S-130 Unit 9: Handline Techniques

Summary:

This unit is intended to be taught as a hands-on presentation in the field, to provide the basic information for an FFT2 to begin development of safe and efficient line construction skills that lead to timely and effective actions in the field, taking in to account variable environmental and fire behavioral conditions.

If field presentation is not possible, the unit can be taught via the PowerPoint in a classroom, utilizing the tools and equipment as reference.

Incident Position Description (IPD) Alignment:

This unit aligns with the following FFT2 IPD specific duties (https://www.nwcg.gov/positions/fft2/position-ipd):

- Apply knowledge of fuels, terrain, weather, and fire behavior to decisions and actions.
- Follow crew Standard Operating Procedures (SOPs).
- Ensure that instructions are clear and understood.

Objectives:

Students will be able to:

- Discuss establishing an appropriate fireline location using topography, fuel conditions, current and forecasted fire behavior, and incident objectives.
- Define and identify appropriate anchor point to start construction of handline.
- Describe two kinds of coordinated crew techniques used for fireline construction.
- Demonstrate the construction of a cup trench on a steep slope and describe its purpose.
- Describe the purpose of organizing tools in a specific order.
- Demonstrate maintaining a safe working distance from other crewmembers.
- Demonstrate the ability to communicate changing conditions and needs during handline construction using common terminology.
- Define and identify an appropriate line construction end point.
- Describe the reason downhill fireline construction is considered a watch out situation.

Unit at a Glance:

Topics	Method	Duration
Line Location	Field Presentation	20 Minutes
Strategic Tool Order	Field Presentation	15 Minutes
Coordinated Crew Techniques	Field Presentation	20 Minutes
Saw Line	Field Presentation	15 Minutes
Handline	Field Presentation	15 Minutes
Spacing	Field Presentation	10 Minutes
Terminology & Communication	Field Presentation	20 Minutes
Total Unit Duration		**2 Hours**

Materials:

- *Incident Response Pocket Guide (IRPG)*, PMS 461, https://www.nwcg.gov/publications/461.
- *NWCG Glossary of Wildland Fire*, PMS 205, https://www.nwcg.gov/glossary/a-z.
- The tools and equipment presented in the unit, as well as local area specific tools and equipment.
- Required fireline PPE.
- Notebook for participants.
- S-130 Student Evaluation Task Sheet.
- Ability to display images and video on large screen (if field presentation not possible).
- White board or easel access for group breakout (if field presentation not possible).

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Note to Instructor

- This unit is intended to be taught as a hands-on presentation in the field.
- The tools and equipment referenced should be available as props for instructors and hands-on implements for students.
- If field presentation is not possible, the unit can be taught via the PowerPoint in a classroom, utilizing the tools and equipment as reference.

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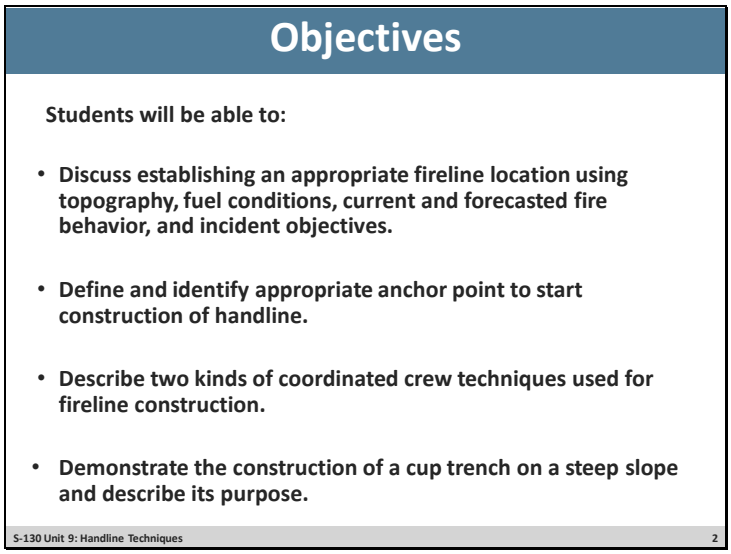
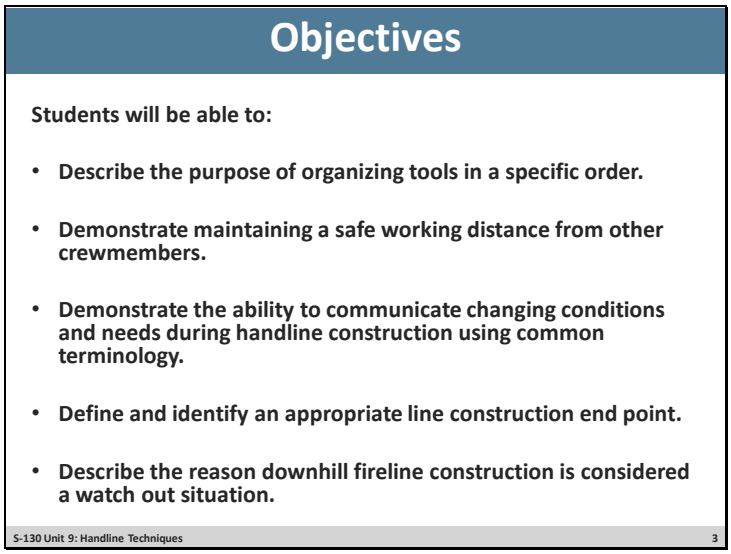


❑ Review unit objectives.

Slide 3



❑ Review unit objectives.

Slