the steps to protect cultural resources during fire management activities.

What is a cultural resource?

Any surviving material that is a potential resource for understanding the past.

Types of Cultural Resources

1. Artifact: A portable material object made or modified by humans
2. Feature: Non-portable artifact such as a rock alignment

Types of Cultural Resources

3. Site: Typical examples are habitation sites, quarry sites, gathering sites and trails.
4. Context: The locations and relationships of artifact structures within a site.

Legal Responsibilities

1. National Historic Preservation Act (NHPA) OF 1966
2. Archaeological Resources Protection Act (ARPA) of 1979

Effects of Fire Management Activities on Cultural Resources

1. Destruction of architecture
2. Displacement of artifacts
3. Destruction of the artifacts

18-7-S130-EP

Cultural Resource Protection

1. Awareness
2. Avoidance
3. Reporting
4. Consulting

18-8-S130-EP

Review Unit 18 Objectives

1. Define the phrase "Cultural Resources."
2. Describe the effects of fire and fire management activities on cultural resources.
3. Describe the steps to protect cultural resources during fire management activities.

18-9-S130-EP

Firefighter Training
S-130

NFES 2730

Student Workbook

DECEMBER, 2003

PREFACE

Firefighter Training, S-130, is required training for qualification as a Firefighter 2 (FFT2) under the Wildland and Prescribed Fire Qualification System Guide, PMS 310-1.

The original Firefighter, S-130 course was developed in 1981 by an Interagency team and revised in 1994. The 2003 version updates that course and was developed by an interagency team composed of:

Ben Jacobs - National Park Service
Craig Cook - Bureau of Indian Affairs
Bobi Stiles - US Forest Service
Michelle Ellis - US Forest Service
Tom Adams - State of Oregon
Rich Mattingly - National Park Service
Shane Del Grosso - US Fish and Wildlife Service

Comments regarding this package or additional information should be addressed to:

nwcg_standards@nifc.blm.gov
National Interagency Fire Center
Fire Training
Training Standards Unit
3833 South Development
Boise, Idaho 83705

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Lesson B - Basic Terminology 0B.1

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Unit 2 - ICS Overview 2.1

Unit 3 - Resource Types 3.1

Unit 4 - Risk Management
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Lesson C - Fire Shelter 4C.1
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Unit 18 - Cultural Resources (Optional) 18.1

INTRODUCTION

This course, Firefighter Training, S-130 and Introduction to Wildland Fire Behavior, S-190, are required training for all personnel prior to certification as a Firefighter (FFT2) under the Wildland and Prescribed Fire Qualification System Guide, PMS 310-1. An adapted version of L-180, Human Factors on the Fireline, has been included as part of this course. This entry-level course for all new firefighters can also be used as a refresher course for returning firefighters.

The purpose of this course is to train new firefighters in basic firefighting skills. Firefighters who successfully complete this course and the Work Capacity Test will be qualified to suppress wildland fires WHILE UNDER CLOSE SUPERVISION.

This course has been designed to be presented by qualified instructors at any location.

FIREFIGHTER TRAINING, S-130

Unit 0 - Introduction

Lesson A - Logistics and Overview

OBJECTIVE:

- Introduce the Firefighter Training course.

COURSE OBJECTIVES

- Explain what the LCES (Lookouts, Communications, Escape Routes, and Safety Zones) system is and how it relates to the Standard Firefighting Orders.
- Construct fireline to required standards using various methods.
- Strengthen, reinforce, and use holding actions on a fireline.
- Extinguish the fire with or without the use of water.
- Complete assigned tasks in a safe and efficient manner.
- Given an assignment in a wildfire environment, describe factors in that environment which could impact safety.

COURSE EVALUATION

Students will be evaluated by the following methods:

- Performance testing
- Oral/written quizzes
- Instructor observation

Some items will be evaluated on a “pass or fail” basis. Others will be evaluated on a percentage basis; for those, a score of 70% or higher is required.

Evaluation methods will be explained to the students at the beginning of each unit/lesson, if applicable.

FIREFIGHTER TRAINING, S-130

Unit 0 - Introduction

Lesson B - Basic Terminology

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Identify nine parts of a fire.
2. Define nine fire behavior terms.
3. Discuss five other useful firefighting terms.

PARTS OF THE FIRE

Origin – the location where the fire started.

Head – shows the direction in which the fire is burning. This is the hottest and most active part of the fire.

Flank (right and left) – Sides of the fire, parallel to the main direction of spread. May have active fire, but not as hot as the head of the fire.

Rear/Heel – Opposite the head of the fire and burning less vigorously, if at all. Often near the fire origin.

Perimeter – Boundary line of the fire or fire edge. May not have active fire on some portions.

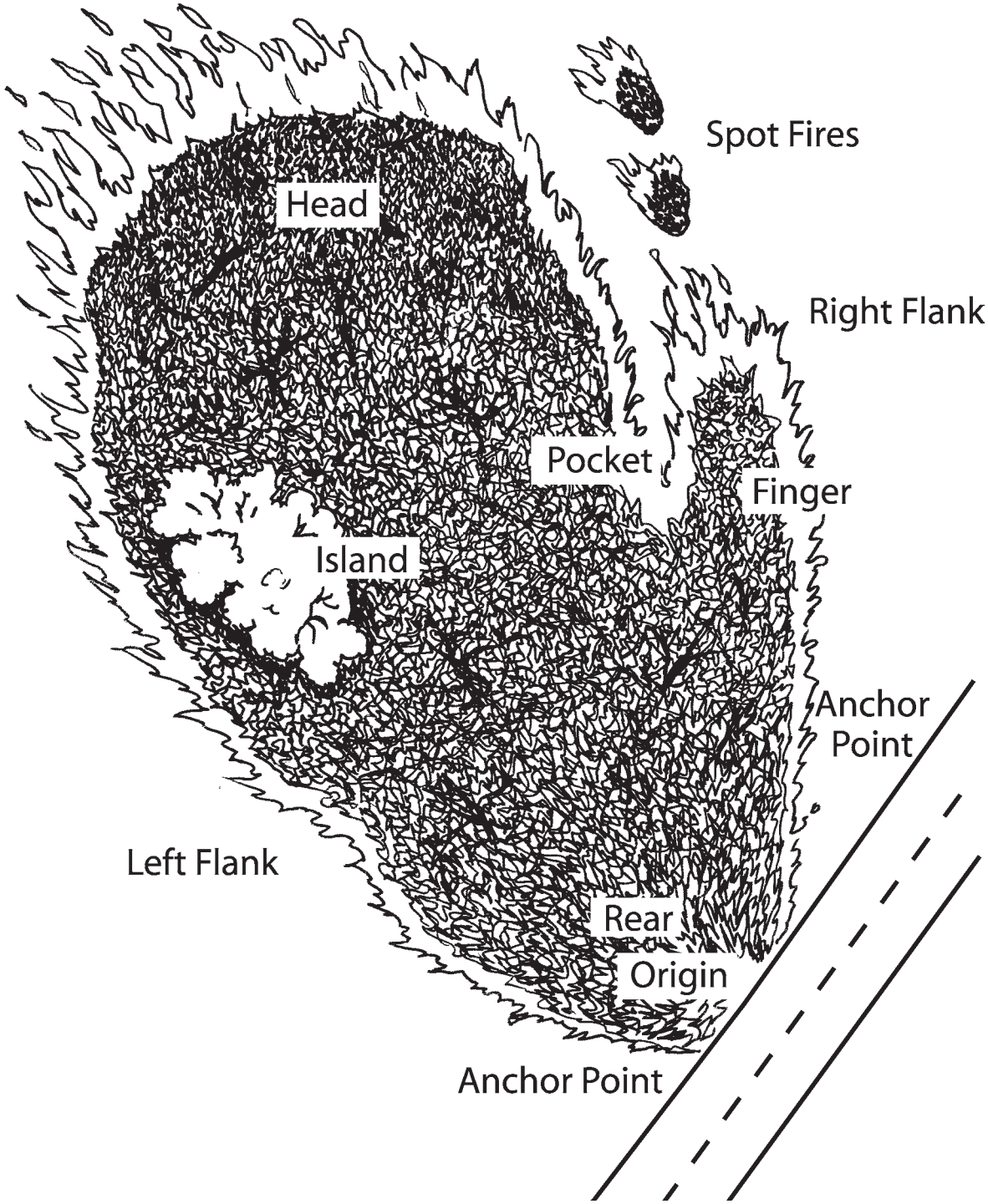
Finger – An area, usually a narrow strip, that burns away from the main part of the fire. Could be dangerous if personnel working the fire are flanked by a finger.

Pocket – Unburned area between the main fire and any fingers.

Island – Area of unburned fuel inside the fire perimeter.

Spot Fire – Burning area outside the main fire perimeter, often caused by wind blown embers or rolling debris.

PARTS OF THE FIRE



FIRE BEHAVIOR TERMS

Spread – Movement of the fire. ROS is Rate of Spread and given in chains per hour. A chain is a surveying term and equals 66 feet. A good rule of thumb is to watch the fire spread for a minute as there are 60 minutes in an hour and just over 60 feet in a chain so this will give a fairly quick, relatively accurate measurement of the fire's forward progress (ex. 1 foot/minute = 1 chain/hour).

Smoldering – Fire burning without flame and barely spreading.

Creeping – Fire burning with a low flame and spreading slowly.

Running – Fire spreading rapidly with a well-defined head.

Backing – Fire moving away from the head, downhill, or against the wind.

Spotting – Sparks or embers produced by the main fire are carried by winds or convection column.

Torching – Fire burning on the surface, but periodically igniting the crown of a single or small group of trees or shrubs before returning to the surface. Although sometimes confused with crowning this behavior is not as serious as a crown fire.

Crowning – Fire that advances across tops of trees or shrubs more or less independent of surface fire. High fire intensity and high forward rate of spread. Use crown fire or crowning with care because it describes a very serious fire situation.

Blowup – Sudden increase in fire intensity or rate of spread of a fire sufficient to preclude direct control or to upset existing suppression plans.

OTHER USEFUL FIREFIGHTING TERMS

Control Line – A comprehensive term used for all the constructed or natural fire barriers and treated fire edges used to contain the fire.

Fireline – Any cleared strip or portion of a control line from which flammable material has been removed by scraping or digging down to mineral soil.

Anchor Point – An advantageous location, generally a fire barrier, from which to start constructing a fireline. Used to minimize the chance of being outflanked by the fire while the line is being constructed.

Mopup – Final extinguishment of a fire after it is lined.

Class of Fire – This classifies the size of the fire with class "A" being the smallest and class "G" being the largest.

FIREFIGHTER TRAINING, S-130

Unit 1 - Firefighter Preparedness

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Explain the importance of the proper use and maintenance of their assigned Personal Protective Equipment (PPE).

2. Develop a list of personal gear needed for an extended period away from their home station.

3. Explain the firefighter's accountability for personal and agency property.

4. List the benefits of maintaining a high level of physical fitness and health.

5. Explain how eating well and staying hydrated can reduce firefighter fatigue.

6. Explain the importance of keeping personal gear and assigned area in fire camp clean and organized.

I. INTRODUCTION

II. PERSONAL GEAR

A. Weight Limits:
Total individual gear weight = 65 pounds
Personal gear weight = 45 pounds
Web gear weight = 20 pounds (weight is without water)

B. Mandatory Items: Personal Protective Equipment (PPE)

1. Hard hat

2. Eye protection

3. Hearing protection

4. Gloves

5. Flame-resistant clothing - Nomex™

   a. Trousers (Flame resistant)

   b. Shirts (Flame resistant)

6. Boots
   Leather work boots, lace-up, 8" high, heavy soles with deep tread, leather laces

7. Socks

8. Fire shelter with vinyl cover

9. Canteens (for drinking fluids only)

10. Head lamp, with fresh/spare batteries and spare bulb

11. Chain saw chaps (if assigned as a chainsaw operator or swamper)

12. First aid kit

13. Flat (bastard) files, 10" or 12"

14. Food, 1-2 meals minimum, preferably high energy

15. Personal gear pack (red bag)

16. Sleeping bag

17. Incident Response Pocket Guide

C. Optional Items

1. Hard hat shroud

2. Tent

3. Jacket or coat

4. Extra clothing (pants, shirts and socks)

5. Personal hygienic gear

6. Small “ditty bag” packed with some personal items and a fire shirt.

D. Other personal items. Some simple items will make your job easier and will add little to the overall pack weight. These items include:

1. Matches (in a waterproof container)

2. Watch

3. Pocketknife

4. Eyeglasses (if needed)/sunglasses

5. Prescriptions (if needed)

6. Water (one gallon per day/minimum)

7. Rain gear

8. Compass

9. Toilet paper

10. Spare boot laces

11. Bandanas

12. Flip flops for use in the showers to prevent athlete's foot

13. Small towel

14. Small flashlight

15. Instant hand sanitizer

III. ACCOUNTABILITY

Firefighters will be issued gear worth more than $500. Firefighters are responsible for the proper use and maintenance of issued property.

The agency will not be held responsible for any personal gear not necessary for use in fire activity.

Care and Maintenance of personal and government issued equipment:

A. Hard hat

1. Keep headband and straps clean.

2. Do not modify.

3. Clean hats with soap and water.

4. Inspect for cracks and damage.

B. Nomex™ (fire resistant) clothing

1. Keep clean - Nomex™ loses its fire retardant capabilities if foreign substances are on or in the fibers. Check tag for washing instructions. Wash separately.

2. Replace clothing if ripped or torn.

C. Boots

1. Keep clean and apply boot grease as necessary.

2. Insure that boots are in good repair. This should include inspecting and replacing soles, insuring all stitching is present, etc.

IV. FIREFIGHTER FITNESS AND HEALTH

A. Introduction

REMEMBER, WHEN PEOPLE GET TIRED, THAT IS WHEN THEY GET HURT!

B. Physical Fitness

Aerobic fitness - is a measure of the maximum amount of oxygen that one can take into their body and transport to the muscles.

Muscular fitness - includes both strength and muscular endurance.

C. Diet

Firefighters can burn up to 300-600 calories an hour and over 6,000 calories a day. Daily caloric intake should equal expenditure. The key to a good diet is a balanced one that includes food in all the main food groups.

1. Carbohydrates

2. Fat

3. Protein

4. Fiber

5. Calcium

6. Vitamins and minerals

7. Sodium

8. Caffeine

9. Hints for a good performance:

- Avoid alcohol.
- Avoid eating red meat two days in a row.
- Limit egg intake to one per day.
- Eat whole wheat bread instead of white.
- Substitute other seasonings for salt.
- Eat ample amounts of fruit and vegetables.
- Avoid large amounts of sugar calories.
- Concentrate on getting enough carbohydrates.

D. Fluids

1. Symptoms of dehydration are:

- Morning headaches
- Diminished or discoloration of urine
- Diminished sweating
- Constipation
- Irritability

2. Firefighters can minimize dehydration by doing the following:

- THE BEST THING YOU CAN DO IS LOAD UP ON WATER.
- Keep a canteen by your side at all times, including while bedding down.
- Use electrolyte replacing drinks in moderation.
- Avoid excessive soft drinks and caffeine.
- Avoid alcohol completely when on fire assignments.
- Drink herbal teas as a hot drink if available instead of coffee.
- Utilize supplemental carbohydrates during sustained exercise.
- Avoid performance enhancing supplements containing caffeine, ephedrine, and creatine which increase the risk of heart related injuries.

E. Fatigue

1. Symptoms of fatigue are:

- Feeling rundown and groggy in the morning.
- Falling asleep at every break given.
- Feeling light headed and having difficulty concentrating.
- Irritability.
- Dulling of the senses (resulting in a reduction in situation awareness).

2. Firefighters can minimize fatigue by doing the following:

- Maintain adequate food and water intake.
- Pace work output while maintaining a steady rate of productivity.
- Maintain 2 to 1 work to rest cycle.
- Sleep whenever given the opportunity, avoid staying up late in fire camp when it is unnecessary.
- MONITOR YOURSELF AND YOUR CO-WORKERS.

F. Personal Hygiene and Area Cleanliness

1. Ways to maintain personal hygiene and prevent sickness from spreading through a fire crew:

- WASH HANDS FREQUENTLY!!!
- Shower when given the opportunity.
- Avoid sneezing and coughing on each other.
- Change socks and underwear frequently.
- Use foot powder.
- Monitor yourself and co-workers for signs of sickness.
- Supplement diet with Vitamin C, Echinacea, zinc, and multi-vitamins if you are feeling fatigued and have early symptoms of sickness.

2. Keeping your personal gear and assigned area in fire camp clean and organized has the advantage of:

- Maintaining a professional appearance for the crew.
- Being prepared to move on short notice.
- Lessening the chance of losing items.
- Minimizing impact to the environment.

FIREFIGHTER TRAINING, S-130

Unit 2 - Introduction to ICS

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Describe the firefighter's chain of command.

2. Define an incident and describe how the incident management structure is organized.

3. Describe the general responsibilities of each section in the Incident Command System (ICS).

4. Name the two positions above the firefighter in the chain of command.

I. WHAT IS INCIDENT COMMAND SYSTEM?

A. Management tool for responding to emergency situations. It establishes the chain of command.

B. It is adaptable to many types of incidents (flood, hurricane, wildfire, search and rescue).

C. It is adaptable to the size of the incident. It can grow to meet the needs of the incident while maintaining span of control.

II. CHAIN OF COMMAND

A. Small Fire Organization

B. Span of Control

C. Building up to a 20-Person Handcrew Organization

III. LARGE FIRE MANAGEMENT ORGANIZATION

A. Fire Progression

B. Incident Command System

The incident is organized into the following five functional areas called sections:

- Command

- Operations
- Planning
- Logistics
- Finance/Administration

C. Incident Types

- Structure fire
- Search and rescue
- Flood
- Hurricane response
- Hazardous materials spill
- Vehicle accident
- Wildland fire
- Nationally declared emergency

IV. ICS SECTIONS RESPONSIBILITIES

A. Command

1. This section has overall responsibility and decision-making for an incident.

2. Positions in the command section include:

   a. Incident commander

b. Safety officer

c. Information officer

d. Liaison officer

B. Operations Section

1. Operations section develops and implements the strategy and tactics.

2. Positions in operations section include:

a. Operations section chief

b. Operations branch director

c. Division/Group supervisor

d. Task force leader

e. Strike team leader (tractor/plow, dozer, engine, crew)

f. Crew representative

g. Single resource boss (crew, engine, dozer, felling, firing, tractor/plow)

h. Advanced firefighter/squad boss

i. Firefighter

j. Air operations positions

k. Staging area manager

3. Operations may be divided geographically or functionally to maintain span of control.

C. Planning Section

1. Responsible for documenting and displaying the approved strategy and tactics for the incident.

2. The planning section includes:

   a. Planning section chief

   b. Situation unit

   c. Resources unit

   d. Documentation unit

   e. Demobilization unit

   f. Human resource specialist

   g. Fire behavior analyst

   h. Field observer

   i. Other miscellaneous positions

D. Logistics Section

1. Responsible for providing support and service for all incident personnel.

2. The logistics section includes:

   a. Logistics section chief

   b. Communications unit

   c. Supply unit

d. Medical unit

e. Food unit

f. Facilities unit

g. Ground support unit

h. Other miscellaneous positions

E. Finance/Administration Section

1. Responsible for processing payments, purchasing, contracts and providing cost estimates.

2. The finance section includes:

a. Finance/Administration section chief

b. Cost unit

c. Procurement unit

d. Compensation/claims unit

e. Time unit

f. Commissary manger

g. Other miscellaneous positions

FIREFIGHTER TRAINING, S-130

Unit 3 - Resource Types

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Explain different types of crew organizations commonly used in initial attack and extended attack.

2. Explain the importance of respecting cultural differences in terms of food, standards of behavior, dress, and customs.

I. INTRODUCTION

A. Firefighter Duties and Responsibilities

1. Performs manual and semi-skilled labor.

2. Ensures that objectives and instructions are understood.

3. Performs work in a safe manner.

4. Maintains self in the physical condition required to perform the arduous duties of fire suppression.

5. Keeps personal clothing and equipment in serviceable condition.

6. Reports close calls, accidents or injuries to supervisor.

7. Reports hazardous conditions to supervisor.

B. Crew Organization

1. Establishes chain of command.

2. Provides pre-planned job assignments.

3. Creates teamwork.

4. Gives individuals responsibility.

5. Reduces confusion.

6. Saves time.

7. Maintains control.

8. Builds esprit de corps.

9. Creates respect among crew members.

II. TYPES OF CREWS

A. Hand Crews

Organized Type 1 and 2 crews must be 18-20 persons.

1. Type 1 hand crews

2. Type 2 hand crews

B. Engine Crews

Types of engines and crew configurations:

1. Type 1, 1000 gallon per minute (GPM), 400 gallon tank capacity, 4 crewmember minimum.

2. Type 2, 500 GPM, 400 gallon tank capacity, 3 crewmember minimum.

3. Type 3, 120 GPM, 300 gallon tank capacity, 2 crewmember minimum.

4. Type 4, 70 GPM, 750 gallon tank capacity, 2 crewmember minimum.

5. Type 5, 50 GPM, 500 gallon tank capacity, 2 crewmember minimum.

6. Type 6, 50 GPM, 200 gallon tank capacity, 2 crewmember minimum.

7. Type 7, 20 GPM, 125 gallon tank capacity, 2 crewmember minimum.

C. Helitack Crews

1. Type 1 Helicopter (e.g., Bell 214, Sikorsky S-61), 16 seats, manager only.

2. Type 2 Helicopter (e.g., Bell 205, Bell 212), 10 seats, manager and three crew persons.

3. Type 3 Helicopter (e.g., Bell 206, Hughes 500D, 500E, Hiller 12 E, Bell 47), 3-5 seats, manager and two crew persons.

D. Dozers/Tractor Plow Crews

Classifications range from Type 1 dozers being the heaviest to Type 3 being the lightest, and tractor plows Type 6 is the lightest.

III. CULTURAL DIFFERENCES

A. Areas of Cultural Differences

B. Other Social and Ethnic Considerations

FIREFIGHTER TRAINING, S-130

Unit 4 - Risk Management

Lesson A - Watch Out Situations and Standard Firefighting Orders

OBJECTIVES: Upon completion of this lesson, students will be able to:

1. Identify the common denominators on tragedy fires.
2. Given a scenario, identify the appropriate Watch Out Situations.
3. Apply appropriate Standard Firefighting Orders to minimize the potential for serious injury or death.

I. INTRODUCTION

Common Denominators of Fire Behavior on Fatal and Near-Fatal Fires
Such fires often occur:

- On relatively small fires or isolated areas of large fires.
- In deceptively light fuels, such as grass, herbs, and light brush.
- When fire responds to topographic conditions and runs uphill.
- When there is an unexpected shift in wind direction or in wind speed.

II. WATCH OUT SITUATIONS

A. Watch Out Situations

1. FIRE NOT SCOUTED AND SIZED UP.

   Why is this important?

2. IN COUNTRY NOT SEEN IN DAYLIGHT

   Why is this important?

   What can you do if you cannot wait to see the country in daylight?

3. SAFETY ZONES AND ESCAPE ROUTES NOT IDENTIFIED.

Why is this important?

4. UNFAMILIAR WITH WEATHER AND LOCAL FACTORS INFLUENCING FIRE BEHAVIOR.

Why is it important?

Weather patterns - Do all fires have them?

How do you obtain this local information?

5. UNINFORMED ON STRATEGY, TACTICS AND HAZARDS.

What does strategy mean?

What are tactics?

What hazards need to be identified?

What questions can be asked to reduce the risks?

6. INSTRUCTIONS AND ASSIGNMENT NOT CLEAR.

What should your instructions include?

7. NO COMMUNICATION LINK WITH CREW MEMBERS/ SUPERVISOR.

Why must you be in communication?

8. CONSTRUCTING FIRELINE WITHOUT SAFE ANCHOR POINT.

What is a safe anchor point?

9. BUILDING FIRELINE DOWNHILL WITH FIRE BELOW.

What is the danger in building line downhill?

Can you ever build line downhill?

10. ATTEMPTING FRONTAL ASSAULT ON FIRE.

What are the dangers involved with a frontal assault?

11. UNBURNED FUEL BETWEEN YOU AND THE FIRE.

Why is this a “watch out situation?”

How can you prevent this potential problem?

12. CANNOT SEE MAIN FIRE, NOT IN CONTACT WITH ANYONE WHO CAN.

Why is this important?

13. ON A HILLSIDE WHERE ROLLING MATERIAL CAN IGNITE FUEL BELOW.

What are the consequences?

14. WEATHER IS GETTING HOTTER AND DRIER.

Why is this a “watch out situation?”

How can you tell if it is getting hotter and drier?

15. WIND INCREASES AND/OR CHANGES DIRECTION.

Why is this a “watch out situation?”

16. GETTING FREQUENT SPOT FIRES ACROSS LINE.

What are the consequences of spot fires?

17. TERRAIN AND FUELS MAKE ESCAPE TO SAFETY ZONES DIFFICULT.

Why is this a “watch out situation?”

18. TAKING A NAP NEAR FIRELINE.

Although this is a convenient place what danger might there be?

III. STANDARD FIREFIGHTING ORDERS

1. Keep informed on fire weather conditions and forecasts.
2. Know what your fire is doing at all times.
3. Base all actions on current and expected behavior of the fire.
4. Identify escape routes and safety zones, and make them known.
5. Post lookouts when there is possible danger.
6. Be alert. Keep calm. Think clearly. Act decisively.
7. Maintain prompt communications with your forces, your supervisor and adjoining forces.
8. Give clear instructions and insure they are understood.
9. Maintain control of your forces at all times.
10. Fight fire aggressively, having provided for safety first.

A. #1 - Keep informed on fire weather conditions and forecasts.

Weather will most often dictate where and how your fire will move.

What weather factors are most important to know?

What personal observations can you make?

Where might you obtain “off-site” weather information?

B. <u>#2 - Know what your fire is doing at all times.</u>

Observe, use lookouts and scouts. This is the basic order that all orders fall back on.

What current information on the fire’s status do you need to know?

How do you obtain this information?

C. <u>#3 - Base all actions on current and expected behavior of the fire.</u>

Fire is not static. It will constantly move and grow until it is controlled. Once you have sized up the fire, begin to anticipate its movements. Current and expected fire behavior will help you do this.

When applying this Standard Firefighting Order, what fire behavior elements are considered?

What time of the day are burning conditions most active and why?

Where would most active burning take place for any operational period?

D. <u>#4 - Identify escape routes and safety zones, and make them known.</u>

This order must be in place before firefighters can become engaged. If the fire situation deteriorates, you can always move to a safety zone until the situation becomes clear to you.

What would you consider when identifying escape routes and safety zones?

E. <u>#5 - Post lookouts when there is possible danger.</u>

A lookout will be able to tell you ***what your fire is doing****. The lookout can also take weather readings to help you predict future fire behavior.*

What things would you consider when assigning a lookout?

F. <u>#6 - Be alert. Keep calm. Think clearly. Act decisively.</u>

You must first be clear and calm in your own mind to be safe and effective. If you are confused then move to a safety zone until the situation is clear again. Remember all of us, no matter what our experience level, will be confused and unsure of ourselves at times on the line. There are often just too many variables changing too fast for our minds to process. If you are confused, then move to your safety zone to watch and learn.

What factors in the fire environment might adversely affect our alertness, thinking, judgment, and decision making ability?

What can you do to prevent or reduce the effect of the following factors?

Fatigue and heat stress?

Carbon Monoxide?

Stress?

What should you do to increase your decision making ability?

G. <u>#7 - Maintain prompt communications with your forces, your supervisor and adjoining forces.</u>

If your communication lines are broken then stop and take time to re-evaluate until the lines are open again.

Who do you need to stay in communication with?

What information do you need?

H. #8 - Give clear instructions and ensure they are understood.

When in doubt, ask for clarification of instructions.

Whose responsibility is it to ensure instructions are given and understood?

How do you "ensure understanding?"

I. #9 - Maintain control of your forces at all times.

How do you "maintain control?"

J. #10 - Fight fire aggressively, having provided for safety first.

What safety considerations need to be taken into account prior to fighting fire aggressively?

IV. SUMMARY

WATCH OUT SITUATIONS
SCENARIO

The scenario you are about to see portrays a tragic fire that occurred in the eastern region of the United States. Watch Out Situations were not observed and/or mitigated. Firefighters lost their lives.

In analyzing this scenario, you are reaping the only benefit that can ever be salvaged from a fire tragedy: a learning experience, to minimize the possibility that this could happen to you.

You will have the opportunity to recognize and react to "Watch Out Situations." Awareness of these hazardous situations is your key to survival in the wildland fire environment.

It is important that you look and listen at a high sensitivity level. Clues, both visual and verbal, will be apparent in this scenario, providing indicators that "Watch Out Situations" are present. Use the checklist on the following page to record your observations.

When the video/DVD is shut off, the class will work together as a group to answer the attached questions.

WATCH OUT SITUATIONS
CHECKLIST

_____1. Fire not scouted and sized up.

_____2. In country not seen in daylight.

_____3. Safety zones and escape routes not identified.

_____4. Unfamiliar with weather and local factors influencing fire behavior.

_____5. Uninformed on strategy, tactics and hazards.

_____6. Instructions and assignments not clear.

_____7. No communication link with crew members/supervisor.

_____8. Constructing fireline without safe anchor point.

_____9. Building fireline downhill with fire below.

_____10. Attempting frontal assault on fire.

_____11. Unburned fuel between you and the fire.

_____12. Cannot see main fire, not in contact with anyone who can.

_____13. On a hillside where rolling material can ignite fuel below.

_____14. Weather is getting hotter and drier.

_____15. Wind increases and/or changes direction.

_____16. Getting frequent spot fires across line.

_____17. Terrain and fuels make escape to safety zones difficult.

_____18. Taking a nap near the fireline.

WATCH OUT SITUATIONS
SCENARIO QUESTIONS

1. Which Watch Out Situations did you observe?

2. Was there an adequate briefing with Engine 731?

3. Why should weather and fuel conditions be part of the daily briefing?

4. What can crew members do if information is missing from the briefing?

5. Describe any other events you observed that contributed to the tragedy.

6. Why is it important to know what is happening on other divisions of the fire?

7. What is your number one priority?

FIREFIGHTER TRAINING, S-130

Unit 4 - Risk Management

Lesson B - LCES

OBJECTIVES: Upon completion of this lesson, students will be able to:

1. Describe how Lookouts, Communications, Escape routes and Safety zones (LCES) is related to the Standard Firefighting Orders.

2. Define escape route, escape time, and safety zone.

3. Identify travel barriers that will affect escape time.

4. List the three types of safety zone categories and describe one example of each.

5. Describe a general guideline for determining safety zone size to avoid radiant heat injury.

6. Identify the limitations of utilizing the Incident Response Pocket Guide safety zone guidelines.

7. Describe the difference between deployment sites and safety zones.

I. LCES AND THE 10 STANDARD FIREFIGHTING ORDERS

A. Lookouts

Black Water Fire - 1937, Wyoming. 15 Civilian Conservation Crew members killed.

Discussion topics

1. What would have posting lookouts done for the firefighters in this case?

2. What does the lookout need to be able to see?

3. Who should be selected as a lookout?

4. How many lookouts are needed?

B. Communications

Battlement Creek Fire - 1976, Colorado. Three hotshots killed.

1. What was the main contributing factor to this accident?

2. What are some barriers to communication?

3. The method used to alert firefighters of approaching hazards must be what?

4. What communication devices/methods could be used?

C. Escape Routes

Loop Fire - 1966, California. 12 hotshot crew members killed and another 9 were injured.

1. What was this crew attempting to do?

2. What happened?

3. How could escape routes have been established to avoid this tragedy?

4. How would you define an escape route?

5. What is escape time?

6. What are some travel barriers you might encounter that will increase escape time?

7. When might you need to reevaluate or change your escape routes?

8. How many escape routes should be available to the firefighter? Why?

D. Safety Zones

1. What is a safety zone?

2. Safety zone categories

   a. The burn

   b. Natural features

   c. Constructed features

3. Examples of these types of safety zones may include (refer to PowerPoint slides):

   a. The burn:

   b. Natural:

   c. Natural:

   d. Natural:

   e. Constructed:

   f. Constructed:

g. Constructed:

h. Constructed (agricultural):

i. Constructed (agricultural):

j. Constructed (forestry):

k. Constructed (urban):

4. Determining the size and location of an effective safety zone.

Safety zones must be pre-located to avoid:

- Locations that are downwind from the fire.
- Locations that are in chimneys, saddles or narrow canyons.
- Locations that require a steep uphill escape route (greater than 50% slope).
- Exposure to heavy fuel concentrations on the windward side of ridges, rocks and other solid objects.

The IRPG table assumes no slope or wind. Convection is not addressed. Convective heat transfer from wind, fire whirls and terrain influences will significantly increase the total heat transfer to firefighters and thus require significant increases in the distance separation guidelines.

E. Scenario - Safety Zones

During the fire season of 2001 fourteen firefighters and two civilians deployed their fire shelters while battling the Thirtymile Fire on the Okanogan-Wenatchee National Forest. Their only escape route was cut off and they retreated up canyon to what was believed to be a safety zone.

The site was approximately ½ acre (100 feet by 100 feet) in size located adjacent to a rock talus and riparian vegetation. The fire burned as a crown fire resulting in flame lengths 60-100 feet high.

II. DEPLOYMENT SITES VS. SAFETY ZONES

A. What is a deployment site and when should it be used?

1.

2.

3.

B. Determining when to seek refuge may or may not be easily identifiable to all fire fighters.

C. Scenarios

1. This photo of the Butte Fire shows the steep ridge with continuous heavy fuels below the ridge line. Crews assigned to this section of the control line were to fire off and secure control lines.

   What factors need to be evaluated to determine if this is a deployment site or a safety zone?

2. We have previously identified these photos as natural safety zones. In the first photo if the large pine trees torched out would your opinion change? Why?

   The second photo shows timber in the background that may be prone to extreme fire behavior. Would time of day affect your opinion of this meadow as a safety zone? Why?

FIREFIGHTER TRAINING, S-130

Unit 4 - Risk Management

Lesson C - Fire Shelter

OBJECTIVES: Upon completion of this lesson, students will be able to:

1. Explain the two most important functions of the fire shelter.

2. Discuss the inspection and care of the fire shelter.

3. Discuss the last resort survival options.

4. Discuss entrapment and deployment site.

5. Demonstrate the correct deployment procedures for the fire shelter in 25 seconds or less.

I. INTRODUCTION

A. Two Most Important Functions of the Fire Shelter

1. To reflect radiant heat. It is NOT designed for direct flame contact.

2. To provide cooler, breathable air to protect your lungs and airway.

B. Mandatory Carrying

A fire shelter will be carried by...

- all fireline personnel during all phases of fire suppression and prescribed fire operations.
- all fire support personnel, such as drivers, who may be required to enter a fire area.

C. Items to Wear and Take into Fire Shelter

1. Gloves

2. Radio

3. Hard hat

4. Water

II. SHELTER INSPECTION AND CARE

A. Visual Inspection of the Shelter in the Polyethylene Case (should be made):

1. When the fire shelter is issued to you.

2. At the beginning of each fire season.

3. Every two weeks during the fire season.

B. Fire Shelter Damage

1. Abrasion is the most common damage. Signs of abrasion include:

   a. Gray vinyl bag through which you cannot see the shelter, or visible dark gray stains.

   b. Aluminum particles in the bottom of the bag.

2. Other signs of damage include:

   a. Tears along folded edges exceeding 1/4".

   b. Dents or punctures in the foil over one-inch wide.

   c. One-half inch or more of foil is missing.

C. Care and Handling

III. LAST RESORT SURVIVAL OPTIONS

A. Introduction

1. Stay alert, keep calm, think clearly and act decisively. **DON'T PANIC.**

2. Full PPE is required, especially a hard hat and gloves!

3. Protect your airway.

4. Escape if possible.

5. Make it a habit and part of your **situational awareness** to note survivable deployment sites throughout the work day.

6. Never plan to share a shelter.

B. **Entrapment is Imminent**, but there **is Time** to Prepare.

1. Drop any gear that will not be needed in the site preparation. The bare minimums should be the fire shelter, a tool for removing ground fuel, and some drinking water.

2. Avoid hazardous terrain and heavy fuels. Be aware of snags, rolling rocks and any area that may have vehicle travel.

3. Rivers, streams, ponds, lakes

4. Site preparation can reduce the potential fire intensity by improving the radiant heat distance separation.

5. Individual site preparation considerations:

   a. Seek the lowest point.

   b. Greatest distance from the nearest fuels.

   c. Smooth surface textures for shelter seal.

   d. Utilize heat barriers.

   e. Remove ground fuels (4' x 8').

   f. Prepare to deploy as a crew with shelters grouped as close together as possible.

6. Consider starting a burnout if you have time.

7. Air resources may be an option, but may not always be available.

8. Do not wait until the flame front is upon you to get into the shelter.

C. No Time for Preparation, and the **Fire is on You**.

1. Immediately deploy if there are hot embers raining down on you.

2. You will be hit with a blast of superheated air before the flame front reaches you. To avoid the impact:

   a. Drop to the ground as quickly as possible and do what ever it takes to get into your shelter.

   b. Find the lowest point available and get you face down into the dirt.

   c. Dig a shallow hole and use a dry bandana to breath through.

3. Position your feet toward the fire.

4. At all costs hang onto the shelter; the winds will be turbulent and powerful.

5. Be prepared for the long-haul; entrapments have lasted up to 90 minutes. Drink water and stay calm.

6. **Stay in your shelter**.

7. The noise will be horrendous.

8. Do not leave your shelter until it is cold to the touch, or told to do so by a supervisor.

D. Heat Barrier Options

1. Vehicles as barriers

2. Dozers, tractor plows, and water-tenders as barriers

3. Structures as barriers

VI. SUMMARY AND REVIEW

A. What is a Fire Shelter?

B. What a Fire Shelter is Not

C. Your Fire Shelter Must be Available and in Good Condition.

D. Fire Shelter Training Recommendations

1. Shelter training is mandatory every year.

2. Shelter deployment practice should occur several times during the fire season.

VII. APPLICATION/EVALUATION

FIREFIGHTER TRAINING, S-130

Unit 4 - Risk Management

Lesson D - Potential Hazards and Human Factors on the Fireline

OBJECTIVES: Upon completion of this lesson, students will be able to:

1. Define safety.
2. Define Situation Awareness and describe why it is important.
3. State the five communication responsibilities.
4. Identify potential hazards in the fire environment.
5. Define the Risk Management Process and describe why it is important.
6. Describe actions that foster teamwork.

I. INTRODUCTION

II. SAFETY

Defined in Webster's Dictionary as:

A. The condition of being safe from undergoing or causing hurt, injury, or loss.

B. A device on a piece of equipment to reduce hazard.

C. Freedom from exposure to danger, exemption from injury, and to protect from injury.

III. HUMAN FACTORS ON THE FIRELINE

A. Introduction

B. Situation Awareness

VIDEO SEGMENT 1

1. What concepts discussed in this first video segment do you think are relevant to the job of firefighting?

2. How much "human factor" do you think is involved in a wildland firefighter's job?

3. Do you perceive human error as being a major factor when accidents occur? Do you think it will be any different on the fireline?

4. What is situation awareness (SA)?

5. Why should you, as a beginning firefighter, maintain good situation awareness?

6. Do you think maintaining your situation awareness on the fireline will be difficult? Why?

7. What happens when you become distracted in any work environment?

C. Communication

VIDEO SEGMENT 2

1. What is it about communication that is so important to you as beginning firefighters?

2. What is required for effective communication to take place?

3. What can you do as a beginning firefighter to help ensure that there is clear communication between you and your supervisor or if you are unsure of a situation?

4. What are some common communication barriers that you have experienced in your day-to-day lives?

VIDEO SEGMENT 3

5. As a beginning firefighter, you would most likely prefer to be addressed on the fireline with direct statements. Why are direct statements important?

VIDEO SEGMENT 4

6. Have you used standardized communication procedures in your work environments prior to firefighting?

VIDEO SEGMENT 5

7. Of the five communication responsibilities (briefing, debriefing, communicate hazards, acknowledge messages, ask if you don't know) which do you feel will apply most directly to you as a beginning firefighter?

8. As a beginning firefighter, would you ever feel reluctant to point out hazards to a more experienced crew member?

9. Should you be encouraged to ask questions in situations where you are unsure of what you are supposed to do?

10. How would you deal with a situation where you were discouraged from asking questions?

IV. THE FIRELINE ENVIRONMENT

A. Hazards in the fireline environment can be organized into two categories:

1. Subjective hazard

2. Objective hazard

Four frequently encountered and potentially fatal hazards in the fire environment:

-
-
-
-

B. Fire Environment Hazards

C. Human Related Hazards

D. Other Environmental Hazards

E. Biological Hazards

F. Equipment Hazards

G. Vehicle Hazards (trucks, dozers, tractor/plows)

H. Aircraft (Rotor and Fixed-Wing) Hazards

I. Base Camp Related Hazards

J. Wildland/Urban Interface Hazards

K. Tree and Snag Hazards

Visible categories or conditions of trees

- Living
- Dead (snags)

V. RISK MANAGEMENT PROCESS

A. STEP 1 - SITUATION AWARENESS

Is there any specific information that you, as a beginning firefighter, will want to know from your supervisor on every assignment?

B. STEP 2 - HAZARD ASSESSMENT

1. There are specific tools that help you identify hazards on the fireline work environment.

2. Do you have a professional responsibility to begin to learn how to identify hazards as a beginning firefighter?

C. STEP 3 - HAZARD CONTROL

1. We have basic rules of engagement on the fireline. These rules provide the primary hazard control/mitigations for all operations on the fireline.

2. There are four key operational components of the Standard Firefighting Orders that must always be in place when working on the fireline.

D. STEP 4 - DECISION POINT

1. Will you be making tactical decisions on the fireline?

2. Should you ask questions if you do not understand a decision being made?

3. If your supervisor tells you this is not a good time to ask questions because of the situation at hand, when is another time you could bring up your question?

E. STEP 5 - EVALUATE

1. Why do you think the risk management process must be continually evaluated?

2. Do you, as well as your supervisor, have a responsibility to continually evaluate the risks in your work environment?

VI. TEAMWORK

A. What are some successful teams you have seen or been involved with prior to today?

B. What were some characteristics of successful teams you have seen or been involved with?

C. What were some characteristics of unsuccessful teams you have seen or been involved with?

D. Why is teamwork so important in firefighting?

TEAMWORK GUIDELINES

1. **Know Yourself and Seek Improvement.**
   Responsibility to learn and improve

2. **Be Technically and Tactically Proficient.**
   Responsibility to reduce errors

3. **Comply With Orders and Initiate Appropriate Actions in the Absence of Orders.**
   Understand the intent of your assignment.

4. **Develop a Sense of Responsibility and Take Responsibility for Your Actions.**
   Admit your mistakes and learn from them.

5. **Make Sound and Timely Decisions and Recommendations.**
   Responsibility to be aware of your situation (S.A.)
   Responsibility to minimize risk
   Learn the risk management process.

6. **Set the Example for Others.**
   Make sure your actions as a firefighter are professional.

7. **Be Familiar with Your Leader and Their Job, and Anticipate Their Requirements.**
   Responsibility to learn and improve

8. **Keep Your Leader Informed.**
   Provide feedback when asked.

9. **Understand the Task and Ethically Accomplish It.**
   Seek clarification when intent is unclear.

10. **Be a Team Member - But Not a "Yes Person."**
    Responsibility to work as a team member
    Use all the communication tools.

FIREFIGHTER TRAINING, S-130

Unit 5 - Transportation Safety

OBJECTIVE: Upon completion of this unit, students will be able to:

- Develop a list of three safety procedures to follow when traveling by each of the following:

  - Vehicle
  - Boat
  - Helicopter
  - Fixed-wing aircraft
  - On foot

I. INTRODUCTION

II. VEHICLE TRAVEL

A. Loading

B. Riding

C. Unloading

III. BOAT TRAVEL

A. Loading

B. Riding

C. Unloading

IV. HELICOPTER TRAVEL

A. Loading

B. Riding

C. Unloading

V. FIXED-WING AIRCRAFT TRAVEL

If in a large transport aircraft, follow the directions of pilot and attendants.

For smaller aircraft:

- Remember the pilot is in command. Follow the pilot's instructions.
- Never open a door while in flight.
- Do not distract the pilot during take-off or landing.
- No smoking.
- Do not slam door shut; assure nothing is hanging outside the door that could cause damage.
- Fasten seat belt/shoulder harness.
- Know emergency egress procedure.

VI. EMERGENCY LANDING PROCEDURES FOR AIRCRAFT

Position yourself in the correct crash position as dictated by the pilot or helitack crew.

VII. FOOT TRAVEL

A. Your supervisor will set the pace and select the route for your crew.

B. Crew members <u>must</u> stay together.

C. Maintain proper distance between crew members (10-feet).

D. Hazards you will encounter while walking to or from the fire are:

1. Darkness (hampers your ability to recognize many objects in time to avoid them).
2. Your hand tools.
3. Another person's hand tools.
4. Falling trees, tree-tops, hanging loose debris from saws or tractors, fire or disease weakened trees.
5. Leaning trees.
6. Snags.
7. Whipping branches.
8. Rolling rocks or logs.
9. Vehicles, heavy equipment, ATVs, aircraft working overhead.
10. Unstable footing.
11. Stream or canal crossings.
12. Stump holes.

13. Local hazards (poisonous insects, snakes, or plants; polluted water).

14. Fire location (know where the fire is, follow your crew leader's directions in an emergency).

VIII. APPLICATION/EVALUATION

FIREFIGHTER TRAINING, S-130
UNIT 5 - TRANSPORTATION SAFETY
PERFORMANCE EVALUATION

Performance evaluation:

Observe students traveling during the training. Instructor may have students load and unload from vehicles and aircraft.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

- ☐ 1. PPE properly worn.
- ☐ 2. Safety measures taken (seat belts, life vests, etc.).
- ☐ 3. Tools and personnel separated.
- ☐ 4. Follows directions of appropriate personnel.
- ☐ 5. Appropriate spacing during foot travel.
- ☐ 6. Eye protection utilized where necessary.

FIREFIGHTER TRAINING, S-130
UNIT 5 - TRANSPORTATION SAFETY

UNIT 5 QUIZ

List three safety procedures for each of the following five modes of transportation.
(6 pts. each = 30 possible points)

1. Vehicle safety procedures: (6 pts.)

2. Boat safety procedures: (6 pts.)

3. Helicopter safety procedures: (6 pts.)

4. Fixed-wing aircraft safety procedures: (6 pts.)

5. Foot travel safety procedures: (6 pts.)

FIREFIGHTER TRAINING, S-130

Unit 6 - Hand Tools

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Given hand tools, personal protective equipment, and proper maintenance tools, check the condition of each item, perform field maintenance, and identify those needing replacement.

2. Demonstrate the proper sharpening techniques for commonly used tools.

3. Given a description of three fireline jobs and a choice of tools, state the tool that would be used for each job.

4. Demonstrate the proper methods of carrying and passing tools.

5. Demonstrate the proper spacing when using hand tools.

6. Demonstrate the proper placement, near a fireline, of one or more tools when not in use.

7. Given a swatter or gunnysack and personal protective equipment, check the condition of the fire swatter and perform field maintenance.

I. INTRODUCTION

II. CUTTING TOOLS

A. Single-bit Ax

1. Terminology/parts

2. Single-bit ax use

3. Single-bit ax sharpening

B. Pulaski

1. Pulaski terminology/parts

2. Pulaski use

3. Pulaski sharpening

C. Adz Hoe

1. Adz hoe terminology/parts

2. Adz hoe use

3. Adz hoe sharpening

III. GENERAL INSPECTION - CUTTING TOOLS

Tool head

- Cracks, gouges, wear and holding wedge
- Damaged cutting head
- Rust
- Safety guards

IV. SCRAPING TOOLS

A. Shovel (round point)

1. Shovel terminology/parts
2. Shovel use
3. Shovel grip and stance
4. Shovel care and maintenance

B. McLeod (kortick removable head)

1. McLeod terminology/parts
2. McLeod use

3. McLeod grip and stance

4. Care and maintenance

C. Combi Tool

1. Combi Tool terminology/parts

2. Combi Tool use

3. Combi Tool grip and stance

4. Combi Tool care and maintenance

D. Fire Rake (also known as a council tool/rake)

1. Fire rake terminology/parts

2. Fire rake use

3. Fire rake grip and stance

4. Fire rake care and maintenance

V. GENERAL SAFETY - HAND TOOLS

A. Utilizing Hand Tools

B. Sharpening Hand Tools

VI. GENERAL STORAGE - HAND TOOLS

A. Safety Guards

B. Vehicles

C. Proximity to Fireline

VII. APPLICATION/EVALUATION

VIII. ALTERNATIVE TOOLS

A. Swatter (flapper)

1. Swatter terminology

2. Swatter use

3. Swatter grip and stance

4. Swatter care and maintenance.

5. Swatter storage

B. Gunnysack/Burlap

1. Gunnysack use

2. Gunnysack grip and stance

3. Gunnysack care and maintenance

4. Gunnysack storage

IX. APPLICATION/EVALUATION

FIREFIGHTER TRAINING, S-130
UNIT 6 - HAND TOOLS
PERFORMANCE EVALUATION

Performance evaluation:

Demonstrate the proper procedures for carrying commonly used scraping tools and for passing crew members while working with these tools.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

☐ 1. PPE properly worn.

☐ 2. Maintains proper spacing.

☐ 3. Carries tool on the downhill side.

☐ 4. Cutting edge is away from body.

☐ 5. McLeod is carried with cutting edge up.

☐ 6. Signal prior to passing crew members.

☐ 7. Wait to be given right-of-way.

FIREFIGHTER TRAINING, S-130
UNIT 6 - HAND TOOLS
PERFORMANCE EVALUATION

Performance evaluation:

Demonstrate the proper grip, stance and use of an alternative tool.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

☐ 1. PPE properly worn.

☐ 2. Tool lightly patted or dragged along fire edge.

☐ 3. Constant movement to prevent burning.

☐ 4. Firm grip.

☐ 5. Feet apart, solid stance.

☐ 6. Eyes on target.

FIREFIGHTER TRAINING, S-130
UNIT 6 - Hand Tools

UNIT 6 QUIZ
(30 possible points)

1. List five commonly used hand tools. (5 points)

2. Identify the maintenance procedures for the following conditions of tool handles and tool heads. (8 points)

HANDLE/CONDITION CHECK	MAINTENANCE
Tool handle is not straight.	
Tool handle is not smooth.	
Tool handle is cracked.	
Retaining bolts/pins are not tight.	
Tool head is loose.	
Tool head is dull.	
Tool head is chipped.	
Tool blade is bent.	

3. Describe the proper safety techniques for sharpening and field maintenance of tools. (3 points)

4. Describe the proper method of carrying hand tools commonly used in your area. (3 points)

5. Using the list of hand tools below, select which hand tools you would use for each of the fireline tasks (multiple answers may apply). (5 points)

Hand Tools:

a. Shovel
b. Pulaski
c. Fire swatter
d. Adze Hoe
e. Ax
f. McLeod
g. Fire rake

Tasks:	Hand Tools:
Limbing a spruce tree.	
Constructing a line in a hardwood forest.	
Knocking down flame in light cheatgrass.	
Digging line in tundra	
Falling a 3"-6" diameter tree in a primitive area.	

6. Demonstrate or describe the proper method of passing hand tools commonly used in your area. (2 points)

7. What is the minimum spacing while working or walking with a handtool? (2 points)

8. Describe proper placement of commonly used tools when they are not needed in fireline construction. (2 points)

Tools should:

FIREFIGHTER TRAINING, S-130

Unit 7 - Firing Devices

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Describe two hazards to operators when using a fusee.

2. Demonstrate or simulate how to ignite, use, and extinguish a fusee.

3. Describe four hazards to operators when using a drip torch.

4. State the proper fuel mixture for a drip torch.

5. Prepare a drip torch for use and ignite.

6. Demonstrate the safe use of the drip torch.

7. Extinguish a drip torch and prepare it for storage.

8. Describe two field expedient methods for igniting wildland fuels.

I. FUSEE

A. Fusee Terminology

B. Fusee Features

C. Fusee Use

D. Fusee Care and Maintenance

E. Fusee Safety

F. Fusee Storage

II. DRIP TORCH

A. Drip Torch Terminology

B. Drip Torch Use

C. Drip Torch Care and Maintenance

D. Safety

III. FIELD EXPEDIENT METHODS OF IGNITING WILDLAND FUELS

A. Methods of Ignition

B. Safety

FIREFIGHTER TRAINING, S-130
UNIT 7 - FUSEE PERFORMANCE EVALUATION

The student will provide an oral response to the following question. The question and performance evaluation are pass/fail.

List two hazards to operators when using a fusee.

Performance evaluation:

Given a fusee and a cleared area, demonstrate (1) igniting a fusee, (2) igniting wildland fuel, and (3) extinguishing the fusee.

CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

- ☐ 1. Sleeves down, gloves on and eye protection in place.
- ☐ 2. Remove striker protector.
- ☐ 3. Expose igniter.
- ☐ 4. Place striker on igniter.
- ☐ 5. Turn face away from fusee.
- ☐ 6. Light fusee by sharply scratching the igniter across the striker.
- ☐ 7. Strike fusee (away from body).
- ☐ 8. Apply flame to simulated fuel.
- ☐ 9. Extinguish fusee by striking sharply on ground or by placing lighted end in mineral soil.

FIREFIGHTER TRAINING, S-130
UNIT 7 - DRIP TORCH PERFORMANCE EVALUATION

The student will provide an oral response to the following questions. All questions and the performance evaluation are pass/fail.

1. Describe four hazards to operators when using a drip torch.

2. Describe the fuel mixture for a drip torch.

Performance evaluation:

Given a drip torch in proper working order, rags, matches, a cleared area and PPE, correctly demonstrate the proper procedures for (a) assembly, (b) lighting, carrying and spreading burning fuel, extinguishing, and (c) storing the drip torch.

CHECKLIST:

Score by placing a check mark in the box:

If a. and b. of the performance examination takes more than five minutes or if there is a failure on any step or procedure, this constitutes failure of the exam.

a. Assemble the drip torch.

- ☐ Shake fuel.
- ☐ Unscrew locking ring.
- ☐ Unscrew and secure fuel flow plug.
- ☐ Remove spout and inspect gasket, fuel, and wick.
- ☐ Set spout with wick in correct position and secure lock ring.
- ☐ Open air vent.
- ☐ Wipe off spilled fuel.

b. Demonstrate proper procedure for lighting, carrying and spreading burning fuel, and extinguishing of the drip torch.

- ☐ Spread fuel on ground litter or paper.
- ☐ Ignite fuel.
- ☐ Ignite drip torch from ground fire.
- ☐ Demonstrate proper procedure for carrying and spreading burning fuel.
- ☐ Extinguish wick by setting upright and letting wick burn dry.

c. Storage procedures

- ☐ Let wick cool before storage.
- ☐ Return drip torch to condition of readiness.

FIREFIGHTER TRAINING, S-130
UNIT 7 - BURNOUT PERFORMANCE EVALUATION

The student will provide an oral response to the following question. The question and performance evaluation are pass/fail.

Describe two field expedient methods for igniting wildland fuels.

Performance evaluation:

Given a cleared area, PPE, and materials necessary for a field expedient method of igniting wildland fuels, correctly demonstrate or simulate the proper procedures for igniting a field expedient device and ensure that all safety considerations are met.

- Ignite field expedient device.
- Demonstrate proper procedure for spreading burning fuel.
- Extinguish properly.
- Ensure all safety considerations are met.

FIREFIGHTER TRAINING, S-130

Unit 8 - Use of Water

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Given a backpack pump and a source of water, demonstrate how to properly operate and maintain the pump.

2. Correctly identify common hose components and accessories.

3. Describe the process of correctly unrolling hose.

4. Use a hose clamp and/or field-expedient method to restrict water flow in a charged line.

5. Describe and demonstrate the two hose lay methods.

6. Correctly identify the water use hand signals.

7. Demonstrate the nozzle settings for straight stream and fog spray.

8. Describe a fire situation when the straight and fog spray nozzle water streams would be used.

9. Describe three protective measures for hose and fittings when in use or being transported.

10. Describe four hazards to hose lays.

11. Retrieve deployed hose using two methods; i.e., watermelon roll, firefighters' carry, figure 8.

12. Identify and mark non-serviceable sections of hose and couplings.

I. BACKPACK PUMP

A. Introduction

B. Terminology/Parts

C. Use

D. Care and Maintenance

E. Safety

II. WATER DELIVERY SYSTEMS

A. Introduction

B. Components and Accessories

1. Fittings and Connections

2. Nozzles

3. Hose

4. Accessories

5. Safety equipment

III. UNROLLING HOSE

IV. RESTRICTING WATER FLOW

V. DELIVERY SYSTEMS

A. Hose Lay

B. Simple hose lay

C. Progressive hose lay

VI. HAND SIGNALS

VII. WATER PATTERNS

A. Straight Stream

B. Fog/spray

C. Application

VIII. CARE OF HOSE, FITTINGS, AND ACCESSORIES

A. Roll hose to protect exposed threads.

B. Replace protective caps on accessories and male hose ends.

C. Be sure female ends have correct gasket size.

D. Drain water from hose.

E. Use accepted method of rolling hose when retrieving, e.g., watermelon roll, figure eight.

F. Hazards to Hose and Accessories

G. Defective Hose and Accessories

IX. EVALUATION

FIREFIGHTER TRAINING, S-130
BACKPACK PUMP
PERFORMANCE EVALUATION

Performance evaluation:

Demonstrate the proper way to operate and maintain a backpack pump.

CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

☐ 1. Fill with clean or strained water.

☐ 2. Maintain proper footing and stance.

☐ 3. Maintain proper body position for carrying and lifting.

☐ 4. Use both straight stream and fog spray.

☐ 5. Directs stream properly.

☐ 6. Clear clogged nozzle, if clogged.

☐ 7. Clean quick connect, if dirty.

FIREFIGHTER TRAINING, S-130
USE OF HOSE AND WATER
PERFORMANCE EVALUATION

Performance evaluation:

Demonstrate correct methods and techniques of the use of hose and water.

CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

☐ 1. Utilize proper hand signals.

☐ 2. Identify commonly used fittings and hose.

☐ 3. Set up hose lays and identify hazards to those hose lays.

☐ 4. Restrict water flow by the use of hose clamp or field-expedient method (charged line).

☐ 5. Utilize various nozzle settings.

☐ 6. Utilize proper water application.

☐ 7. Perform hose retrieval.

FIREFIGHTER TRAINING, S-130

Unit 9 - Suppression

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Describe three methods for breaking the fire triangle.

2. Describe three methods of attack on a fire.

3. List three suppression techniques and describe their uses.

4. Describe the blackline concept.

5. Describe four kinds of fire control line.

6. Name four threats/hazards to an existing control line when fire is burning inside the line.

7. Describe the proper follow-up procedures for a dozer or tractor plow fireline.

8. Describe two kinds of coordinated crew techniques used for fireline construction and with at least four additional personnel, construct a fireline utilizing these techniques.

9. Describe safety procedures to follow when in an area where retardant/water drops are being made.

10. Describe five safety procedures to follow when working around engines, tractor plows, and dozers.

11. Demonstrate the proper use of appropriate hand tools during fire suppression activities.

12. Demonstrate the construction of a cup trench on a steep slope.

I. INTRODUCTION

- Control Line: Comprehensive term used for all the constructed or natural fire barriers and treated fire edges used to control the fire.

- Fireline: Any cleared strip or portion of a control line from which flammable material has been removed by scraping or digging down to mineral soil.

II. THE FIRE TRIANGLE AND FIRELINE CONSTRUCTION STANDARDS

A. Elements of the Fire Triangle

1. Oxygen - in the air

2. Heat - a source of ignition

3. Fuel - any combustible materials

B. Methods for Breaking the Fire Triangle

1. Oxygen - Suffocate the fire with dirt or water to rob the fire of oxygen.

2. Heat - Cool the fire by applying water, dirt, retardant or a combination.

3. Fuel - Separate the fuel to prevent combustion or remove fuel during fireline construction.

C. Fireline Construction Standards

Some factors that likely will influence standards for line construction are:

1. Fuel type of the area

2. Fuel moisture

3. Continuity and arrangement of fuels

4. Temperatures will inversely affect fuel moisture

5. Increases in wind

III. METHODS OF ATTACK

A. Direct Attack

B. Indirect Attack

C. Flanking/Parallel Attack

IV. SUPPRESSION TECHNIQUES AND USES

A. Hotspotting

B. Cold Trailing

C. Scratch Line

D. Fireproofing Fuels

E. Burning Out

V. BLACKLINE CONCEPT

VI. TYPES OF FIRE CONTROL LINE (TO MINERAL SOIL, PERMAFROST, OR WATER LEVEL)

A. Constructed Fireline

B. Natural Control Line

VII. THREATS TO EXISTING CONTROL LINE

A. Spotting

B. Rolling Debris

C. Creeping

D. Radiant Heat

VIII. DOZER OR TRACTOR PLOW FIRELINE FOLLOW UP PROCEDURES

A. Clean Up

B. Break Up Machine Piles and Berms

C. Fireproof Needed Areas

D. Prepare and Burn Out Control Line

E. Security of the Control Line

F. Mop up the Interior

G. Patrol the Control Line

IX. TYPES OF COORDINATED CREW TECHNIQUES

A. One-lick (Progressive)

B. Bump-up (Leap frog)

X. RETARDANT/WATER DROP SAFETY PROCEDURES

A. Retardants and water are useful tools in the suppression of wildfire, but can be dangerous to personnel working in the drop area. Retardants will reduce the rate of spread but rarely extinguish a fire. An airplane traveling at 130 knots and dropping 2,000 gallons (as much as 10 pounds per gallon) can do a lot of damage to the drop area.

B. If you have prior information that there will be a drop in your area:

1. Indicate your presence (usually a supervisor responsibility).

2. Move out of the area. At least 200 feet perpendicular to the drop.

3. Remain clear of large old trees, snags, etc. Maintain a distance 1½ times the height of the nearest tree.

4. Determine when drops are completed.

5. Move back into the area quickly to take advantage of the retardant/water effects on the fire.

6. Remember that the area may be slick after retardant drop.

C. Bodily injuries can be caused by low drops in the following examples:

1. Being thrown against rocks, trees, etc.

2. Being struck by flying debris knocked out of trees by the retardant.

3. Being struck by tools or debris kicked up by the retardant.

D. If you are unable to move clear of the drop area, follow accepted agency procedures for protecting yourself and others.

XI. SAFETY PROCEDURES USED AROUND FIRELINE EQUIPMENT

A. Engines

B. Tractor Plow and Dozer

XII. APPLICATION/EVALUATION

A. Demonstrate the proper use of appropriate hand tools during suppression activities (line construction, hot spotting, mopup).

B. Construct a control line using at least two coordinated crew techniques.

C. Demonstrate the construction of a control line with a cup trench on a steep slope.

D. Demonstrate the proper procedures to follow when caught in a retardant/water drop.

FIREFIGHTER TRAINING, S-130
UNIT 9 - SUPPRESSION
PERFORMANCE EVALUATION

Performance evaluation:

INSTRUCTOR CHECKLISTS:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

1. Demonstrate the proper use of appropriate hand tools during suppression activities (line construction, hot spotting, mopup).

   ☐ a. Inspect tool.

   ☐ b. Safe use of hand tool.

2. Construct a control line using at least two coordinated crew techniques.

   ☐ a. Proper spacing when walking and working (10 - 15 feet apart).

   ☐ b. Line extending to mineral soil, water level, or permafrost.

   ☐ c. Proper intra-crew communications.

   ☐ d. Proper use of crew for specified method.

3. Demonstrate the construction of a control line with a cup trench on a steep slope.

- ☐ a. Adequate downhill berm.
- ☐ b. Appropriate tool choice.
- ☐ c. Adherence to safety procedures.
- ☐ d. Cup trench can withstand a rolling firebrand representative of the area; e.g., rolling pine cones, pieces of wood, logs, palmetto, cacti, nuts.

4. Demonstrate the proper procedures to follow when caught in a retardant/ water drop.

In some instances, it may not be possible to complete evaluation of situation #4. However, the instructor should ensure that students have a thorough understanding of these techniques and their local variations.

Contingency:

Student will describe each method and local variation of each. May be done orally or in writing. Instructor evaluates students to ensure they meet the objective.

- ☐ a. Wear full PPE.
- ☐ b. Lie face down, head toward direction of incoming aircraft.
- ☐ c. Helmet on securely with chin strap, feet spread, goggles in place.
- ☐ d. Hand tool held firmly at side.
- ☐ e. Grab something solid such as a rock, tree or shrub.
- ☐ f. Move out of area.

FIREFIGHTER TRAINING, S-130
UNIT 9 - SUPPRESSION

UNIT 9 QUIZ
(50 Total Points)

A minimum score of 35 points is required for a passing grade.

1. Identify the three elements of the fire triangle. (3 points)

2. Name and describe two primary methods of attack on a fire. (6 points)

3. Explain when the following five suppression practices are used. (10 points)

   a. Hotspotting

   b. Cold trailing

   c. Cup trench

   d. Scratch line

   e. Fireproofing

4. Describe the blacklining concept. (2 points)

5. Identify four kinds of control line, natural or constructed. (4 points)

6. Name four threats or hazards to an existing control line when fire is burning inside the line. (4 points)

7. Identify the proper procedures for follow up of a dozer or tractor plow control line. (5 points)

8. Name two kinds of coordinated crew techniques used for fireline construction. (2 points)

9. Describe safety procedures to follow when in an area where retardant/water drops are being made. (4 points)

10. Identify five safety procedures to consider when working around each of the following: (10 points)

    a. Engine

    b. Dozer/Tractor Plows

FIREFIGHTER TRAINING, S-130

Unit 10 - Patrolling and Communication

Lesson A - Patrolling

OBJECTIVES: Upon completion of this lesson, students will be able to:

1. Describe five ways to communicate with designated personnel.

2. Describe a systematic method of locating spot fires.

3. Describe four considerations when patrolling a fire.

I. INTRODUCTION

As a member of a fire crew, you may be called upon to:

A. Communicate any unusual situation to your supervisor.

B. Patrol a section of line.

C. Patrol for spots or spot fires outside the fireline.

II. MAINTAINING GOOD COMMUNICATION

A. Communication Methods

1.

2.

3.

4.

5.

6.

B. Identify a Communication Plan in Advance with Supervisor.

This may include:

1. What type of communication to use.

2. How often you must report.

3. What kind of information to report.

4. What types of signals to use if necessary.

5. Having a backup plan.

III. PATROLLING THE FIRE AREA

Considerations for patrolling an area or path include:

A. Purpose of the Patrol Assignment

1. To patrol constructed line looking for weak areas, hot spots, and slopovers.

2. To reinforce the line when necessary.

3. To patrol an area outside of the line looking for spot fires.

B. Coverage of the Assigned Area

1. This should be determined by your supervisor and the situation.

2. Is the area fairly hot or does it consist of a long cold section of line?

3. Does the assigned area need to be covered once every operational period or in any other emergency?

4. Do instructions tell how often the reports should be made and how to report to the supervisor in case help is needed or in case of an emergency?

C. Information to be Reported

1. The need for help in the patrol area.

2. The fire behavior.

3. Machinery in the area.

4. Any hazards.

D. Consider working in pairs or in a systematic approach.

E. Always know where safety zones are located and have planned escape routes.

IV. PATROLLING FOR SPOT FIRES

A. Conditions that May Contribute to Spot Fires:

1. Extremely dry weather

2. Steep topography

3. Heavy fuel

4. Crown fires

5. Whirlwinds or dust devils

6. Torched-out, lone tree

7. Wind across the fireline

8. Punky logs and tree roots hidden beneath the fire line in the soil

9. Snags

10. Flashy fuels

B. Searching for Spot Fires

1. Inspect an area adjacent to the fire determined by your supervisor.

2. Select two reference points in that area (such as trees).

3. Travel between the reference points in a pattern parallel to the fireline, systematically covering that area.

4. Patrol areas at intervals determined by fuel type.

C. If a Spot Fire is Found:

1. Report it to your supervisor.

2. Begin initial attack, and suppression.

3. Flag area of spot fire.

4. Flag to main fireline, if nearby.

V. APPLICATION

Given a marked area, the students will:

A. Determine two reference points.

B. Demonstrate method of search.

C. Demonstrate or describe how a spot fire would be marked on the ground.

D. Describe to whom spot fire would be reported.

VI. EVALUATION

FIREFIGHTER TRAINING, S-130
UNIT 10 - Patrolling

UNIT 10 QUIZ
(30 Total Points)

Passing score requires a minimum score of 21 points.

1. Describe four considerations when patrolling a fire. (8 points)

2. Describe five ways to communicate with designated personnel. (10 points).

3. Describe a systematic method of locating spot fires. (8 points)

4. Describe how spot fires are marked on the ground. (4 points)

FIREFIGHTER TRAINING, S-130

Unit 10 - Patrolling and Communication

Lesson B - Radio Communication

OBJECTIVES: Upon completion of this lesson, students will be able to:

1. Describe frequencies and how they affect radio communications.

2. List four elements of proper radio use procedures.

3. Transmit a message clearly using proper procedure and language.

4. Describe three radio trouble shooting practices used to improve radio reception or transmission.

5. Describe precautions and care to protect the radio from damage.

I. INTRODUCTION

Radio classes:

A. Lowband

1. Utilizes low frequency range.

2. Travels greater distances.

3. Waves are more able to bend around mountains, etc.

4. Used widely in the 1960s, 70s, and 80s.

B. Very High Frequency (VHF)/Highband

1. Utilizes upper end of the (FM) range.

2. Operates from 150-170 frequency range.

3. Waves travel shorter distance than lowband.

4. Needs repeater to increase range.

5. Used frequently in wildland fire operations.

C. Ultra High Frequency (UHF)

1. Utilizes the next higher frequency band above VHF/highband.

2. Radio waves travel distance is short because waves absorbed by vegetative cover, trees, etc.

3. Used primarily around fire base camp for the logistics section.

II. TERMINOLOGY

A. Programmable, Hand Carried Radio

B. Mobile Radio - in Vehicle

C. Base Station Radio - Permanent Location

D. Antenna

E. Microphone

F. On-off Switch

G. Volume Control

H. Squelch Control

I. Channel Selector

J. Tone control

K. Scanner

L. Replacement Batteries and Installation

III. RADIO USE

A. For Official Use Only.

B. Emergency Traffic has Priority.

C. Use Clear Text to Relay Message. No “CB” Talk.

D. Think Before Pushing the Button.

E. Write Down Messages you Receive.

IV. PROPER RADIO USE PROCEDURES

A. Be Courteous.

B. Swearing and Obscene Language is Prohibited.

C. Answer Radio Calls Promptly.

D. Have Pencil and Note Pad Ready for Messages.

E. Be Brief; Radio Channels are Busy.

F. To Declare an Emergency:

Break into the radio traffic and ask for the channel to be cleared for emergency traffic.

G. Talk Into the Microphone.

H. Use Normal Tone of Voice.

V. TRANSMITTING AND RECEIVING A RADIO MESSAGE

The proper procedure in transmitting a message is as follows:

A. Wait until the person using the radio is finished before you start.

B. When initiating a call, transmit the station name or unit number of the person you are calling first, followed by your station name or unit number.

C. Microphones should be held 2-4 inches away from your mouth; avoid wind blowing into microphone when speaking.

D. Wait one full second after pressing the transmit button before speaking.

E. Answer the radio with your station name or unit number.

F. If more than one station or unit calls at the same time, use the procedure for initiating a call to identify who needs to answer.

G. The person who initiates the call closes with the proper identifier.

VI. RADIO TROUBLESHOOTING

A. Radio Traffic Overloaded

B. Poor Location

C. Low Battery

D. Loose Antenna

E. Operating on Wrong Channel

VII. RADIO CARE AND MAINTENANCE

A. Protect the radios from dust, moisture, fire retardant, excessive vibration, dropping, extreme heat, etc.

B. Keep portables in a protective case.

C. Do not modify or attempt repairs on any radios. Notify your supervisor or a qualified radio technician so the problem can be fixed.

D. Do not use the antenna to pull the portable radio from its case.

VIII. APPLICATION/EVALUATION

FIREFIGHTER TRAINING, S-130
UNIT 10, LESSON B - RADIO COMMUNICATIONS
PERFORMANCE EVALUATION

Performance evaluation:

INSTRUCTOR CHECKLISTS:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

1. Given a two-way portable radio, demonstrate how to prepare, transmit and receive.

To prepare portable for use:

- ☐ a. Check antenna.
- ☐ b. Turn on radio.
- ☐ c. Adjust squelch: turn knob to the point of garbled noise, then turn back until radio is quiet.
- ☐ d. Select channel to be used.

To transmit:

- ☐ a. Depress microphone key.
- ☐ b. Place microphone two to four inches from mouth.
- ☐ c. Speak distinctly and concisely.
- ☐ d. Release microphone key.

To receive:

- ☐ a. Turn radio on.
- ☐ b. Adjust volume to hear communication.
- ☐ c. Listen.

2. Given a two-way mobile radio, demonstrate how to prepare, transmit and receive.

To transmit:

- ☐ a. Turn on engine in vehicle.
- ☐ b. Turn on radio; adjust volume.
- ☐ c. Adjust squelch.
- ☐ c. Select channel.

To receive:

- ☐ a. Turn on; adjust volume.
- ☐ b. Adjust squelch.

3. Transmit a message clearly using proper procedure and language.

- ☐ Messages should be transmitted in normal, concise language in 30 seconds or less.

THE FOLLOWING TWO TASKS MAY NOT BE OBSERVABLE. IF NOT, THE STUDENT MAY ANSWER ORALLY OR IN WRITING.

4. Demonstrate what to do to improve radio reception and/or transmission.

5. Demonstrate precautions needed to protect the radio from damage.

FIREFIGHTER TRAINING, S-130

Unit 11- Mopup and Securing the Fireline

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Describe and demonstrate how to extinguish burning materials by chopping, scraping, and mixing them with soil and water.

2. Describe precautions to take when applying water to hot materials and demonstrate proper techniques for doing so.

3. Describe a systematic method of mopup and give two reasons for using this method.

4. Describe how each of the four senses aid in detecting burning materials.

5. Discuss the importance of breaking up and dispersing machine piles and berms adjacent to the control line.

6. Demonstrate the technique of cold trailing on a simulated fire perimeter.

7. State three factors that determine the amount of additional work required for a water or retardant line.

8. Given a constructed control line, strengthen the line to facilitate holding by rearranging and fireproofing fuels adjacent to the line.

I. INTRODUCTION

II. MINIMUM IMPACT SUPPRESSION TACTICS

III. METHODS OF MOPUP

Hand tools are used for mopup in the following ways:

- Scraping
- Digging
- Stirring
- Mixing
- Separating
- Turning logs and other heavy materials

A. Dry Mopup

B. Wet Mopup

C. Safety

IV. SYSTEMATIC MOPUP

Process for applying systematic mopup:

- Start with the hottest area and progress to the coolest.

- Plan a beginning and an ending point. Keep to the plan and work methodically.

- Work inward from the control line.

- Examine the entire assigned area.

- Make sure instructions are clear. Ask questions.

- For large burns and/or complicated situations some type of grid (block) system should be implemented. Set priorities and number each block.

V. USING THE FOUR SENSES TO DETECT HOT MATERIALS

A. Sight - look for:

1. Smoke

2. Heat waves

3. White ash

4. Stump holes

5. Steam

6. Gnats

B. Touch

1. Do not wear gloves.

2. At first, feel with the back of your hand about 1 inch away, then carefully with direct contact.

C. Smell

1. Smoke

2. Burning materials and the gases that these materials give off

D. Hearing - listen for the:

1. Crack and pop of burning material.

2. Hiss of water as it hits hot materials.

VI. COVERED FUELS

A. Machine Piles

B. Ground Fuels

VII. OTHER AIDS TO ASSIST THE MOPUP PROCEDURE

A. Infrared Imagery – Aircraft

B. Infrared Devices (heat detectors) – Handheld

VIII. STRENGTHENING THE CONTROL LINE

A. Rearranging Fuels

B. Trenches

C. Waterbars

IX. FOLLOW UP OF A WET LINE, RETARDANT LINE, OR TREATED AREA

A. Deficiencies that may occur

1. Not all fuels in a treated area may be coated.

2. Skips in application of water or retardant occur.

3. Evaporation has dried out fuels since application.

B. Action

1. Assess the nature of the fuels inside and outside the treated area for:

   - Arrangement
   - Continuity
   - Compactness
   - Loading

2. Assess the fire activity threatening the treated area for:

   - Smoldering
   - Creeping
   - Running
   - Spotting
   - Crowning

3. Assess the chances for later burn through the treated area. Look for:

   a. Parched and/or scorched but unburned fuels near the area.

   b. Fuels not fully burned out near the treated area.

4. Reinforce the treated area by:

   a. Constructing a fireline.

b. Limbing up nearby trees and brush.

c. Fireproofing fuels on the outside of the control line.

d. Dropping snags.

5. If safe and practical, burn out areas of unburned fuel near the treated area to prevent a possible slopover or reburn later.

X. APPLICATION/EVALUATION

A. Dry Mopup

B. Wet Mopup

Types of Class A Foam

Expansion
1:1

20:1

Foam Solution
- A clear to milky fluid
- lacks bubble structure
- mostly water

Wet Foam
- Watery
- Large to small bubbles
- Lacks body
- Fast drain times

Fluid Foam
- Similar to watery shaving cream
- Medium to small bubbles
- Flows easily
- Moderate drain times

Dry Foam
- Similar to shaving cream
- Medium to small bubbles
- Mostly air
- Clings to vertical surfaces
- Slow drain times

Drainage
Rapid

Slow

FIREFIGHTER TRAINING, S-130
UNIT 11 - MOPUP AND SECURING THE FIRELINE

UNIT 11 QUIZ
(65 Total Points)

A minimum score of 45 is required for a passing grade the written quiz.

1. Which four senses aid in the detection of burning materials? How? (12 points)

2. Describe five precautions or techniques used to safely apply water to hot materials. (10 points)

3. Why is it important to break up and disperse machine piles adjacent to the fireline? (3 points)

4. Describe a systematic method of mopup. (10 points)

5. Describe the technique of cold trailing on a simulated fire perimeter. (4 points)

6. Describe what to do when using the following two methods to strengthen the control line. (8 points)

   a. Rearrange fuels adjacent to a control line to facilitate holding the fire.

   b. Fireproof fuels adjacent to a control line to facilitate holding the line.

7. Describe the proper follow up procedures for a wet line, retardant line, or treated area. (10 points)

8. Describe the method to extinguish burning materials without the use of water. (4 points)

9. Describe the method for wet mopup. (4 points)

FIREFIGHTER TRAINING, S-130

Unit 12 - Fire Exercise

OBJECTIVES: Upon completion of this unit, when given a live fire or simulated (flag) fire exercise, the students will be able to:

1. Demonstrate proper travel procedures en route to and from a fire.

2. Demonstrate proper use, handling, and maintenance of handtools.

3. Construct progressive and leap frog handline.

4. Construct simple and progressive hoselays.

5. Use escape routes to promptly retreat to a safety zone.

6. Participate in an “after action review.”

FIREFIGHTER TRAINING, S-130

Unit 13 - Hazardous Material Awareness

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Develop a working definition of hazardous materials.

2. Explain the general guidelines when reacting to a possible hazardous materials emergency.

3. List and explain the six steps in the D.E.C.I.D.E. process.

4. List and explain the six clues for detecting the presence of hazardous materials.

I. INTRODUCTION

A. Definition of Hazardous Material

B. Their Role in Our Lives

C. Exposure to Hazardous Material

1. In the event you encounter a hazardous material incident you must ask the following questions:

   - Am I properly trained to handle the situation?
   - Will my action create undo risk to myself or others?
   - Will my involvement favorably change the outcome?

2. Knowledge is necessary to protect fellow workers, yourself and the surrounding community and environment.

3. Ability to recognize and identify hazardous materials will help you become part of solutions, not part of the problem.

4. The problem must be analyzed. Set goals and objectives to minimize the potential harm associated with the release of hazardous materials.

II. GENERAL GUIDELINES WHEN REACTING TO A POSSIBLE HAZARDOUS MATERIALS EMERGENCY

A. Isolate or Deny Entry

B. Identify the Hazards

DOT Emergency Response Guidebook

- White pages - Basic placards/colors.
- Yellow pages - List hazardous materials by consecutive identification (ID) number.
- Blue pages - List hazardous materials alphabetically.
- Orange pages - Give specific information on the hazards associated with the identified chemical.
- Green pages - Identify evacuation distances and water reactive materials which produce toxic gases upon contact with water.

C. Approach Cautiously

D. Obtain Help

E. Decide on Site Entry

III. D.E.C.I.D.E.

A. Detect Hazardous Materials Present

B. Estimate Likely Harm

C. Choose Response Objective

D. Identify Action Options

E. Do Best Option

F. Evaluate Your Progress

IV. APPLICATION

Hazardous Material Placard

FIREFIGHTER TRAINING, S-130

Unit 14 - Wildland/Urban Interface Safety

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Identify the wildland/urban interface watch out situations.

2. Identify personnel safety concerns in wildland/urban interface fires.

I. INTRODUCTION

Three categories of tactical plans in the interface:

A. Defensive Mode

B. Offensive Mode

C. Combined Mode

II. DISCUSSION OF THE WILDLAND/URBAN WATCH OUT SITUATIONS

A. Wooden Construction and Wood Shake Roofs

B. Poor Access and Narrow Congested One-Way Roads

C. Inadequate Water Supply

D. Natural Fuels 30 Feet or Closer to Structures

E. Extreme Fire Behavior

F. Strong Winds

G. Evacuation of Public (Panic)

I. Bridge Load Limits

III. WORKING AROUND POWER LINES

The following powerline safety issues are extremely important and must be adhered to:

- Beware of water or liquids pooled or running along the surface. Liquids are good conductors of electricity.

- Downed conductor (line) on vehicle: DON'T leave vehicle until power company arrives. If the vehicle is on fire or fire is near, jump clear, DON'T hang on, keep feet together and bunny hop away.

- DON'T operate heavy equipment under powerlines.

- DON'T use powerline rights-of-way as a jump or cargo drop spot.

- DON'T drive under powerlines with long antennas.

- DON'T fuel vehicles under powerlines.

- DON’T stand near powerlines during retardant or helicopter bucket drops.

- DON’T park under powerlines.

- DON’T apply straight stream to powerlines.

- DON’T go near or move downed lines.

- DON’T stand or work in dense smoke near power lines. The potential for arcing is high.

IV. HAZARDOUS MATERIAL

A. Petroleum or Propane Tanks

B. Garages and sheds can contain many of the following:

C. Drug Labs (meth labs)

D. Identify and mark all hazards with flagging or other warning devices. Post a lookout. Keep your supervisor informed of hazards. Avoid breathing hazardous fumes without proper protection at all costs.

V. SUMMARY

A. Structure Defense and Safety to Personnel and Equipment

B. Hopeless Situations

C. DOs and DON'Ts in Protecting Structures in the Interface

FIREFIGHTER TRAINING, S-130

Unit 15 - Pump Operations (Optional)

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Identify the two common types of pumps.

2. Identify the responsibilities and personal protective equipment of the portable pump operator.

3. Demonstrate the proper setup and operation of a portable pump.

I. INTRODUCTION

II. TYPES OF PORTABLE PUMPS

There are two commonly used pumps for wildland fire suppression.

A. Positive Displacement Pumps

1. Rotary gear pump

2. Piston pump

3. Advantages

4. Disadvantages

B. Centrifugal Pump

1. Most commonly used pump in fire suppression.

2. Consists of one to four devices called impellers.

3. Advantages

4. Disadvantages

III. DELIVERY SYSTEM FOR PORTABLE PUMPS

A. Pacific Mark 3 Centrifugal Pump

1. Two cycle engine, air cooled, mixed gas ½ pint per gallon. 16:1 ratio (unless specified otherwise by manufacturer guidelines.)

2. 4-stage centrifugal pump

3. Weight = 55 pounds; horse power = 8.5

4. Maintenance

B. Wajax-Pacific/Halprin™ Wildfire Mark 3 Pump

1. Commonly called a Mark 3 pump.

2. Efficient and unit designed to meet the requirements of all fire control techniques.

3. Performance range makes it possible to use the pump for filling tanks and suppressing forest fires.

4. Suitable for rural and municipal fire protection or wherever a large volume of water is needed.

5. Two-cycle, single cylinder, 8.5 hp, rotex air-cooled engine.

6. Fuel must be mixed with oil (covered in detail later in the course).

7. The starter cord and handle is a spring-loaded rewind unit. In case of a rewind failure, remove outer case, put the rope on the crankshaft pulley and start the engine.

8. Some pumps are equipped with a decompressor switch which releases pressure from the combustion chamber to make starting easier. Close it as soon as the engine starts to prevent damage to the engine.

9. Use stop switch to shut off the engine after a cool down period, or in an emergency. Hold down until the engine has completely stopped.

10. The air filter is located inside the metal shroud connecting to the carburetor.

11. The choke lever is a flip type that closes the butterfly in the carburetor for a richer fuel mixture when starting a cold engine.

12. The throttle control is labeled and should be set according to directions on the label.

13. The automatic cutoff switch stops the engine and eliminates overspeeding when the pump runs out of water or loses prime. The reset rod on the automatic cutoff switch may not work if the throttle is set half way, as the engine RPM may not be high enough to trip the reset.

14. The Mark 3 engine is coupled with a four-stage centrifugal pump.

15. The fuel tank holds five gallons of mixed fuel and attaches to the pump engine using a quick connect fitting.

IV. PACIFIC MARK 3 PUMP SUPPLEMENTAL INFORMATION

A. Pump Parts Identification

1. Starter

2. Muffler

B. Motor Protection

1. Equipped with an automatic cutoff switch that will stop the engine and prevent damage should overspeeding occur.

2. Conditions that could cause the unit to shut down include:

- Pump not fully primed
- Leaking suction hose connections
- Defective suction hose
- Loose cap on primer opening
- Foot valve leaking or not completely submerged
- Air locks in the suction hose

C. Ignition Checks

V. PUMP STORAGE, CARE, AND MAINTENANCE

A. Storage

B. Care and Maintenance

VI. ROLE OF THE PUMP OPERATOR

A. Safety

B. Pump Kit Components

C. Pump Site

VII. APPLICATION/EVALUATION

FIREFIGHTER TRAINING, S-130
UNIT 15 - PUMP OPERATIONS
PERFORMANCE EVALUATION

Performance evaluation:

Demonstrate the proper setup and operation of a portable pump.

INSTRUCTOR CHECKLIST:

Score by placing a check mark in the box. Failure on any step or procedure constitutes failure of the exam.

Pump Setup

☐ 1. Foot valve strainer assembly checked and attached to suction hose.

☐ 2. Suction hose and foot valve strainer assembly attached to suction end of pump.

☐ 3. Foot valve strainer assembly placed in water supply properly.

☐ 4. Pump primed (1 of 2 methods).

☐ 5. Fuel mixed in correct proportions.

☐ 6. Fuel system connections checked and cleaned.

☐ 7. Fuel hose attached to fuel can and pump.

☐ 8. Fuel supply valve opened.

☐ 9. Air vent on fuel can opened.

☐ 10. Correct fittings hooked on to discharge side of pump.

☐ 11. Discharge hose hooked to pump on discharge side.

☐ 12. Nozzle hooked up.

☐ 13. All connections on suction side of pump checked and tightened with proper tools.

☐ 14. Pump set near water source in a firm and level position.

☐ 15. Proper safety equipment used.

☐ 16. Needed tools and supplies readily available for use.

☐ 17. Check equipment.

Priming

☐ 1. First and preferred method

Attach the hand priming pump to the discharge side of the pump head. Water is drawn past the foot valve through the suction hose and into the pump case, filling all four cavities of the pump head. Some water will squirt from a small hole located on the handle end of the priming pump when the pump is primed.

OR

☐ 2. Second method

Remove the priming inlet cap on top of the pump case and pour water directly into the pump head. When the pump case is full, shake the suction hose to clear the hose of air. Add more water until pump case is full, replace inlet cap and tighten.

OR

☐ 3. Third method

Remove the priming inlet cap and take hold of the suction hose working it back and forth in the water source with quick jabbing motions. This will force water past the foot valve and into the pump head. When water flows out of the priming port, replace and tighten the pumping cap.

Starting

☐ 1. Fuel tank positioned near pump.

☐ 2. Pull the decompressor switch out until it comes to a “click” stop. Model year 1983 and newer models of Mark 3 pumps are equipped with the decompressor switch.

☐ 3. Close the choke shutter if the engine is cold.

☐ 4. Move the throttle lever to the “start and warm up” position.

☐ 5. Check the reset rod on the automatic cutout switch; it should be pushed in.

☐ 6. Pull the starter cord with short smooth pulls; do not fully extend the cord.

☐ 7. Push the decompressor switch fully in as soon as the engine starts.

☐ 8. Open the choke slowly after the engine has started.

Operation

☐ 1. Allow the engine to warm up for at least two minutes before using full throttle. Failure to do so may lead to piston scuffing and more serious damage.

☐ 2. Check the spark plug for cleanliness and check fuel mixture ratio. Do not perform any field adjustment on the carburetor. These adjustments are made in a shop under specific pump pressure.

☐ 3. Connections on suction side of pump checked for leaks.

☐ 4. Foot valve strainer assembly checked for proper placement.

Shutdown (Failure to use proper warm-up and cool-down procedures will result in severe engine damage.)

☐ 1. First method

☐ a. Move the throttle lever to the “stop” position.

☐ b. Allow the unit to run for approximately one minute with the throttle in this position.

☐ c. Press and hold the stop switch until the engine is fully stopped.

☐ 2. Second method (Used when the pump is left in place and not expected to operate for several hours.)

☐ a. Move the throttle to the “stop” position.

☐ b. Older model fuel tanks - the fuel supply valve located in the recess of the tank is turned off.

Newer model fuel tanks - pull the male end of the fuel line quick-connect from the base of the tank.

The engine will run at a low idle and have ample time to cool down and will stop due to the lack of fuel.

FIREFIGHTER TRAINING, S-130

Unit 16 - Map Reading and Use of the Compass (Optional)

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Identify the symbols depicted on a locally used map with legend.

2. Name and describe the land survey system used locally.

3. Locate a legal description of a point on a map.

4. Identify major topographic features, both in the field and on a map.

5. Demonstrate the ability to read and shoot an azimuth (bearing) off a compass.

6. Explain the importance of knowing the proper declination of an area.

7. Determine one's walking pace on flat and sloped ground in one chain and 100 foot intervals.

8. Given a compass with proper declination and a local map, determine an azimuth, distance, and be able to navigate through wildland terrain between two points.

I. INTRODUCTION

II. TYPES OF MAPS

A. Highway Map

B. Aeronautical Chart

C. Military Map

D. USGS Topographic Map

E. Geographical Information System (GIS) Maps

III. FEATURES OF TOPOGRAPHIC MAPS

A. General Information

1. North arrow is normally pointed towards the top of the map.

2. Map scale is usually found at the bottom of the map. One unit on the map represents a certain number of units on the ground, i.e., 1:24,000 reads as: one inch on the map equals 24,000 inches on the ground; or one inch on the map equals 2,000 feet on the ground.

3. Quad size is usually found at the upper right corner of the map. This indicates how many minutes of latitude are contained within a particular map. Common map quads are 7-1/2 and 15 minutes. Map scale for 7-1/2 minute quads is normally 1:24,000, scale for 15 minute quads is normally 1:62,500.

4. Declination is usually found at the bottom of the map.

5. Contour interval is usually found at the bottom of the map.

6. Map name is usually found at the bottom right of the map.

7. Road classification is usually found at the bottom right of the map.

8. Colors - (reminder: most maps you get on fires are black and white)

9. Various scales are located around the perimeter of the map representing latitude/longitude, UTM, etc.

10. Map symbols show detail of landscape in the following areas:

    - Human-made features - city limits, political boundaries, roads, structures, orchards, surveying benchmarks, microwave towers

    - Water features - lakes, streams, oceans, intermittent streams

    - Vegetation features - forest, brush

    - Elevation features

B. Contour Lines

Actual lines on a map along which every point is at the same height above sea level.

C. Properties of Contour Lines

IV. LAND SURVEY SYSTEMS

A. Metes and Bounds System

B. Public Land Survey System

C. Other Methods to Describe Map Locations

1. Latitude and longitude

2. Local map grid system

3. Military grid

4. Universal Traverse Mercator grid

V. METHODS FOR IDENTIFYING AND DESCRIBING LOCATIONS ON MAPS

A. Local Grid System Method

B. Latitude and Longitude

Measured in degrees, minutes and seconds.

C. Township and Range from the Public Land Survey System

1. Initial point: Most states west of the Mississippi and north of the Ohio Rivers were surveyed after the 1796 Public Land Survey law. Thirty-five initial points were established by astronomical observations.

2. Baseline: Extends east and west through each initial point.

3. Principal Meridian: Extends north and south through each initial point.

4. Township subdivision: Land is divided into "townships" by "range lines" running north-south (equivalent to longitude) and "township lines" running east-west (equivalent to latitude, note the difference between "township lines" and "townships").

5. Sections: Townships are divided into 36 equally numbered "sections." Sections are always numbered in the sequence depicted in the SW.

6. Section subdivision: sections can be divided into "quarter sections" which equal 160 acres and measure 40 chains on each side. These are referred to their location in relation to the middle of the section. Example: NW1/4.

7. A location is identified by township, range, section, and quarter section information. Example: NW1/4, S6, T3S, R12E.

VI. APPLICATION

VII. COMPASS INTRODUCTION

VIII. PARTS OF THE COMPASS

A. Travel arrow: located at the top of the compass and indicates direction of travel on the ground (note luminous point).

B. Various scales: located on the top and the sides of the compass and normally correspond with typical topographic map scales.

C. Magnifying glass: located just below the travel arrow.

D. Dial: revolving housing which is divided into 360 degrees. The dial rim is marked with the four cardinal directions, north, east, south, and west. Each mark represents two degrees, every 20th degree is marked with a number from 20 to 360. Zero and 360 degrees are the same.

E. Index pointer: white mark on the dial where the bearing is read. Corresponds to the travel arrow.

F. Magnetic needle: free swinging suspended needle located inside the dial. Red side always points toward magnetic north (note luminous point).

G. Orienting arrow: located inside the dial and always points toward north on the dial as the housing is revolved (note luminous points). Will point toward the degree of declination if declination can be adjusted.

H. Orienting lines: located inside the dial and are parallel to the orienting arrow.

I. Aid lines: located above the dial on each side of the magnifying glass and are parallel to the travel arrow.

J. Declination scale: located inside the dial and denotes magnetic declination from true north.

IX. DETERMINING AN AZIMUTH

Azimuths (also called bearings) are horizontal angles fixing a direction in respect to north, and are expressed in degrees.

A. Cardinal Directions

B. Reading an Azimuth

C. Shooting an Azimuth/bearing (example 140 degrees)

D. Determining Back Azimuth

X. DECLINATION (ALSO CALLED VARIATION)

A. True North versus Magnetic North

B. Setting Declination on a Compass

C. Compare True and Magnetic North Azimuths on the Compass

XI. USING A COMPASS WITH A MAP

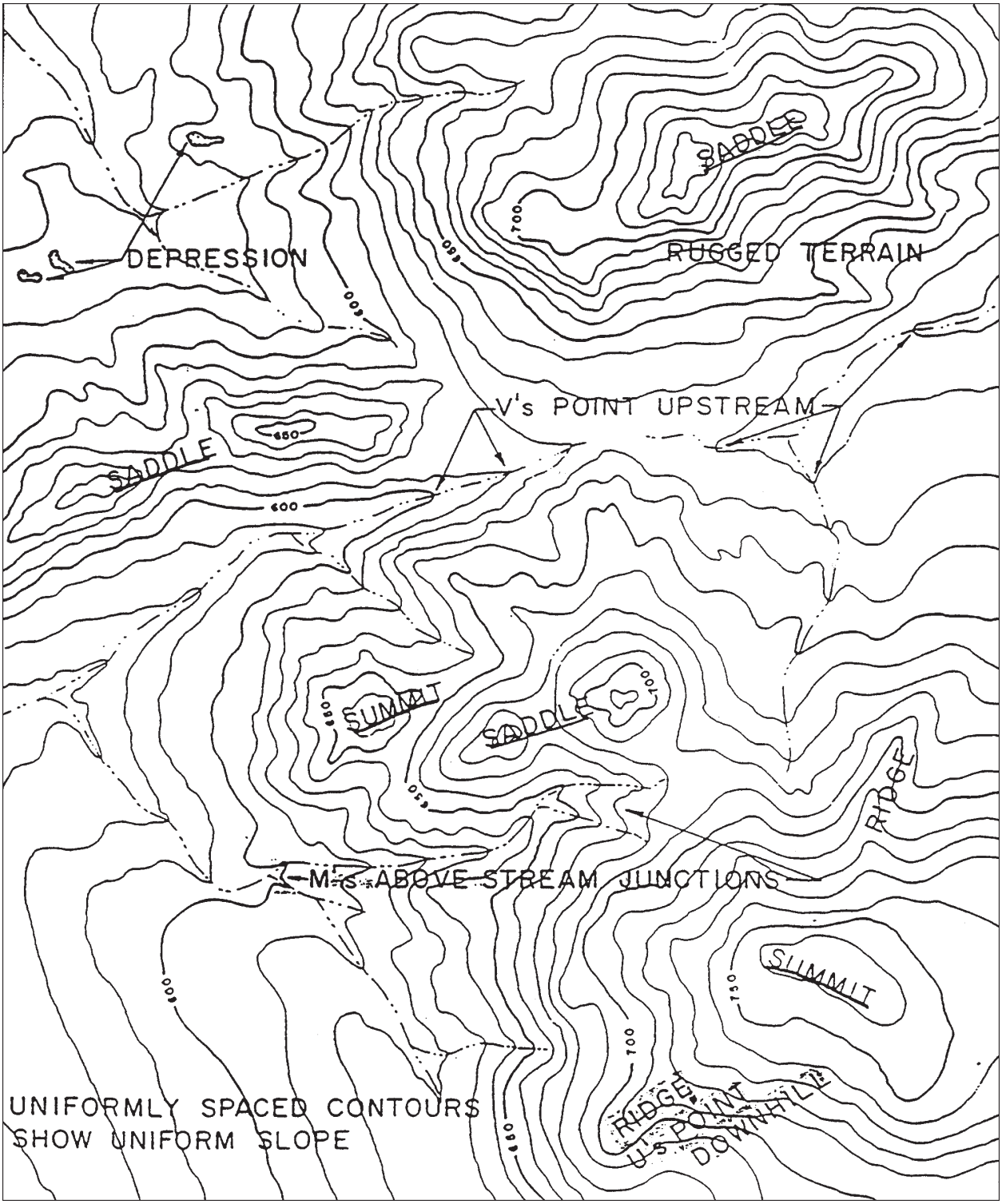
A. Orienting a Map Toward North

B. Shooting an Azimuth on a Map

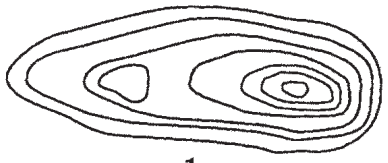
XII. APPLICATION

XIII. FIELD EVALUATION

16.8

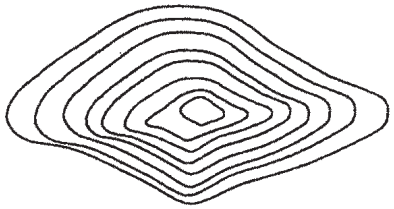

SADDLE
RUGGED TERRAIN
DEPRESSION
V's POINT UPSTREAM
SADDLE
SUMMIT
SADDLE
RIDGE
M's ABOVE STREAM JUNCTIONS
SUMMIT
RIDGE
U's POINT DOWNHILL
UNIFORMLY SPACED CONTOURS
SHOW UNIFORM SLOPE

Match the profile (A-F) with the contour lines (1-6)



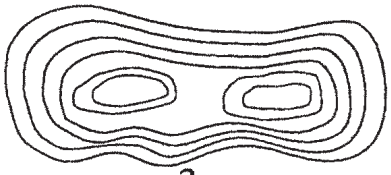
1

A



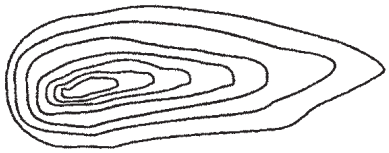
2

B



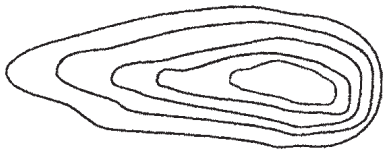
3

C



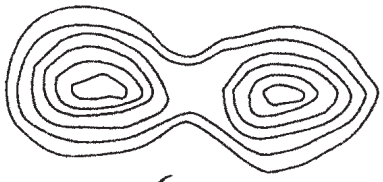
4

D



5

E



6

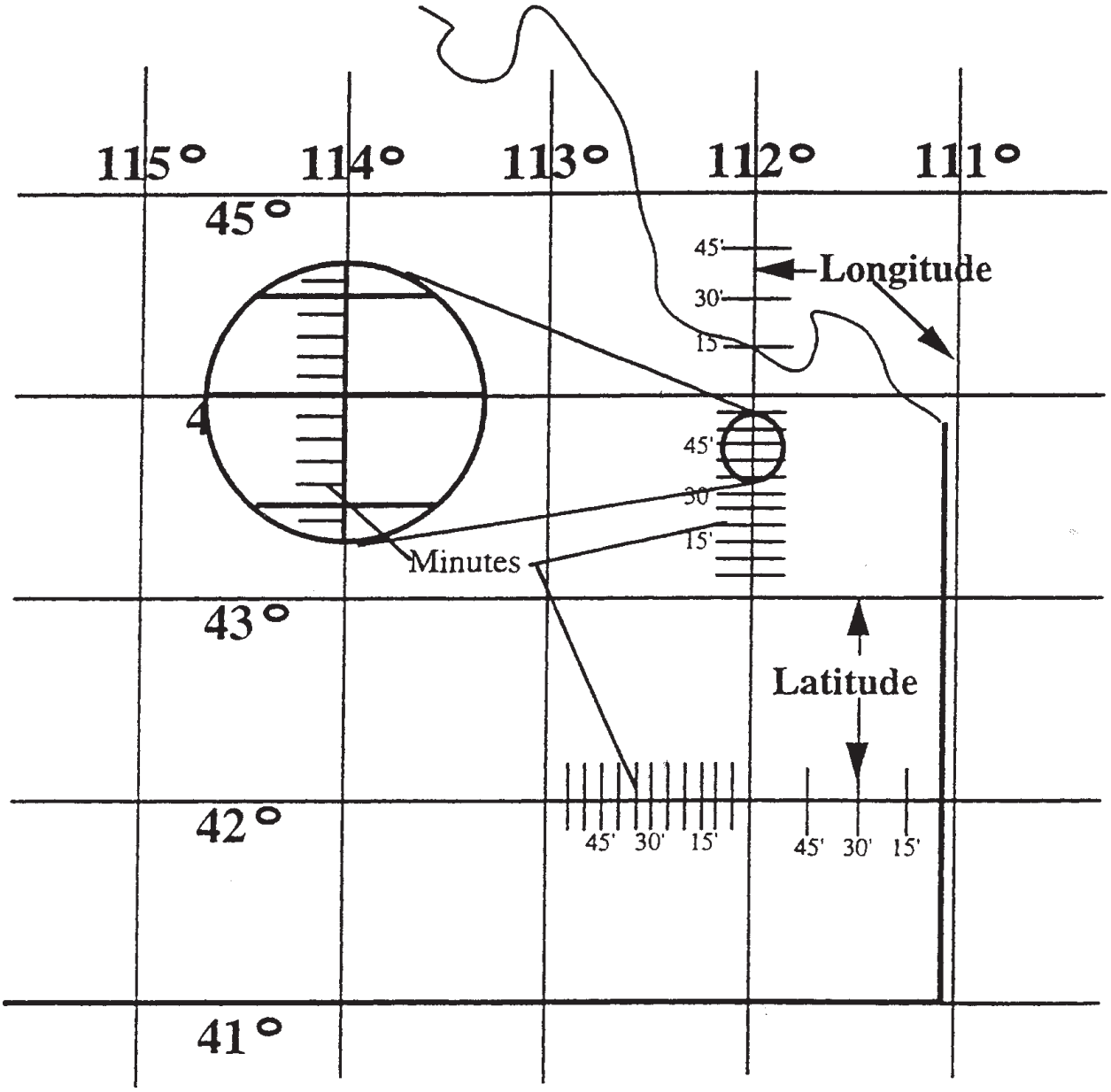
F

1. _____ 4. _____

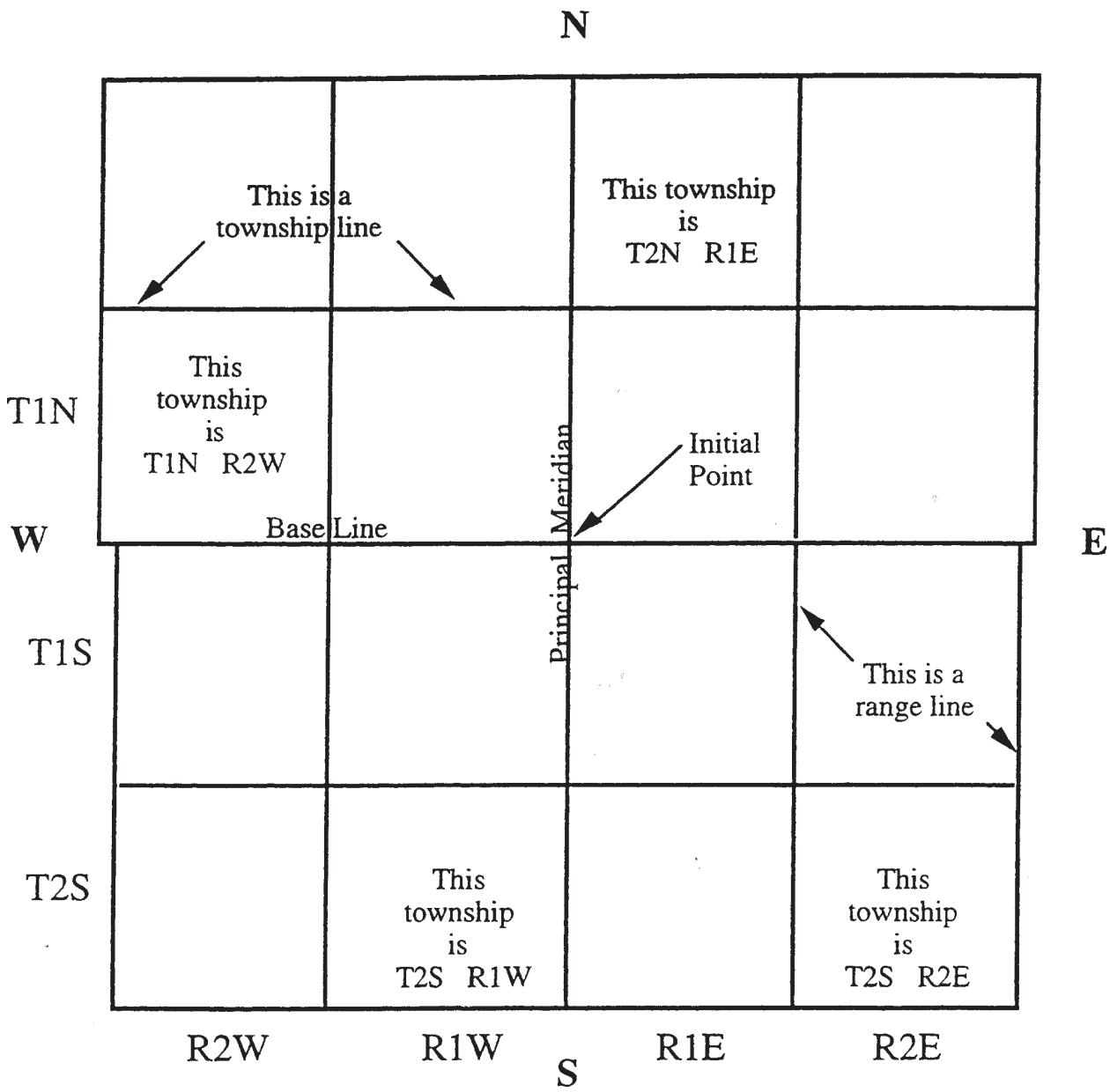
2. _____ 5. _____

3. _____ 6. _____

Latitude and Longitude



Township and Range Reference



Numbering Sections Within A Township

6 Miles

6 Miles

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Numbering Sections Within A Township

6 Miles

6 Miles

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

FIREFIGHTER TRAINING, S-130

Unit 17 - Wildland Fire Investigation (Optional)

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Describe items to watch for when traveling to, arriving at, and during initial attack that might show the origin and/or cause of the fire.

2. Given a simulated situation, record and report all information that will help in determining fire cause and origin.

3. Given a simulated fire situation, designate and protect the area of fire origin.

I. INTRODUCTION

II. FIRE OBSERVATION AND ORIGIN AREA PROTECTION RESPONSIBILITIES

A. Observe

1. While traveling to the fire notice:

   - Vehicles speeding away from the fire area.
   - (If after dark) a vehicle without lights.
   - Vehicles parked in unlikely spots.
   - Children leaving the fire area.
   - Gates or fences down or damaged.
   - Power lines down or damaged.

2. After arriving at the scene, observe:

   - Tire or footprint impressions leading to the fire origin.
   - Suspicious-looking people (sometimes trying to help).
   - Conversations of on-lookers (who, what, where, when, and how).
   - Power lines down (also a hazardous condition for firefighters).
   - General area of origin, what is burning, color of smoke, where burning, etc.

- Any objects that are foreign to the natural or normal surroundings.

- Signs of a campfire or debris burning.

3. During initial attack, note and immediately report any ignition devices observed in the area of origin, such as:

    - Matchbooks

    - Candles

    - Road flares/fusees

B. Record

C. Report

D. Protect

1. Don't:

    - Walk through the suspected origin area.

    - Apply water or cut a fireline through the area.

    - Drive vehicles over the origin area.

2. Do:

    - Use flagging tape, rope, or rolled toilet paper to protect a larger area.

- Keep others away from the suspected area by posting guards, if necessary.

- Protect origin by placing hand tools around a suspected small area.

III. APPLICATION

IV. EVALUATION

FIREFIGHTER TRAINING, S-130
UNIT 17 - WILDLAND FIRE INVESTIGATION TEST

1. What are some items to watch for that might show the origin and/or cause when:

   a. Traveling to fire.

   b. Arriving at the fire.

   c. Conducting initial attack.

2. Describe the methods used to designate and protect the area of origin.

FIREFIGHTER TRAINING, S-130

Unit 18 - Cultural Resources (Optional)

OBJECTIVES: Upon completion of this unit, students will be able to:

1. Define the phrase “Cultural Resources.”

2. Describe the effects of fire and fire management activities on cultural resources.

3. Describe the steps to protect cultural resources during fire management activities.

I. INTRODUCTION

II. CULTURAL RESOURCES - DEFINITIONS AND TERMINOLOGY

A. Cultural Resource

B. Types of Archaeological/Cultural Resources

1. Artifact

2. Feature

3. Site

4. Context

III. HISTORICAL OVERVIEW

IV. LEGAL RESPONSIBILITIES

A. National Historic Preservation Act (NHPA) of 1966

B. Archaeological Resources Protection Act (ARPA) of 1979

V. EFFECTS OF FIRE MANAGEMENT ACTIVITIES ON CULTURAL RESOURCES

A. Positive impacts from fire and fire suppression activities:

1. Identifying previously unknown artifacts/sites.

2. Reduce vegetation so areas can be surveyed.

B. The most severe impacts to cultural resources occur during fire suppression and rehabilitation activities.

C. Impacts from Fire Suppression

1. Fireline construction with mechanical equipment.

2. Handline and helispot construction:

3. Aerial applications

4. Concentration of people in and around sites.

5. Stockpiling and collecting of artifacts by fire suppression personnel. DON'T DO IT!

D. Impacts from Mopup Activities

1. Engines and other vehicles moving around inside the burned area crushing or displacing cultural materials.

2. Dragging hoses across sites and material which can cause breakage, artifact displacement, or structural damage to features such as burials, pithouses and hearths.

3. Digging and tillage of the soil, straight stream water application, digging roots and stump holes

E. Impacts from Prescribed Fire

1. The impact of installing control lines.

2. The actual physical impact of fire on structures, pottery, and stone artifacts, and archaeological sites.

3. The loss of ground cover can lead to erosion and vandalism. Positive impacts are the same as described for fire suppression.

VI. STEPS TO PROTECT CULTURAL RESOURCES DURING WILDFIRE SUPPRESSION AND PRESCRIBED BURNING ACTIVITIES

A. Be Aware

B. Avoid Significant or Unknown Eligibility Sites

C. Report

APPENDIX D

COURSE EVALUATIONS/ FINAL EXAM

STUDENT FINAL COURSE EVALUATION

Course Name and Number: _____

Date: _____ **Location:** _____

Check the response that best reflects your opinion. If you have specific input on the course's strengths or improvement opportunities, provide comments in the Remarks section.

This Course **Remarks:**

- ☐ Exceeded my expectations
- ☐ Fulfilled my expectations
- ☐ Failed to meet my needs

Course Time Allocated **Remarks:**

- ☐ Appropriate
- ☐ Took too much time (should be shorter)
- ☐ Insufficient (needed to be longer)

Level of Instruction **Remarks:**

- ☐ Appropriate
- ☐ Too basic
- ☐ Too advanced

Instructor Presentations **Remarks:**
(Consider objectives met, clarity of instruction, enthusiasm, training aids, exercises, methods used)

- ☐ Excellent
- ☐ Good
- ☐ Satisfactory
- ☐ Unsatisfactory

Course Materials **Remarks:**
(Consider usefulness of texts, exercises, handouts, reference materials)

- ☐ Excellent
- ☐ Good
- ☐ Satisfactory
- ☐ Unsatisfactory

Classroom and Breakout Room **Remarks:**
(Consider lighting, temperature, cleanliness, furnishings, equipment, distractions)

- ☐ Excellent
- ☐ Good
- ☐ Satisfactory
- ☐ Unsatisfactory

Correspondence and Guidance **Remarks:**
(Consider timing of pre-course materials and information provided concerning, travel, lodging, logistics)

- ☐ Excellent
- ☐ Good
- ☐ Satisfactory
- ☐ Unsatisfactory

What did you like MOST about this course?

What did you like LEAST about this course?

Recommendations for improving this course (Be specific):

Name (Optional):

TRAINING COURSE EVALUATION

(To be completed by the course coordinator and/or lead instructor)

The National Interagency Fire Center (NIFC) Fire Training is interested in obtaining your candid evaluation of the various factors of this NWCG course. Your evaluation of the factors listed below and any other constructive suggestions will be valuable guides for improving the course. Comments associated with specific cadres, locations and facilities should be forwarded to the course coordinator, not to NIFC Fire Training.

Course:_____ **Location presented**:_____

Dates presented:_____ **Your name**:_____

Course Related Material (understandability, completeness, technical errors); consider any or all of the following items:

1. Pre-course work/pre-test
2. Objectives
3. Instructor materials
4. Student workbook
5. Handouts
6. Audio/video aids
7. Quizzes/tests
8. Exercises/scenarios
9. Simulations/field work
10. Group interaction
11. Time allotted

Comments:

Please give us your feedback on any or all of the following:

1. Did the lecture follow the student workbook?
2. What percent of the materials was new to you?
3. Were the course materials relevant to the associated position?
4. What aspects of the course did you find most valuable?
5. What aspects of the course did you feel needed to be strengthened?
6. Did the course meet or exceed your expectations?
7. Were unit and course objectives met?
8. When the course is re-written, would you be interested in participating?

Comments:

Please return this form to:

nwcg_standards@nifc.blm.gov

or

National Interagency Fire Center
Fire Training
Training Standards Unit
3833 S. Development Avenue
Boise, ID 83705

S-130 FIREFIGHTER TRAINING
INSTRUCTOR FINAL EVALUATION OF EACH STUDENT

ANY ELEMENT CHECKED "NO" SHOULD HAVE AN EXPLANATION ATTACHED IN THE COMMENTS. AN ELEMENT CHECKED "NO" DOES NOT NECESSARILY SIGNIFY A FAILURE OF THE ENTIRE COURSE. IT IS UP TO THE INSTRUCTOR TO DETERMINE WHETHER OR NOT AN INDIVIDUAL POSSESSES THE SKILLS TO PASS THE COURSE.

1. Student wore their personal protective equipment, was prepared for the field sessions, and demonstrated care of tools and issued gear throughout the training.

   Yes _____ No_____

2. Student demonstrated basic knowledge and understanding of the 18 Watchouts, Standard Firefighting Orders, and LCES.

   Yes _____ No_____

3. Student demonstrated basic knowledge and understanding of Human Factors and the Risk Management Process.

   Yes _____ No_____

4. Student demonstrated the ability to effectively and safely deploy a fire shelter.

   Yes _____ No_____

5. Student demonstrated the ability to effectively and safely use all hand tools (cutting, scraping, smothering).

   Yes _____ No_____

6. Student demonstrated the ability to effectively and safely use all firing devices (fusee, drip torch, field expedient).

Yes _____ No_____

7. Student demonstrated proper travel procedures (vehicle, foot, etc.) en route to and from an incident.

Yes _____ No_____

8. Student demonstrated the ability to effectively and safely construct progressive and leap frog handline.

Yes _____ No_____

9. Student demonstrated the ability to effectively and safely construct simple and progressive hoselays.

Yes _____ No_____

10. Student demonstrated the knowledge to effectively and safely perform basic firefighting tasks (cold trailing, hotspotting, spot fire detection, patrolling, mopup, retardant drop procedures, etc.)

Yes _____ No_____

11. Student demonstrated an awareness of potential hazardous material identification.

Yes _____ No_____

12. Student demonstrated the ability to effectively communicate with supervisors, and other crewmembers.

Yes _____ No_____

13. Student demonstrated the ability to work as an effective and safe team member.

Yes _____ No_____

14. Student demonstrated the capability to perform arduous work for extended periods.

Yes _____ No_____

15. Student passed the final examination.

Yes _____ No_____

I recommend/do not recommend (circle the one that applies) that the student be qualified as a Firefighter Type 2.

_____	_____
Signed	Signed
Title: Lead Instructor	Title: Student
Date: _____	Date: _____

Comments (includes additional training needs if one of the above elements was checked no):

S-130 INTRODUCTION TO FIREFIGHTER TRAINING
FINAL EXAM

50 questions for a total of 100 points.

Name: _____

1. List five situations that shout Watch Out.

   -
   -
   -
   -
   -

2. To reduce the risk of entrapments post a _____ and maintain good _____.

3. Describe the difference between a Safety Zone and a Deployment Site.

4. Identify five mandatory personal protective items that must be worn by firefighter on the line.

-
-
-
-
-

5. The person ultimately in charge of the fire is called the:

a. Division Group Supervisor.
b. Fire Management Officer.
c. Incident Commander.
d. Local Fire Chief.

6. List five of the “Standard Firefighting Orders”:

-
-
-
-
-
-

7. Name three wildland fire hand tools that are used in your local area.

-
-
-

8. Why should firefighters maintain at least 10 feet of space or more, when walking and working together along the fire line?

9. When loading a helicopter you should:

   a. Approach when directed by the pilot or helitack crewmember.
   b. Approach from the rear of the aircraft.
   c. Never board without being escorted.
   d. All the above.

10. List two firing devices that may be used in firing operations.

-
-

11. List two hazards when using a fusee during firing operations.

-
-

12. The most effective ground technique for patrolling for spot fires is the use of a systematic grid to search a designated area.

True False

13. When reacting to a possible hazardous material emergency you should immediately do what?

a. Rush in and put out the fire.
b. Try to identify the material by smell.
c. Protect the point of origin.
d. Remove hazardous materials.

14. When responding to a possible hazardous materials emergency, where would you look for more information on any identified hazardous material?

a. DOT Emergency Response Guidebook.
b. Agency Hazardous Materials list.
c. National Chemical Guideline.
d. OSHA Safety List.

15. Which of the following are common denominators in fatal or near miss fires? (circle all that apply).

a. Most occurred during initial attack.
b. Most occurred during mopup.
c. Most occurred in heavy fuels.
d. Most occurred in light fuels.

16. When is it ok to not have an identified escape route and safety zone?

a. When you know the country
b. On small fires
c. On prescribed burns
d. Never

17. Situation: You are on a hillside building a fireline and can no longer see the main fire at the bottom of the valley or make contact with anyone who can see the fire. There are light to moderate fuels below you and all afternoon the weather has been getting hotter while the wind is beginning to increase and swirl. Which watch-out situations exist? List below.

-
-
-
-
-
-
-

18. The first three Standard Firefighting Orders deal with:

a. Fire behavior.
b. Organization and control.
c. Fireline safety.
d. Communication.

19. What three weather factors are most important to firefighters?

-
-
-

20. List three factors in the fire environment that reduce our judgment, alertness, thinking and decision making ability.

-
-
-

21. A fire shelter is designed to (circle all that apply)

a. Protect against prolonged direct flame contact.
b. Reflect radiant heat.
c. Allow you to fight fires more aggressively.
d. Provide you with breathable air.

22. When must fireline personnel carry a fire shelter?

a. During the initial attack.
b. During mopup operations.
c. When entering the fire area.
d. During a prescribed burn.
e. All of the above.

23. How often should your shelter be inspected?

24. List two of the four recommended items to wear or take into your fire shelter.

-
-

25. While deployed in a fire shelter, water should be used to?

a. Moisten clothing.
b. Wet your face.
c. Moisten shelter.
d. Drink.

26. A shelter should be removed from service if it

a. Has a ½ inch tear along folded edge.
b. Has been deployed for inspection or demonstration.
c. Is over a year old.
d. All of the above.

27. List five of the Wildland/Urban interface watch out conditions.

-
-
-
-
-

28. When would you remove property from a burning or at risk structure?

a. Never.
b. Only when destruction is imminent.
c. When property value exceeds $10,000.
d. When instructed by owners.

29. A wildland firefighter should never attempt to extinguish a structure fire by entering a burning building.

True False

30. A bandana worn over the face should be kept moist to help cool the air you are breathing.

True False

31. If you have to use your fire shelter, list two good places to set it up.

•

•

32. When building fireline, unburned fireline debris should be scraped to the _____ of the fireline.

a. Inside
b. Outside

33. If you have retardant dropped on you, you should change your clothes and clean off the retardant as soon as possible.

True False

34. According to the ICS system, if you worked as an engine crewmember on a small fire, you work directly for the:

a. Squad Boss.
b. Division Group Supervisor.
c. Engine Boss.
d. The Fire Chief.

35. Fire shirts are fire resistant, not fire proof.

True False

36. The male end of the hose should be on the inside of the roll when rolling hose.

True False

37. How many feet are in a chain?

a. 55
b. 66
c. 640
d. 68
e. 5280

38. Tools with loose heads:

a. Should be used carefully.
b. Should be thrown away.
c. Should be flagged and marked to indicate repairs are needed.
d. Should be returned to the tool cache to be made available for someone else to use.
e. Should be given to coworkers.

39. Two types of hose lays are:

a. Progressive
b. Simple
c. Complex
d. Simplex

40. During a lighting storm, it is best to seek shelter at the base of a large tree.

True False

41. A cup trench or a “V” trench is used to:

a. Prevent water from escaping a holding dam.
b. Prevent erosion.
c. Prevent rolling materials from crossing the control line.
d. None of the above.

42. If a tanker (according to ICS terminology) has been ordered for your fire, you will receive:

a. A 1,000 water tender on your fire.
b. A helicopter with a bucket.
c. A reconnaissance plane.
d. A fixed wing aircraft with retardant.

43. Your fire shelter should only be carried on wildfires and not prescribed burns.

True False

44. The part of the fire that is burning most intensely is generally called the:

a. Head.
b. Flank.
c. Finger.
d. Black.

45. Explain the difference between a finger and a spot fire.

46. List three human factors that could affect your ability to maintain your situation awareness on the fireline.

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47. Situation awareness is:

a. The gathering of information by observation and communication.
b. The foundation of all the decision making.
c. An ongoing cycle.
d. All of the above.

48. List the five steps of the Risk Management Process.

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49. Three things that must occur for effective communication to take place are:

a. Pertinent topic, two or more individuals, and an exchange of information.
b. Sender, receiver, and an exchange of information.
c. Correct attitude, concentration, and an exchange of information.
d. None of the above.

50. Teamwork is very important in firefighting. List one reason why.

FIREFIGHTER TRAINING, S-130
FINAL EXAM ANSWER KEY

50 questions for a total of 100 points.

Name: _____

1. List five situations that shout Watch Out. (5 points)

   1. **Fire not scouted and sized up.**
   2. **In country not seen in daylight.**
   3. **Safety zones and escape routes not identified.**
   4. **Unfamiliar with weather and local factors influencing fire behavior.**
   5. **Uninformed on strategy, tactics and hazards.**
   6. **Instructions and assignments not clear.**
   7. **No communication link with crew members/supervisor.**
   8. **Constructing fireline without safe anchor point.**
   9. **Building fireline downhill with fire below.**
   10. **Attempting frontal assault on fire.**
   11. **Unburned fuel between you and the fire.**
   12. **Cannot see main fire, not in contact with anyone who can.**
   13. **On a hillside where rolling material can ignite fuel below.**
   14. **Weather is getting hotter and drier.**
   15. **Wind increases and/or changes direction.**
   16. **Getting frequent spot fires across line.**
   17. **Terrain and fuels make escape to safety zones difficult.**
   18. **Taking a nap near the fireline.**

2. To reduce the risk of entrapments post a ____**lookout**____ and maintain good ___**communications**___. (2 points)

3. Describe the difference between a Safety Zone and a Deployment Site. (2 points)

   Safety Zone: A place where a fire shelter is not needed; where firefighters may find refuge from danger.

Deployment Site: An area that the firefighter can use to deploy their fire shelter when escape routes and safety zones have been compromised.

4. Identify five mandatory personal protective items that must be worn by firefighter on the line. (5 points)

   Hard hat, eye protection, hearing protection, gloves, flame resistant pants, flame resistant shirt, leather boots, fire shelter, socks, canteen, headlamp

5. The person ultimately in charge of the fire is called the: (1 point)

   c, Incident Commander.

6. List five of the "Standard Firefighting Orders": (5 points)

   1. **Keep informed on fire weather conditions and forecasts.**
   2. **Know what your fire is doing at all times.**
   3. **Base all action on current and expected behavior of the fire.**
   4. **Identify escape routes and safety zones, and make them known.**
   5. **Post lookouts when there is possible danger.**
   6. **Be alert. Keep calm. Think clearly. Act decisively.**
   7. **Maintain prompt communications with your forces, your supervisor, and adjoining forces.**
   8. **Give clear instructions and insure they are understood.**
   9. **Maintain control of your forces at all times.**
   10. **Fight fire aggressively, having provided for safety first.**

7. Name three wildland fire hand tools that are used in your local area. (6 points)

   Pulaski, axe, shovel, McLeod, adz-hoe, swatter, gunnysack or other locally used tools

8. Why should firefighters maintain at least 10 feet of space or more, when walking and working together along the fire line? (2 points)

   Clearance for branches, clearance for tools, flying debris, etc.

9. When loading a helicopter you should: (1 point)

a, Approach when directed by the pilot or helitack crewmember.

10. List two firing devices that may be used in firing operations. (2 points)

Fusee, drip torch, matches, burning firebrand

11. List two hazards when using a fusee during firing operations. (2 points)

Spattering, fumes, high intensity light, etc.

12. The most effective ground technique for patrolling for spot fires is the use of a systematic grid to search a designated area. (1 point)

True

13. When reacting to a possible hazardous material emergency you should immediately do what? (1 point)

c, Protect the point of origin.

14. When responding to a possible hazardous materials emergency, where would you look for more information on any identified hazardous material? (1 point)

a, DOT Emergency Response Guidebook.

15. Which of the following are common denominators in fatal or near miss fires? (circle all that apply). (2 points)

b, Most occurred during mopup.
d, Most occurred in light fuels.

16. When is it ok to not have an identified escape route and safety zone? (1 point)

d, Never

17. Situation: You are on a hillside building a fireline and can no longer see the main fire at the bottom of the valley or make contact with anyone who can see the fire. There are light to moderate fuels below you and all afternoon the weather has been getting hotter while the wind is beginning to increase and swirl. Which watch-out situations exist? List below. (7 points)

Watch out situations #8, 9, 11, 12, 13, 14 and 15.

18. The first three Standard Firefighting Orders deal with (1 point)

a, Fire behavior.

19. What three weather factors are most important to firefighters? (3 points)

Temperature, relative humidity and wind

20. List three factors in the fire environment that reduce our judgment, alertness, thinking and decision making ability. (3 points)

Fatigue, heat stress, smoke, stress

21. A fire shelter is designed to? (circle all that apply) (2 points)

b, Reflect radiant heat.
and
d, Provide you with breathable air.

22. When must fireline personnel carry a fire shelter? (1 point)

e, All of the above.

23. How often should your shelter be inspected? (1 point)

When the fire shelter is issued to you, at the beginning of each fire season, every two weeks during the fire season, when you believe it may have been damaged.

24. List two of the four recommended items to wear or take into your fire shelter. (2 points)

Gloves, radio, hardhat, water

25. While deployed in a fire shelter, water should be used to (1 point)

d, Drink.

26. A shelter should be removed from service if it (1 point)

b, Has been deployed for inspection or demonstration.

27. List five of the Wildland/Urban interface watch out conditions. (5 points)

Wooden construction and wood shake roof; Poor access and narrow congested one way roads; Inadequate water supply; Natural fuels 30 feet or closer to structures; Extreme fire behavior; Strong winds; Need to evacuate public; Structures located in chimneys, box or narrow canyons, saddles or on steep slopes in flashy fuels; Bridge load limits; Working around power lines; Petroleum or propane tanks are present.

28. When would you remove property from a burning or at risk structure? (1 point)

a, Never.

29. A wildland firefighter should never attempt to extinguish a structure fire by entering a burning building. (1 point)

True

30. A bandana worn over the face should be kept moist to help cool the air you are breathing. (1 point)

False

31. If you have to use your fire shelter, list two good places to set it up. (2 points)

Burned area, rock slope (where the shelter can be sealed), areas with light fuels, prepared deployment zones, wetlands

32. When building fireline, unburned fireline debris should be scraped to the _____ of the fireline. (1 point)

b, Outside

33. If you have retardant dropped on you, you should change your clothes and clean off the retardant as soon as possible. (1 point)

True

34. According to the ICS system, if you worked as an engine crewmember on a small fire, you work directly for the: (1 point)

c, Engine Boss.

35. Fire shirts are fire resistant, not fire proof. (1 point)

True

36. The male end of the hose should be on the inside of the roll when rolling hose. (1 point)

True

37. How many feet are in a chain? (1 point)

b, 66

38. Tools with loose heads: (1 point)

c, Should be flagged and marked to indicate repairs are needed.

39. Two types of hose lays are: (2 points)

a, Progressive
and
b, Simple

40. During a lighting storm, it is best to seek shelter at the base of a large tree. (1 point)

False

41. A cup trench or a "V" trench is used to: (1 point)

c, Prevent rolling materials from crossing the control line.
Note: Water Bars are to prevent erosion.

42. If a tanker (according to ICS terminology) has been ordered for your fire, you will receive: (1 point)

d, A fixed wing aircraft with retardant.

43. Your fire shelter should only be carried on wildfires and not prescribed burns. (1 point)

False

44. The part of the fire that is burning most intensely is generally called the: (1 point)

a, Head.

45. Explain the difference between a finger and a spot fire. (4 points)

A finger is an area, usually a narrow strip, that burns away from the main part of the fire, but is still part of the main fire.
A spot fire is an area burning outside the main fire perimeter, often caused by wind blown embers or rolling debris. It is separate from the main fire.

46. List three human factors that could affect your ability to maintain your situation awareness on the fireline. (3 points)

Inexperience, stress (both personal and job related), fatigue, distractions (environmental, personal, etc.), attitude

47. Situation awareness is: (1 point)

d, All of the above.

48. List the five steps of the Risk Management Process. (5 points)

- **Situation Awareness**
- **Hazard Assessment**
- **Hazard Control**
- **Decision Point**
- **Evaluate**

49. Three things that must occur for effective communication to take place area: (1 point)

b, Sender, receiver, and an exchange of information.

50. Teamwork is very important in firefighting. List one reason why. (1 point)

- **Individuals cannot know all the hazards in the work environment.**
- **Individuals cannot by themselves accomplish most tasks that are assigned to a crew.**
- **Good teamwork goes hand in hand with good communication.**
- **A crew is only as strong as its weakest member.**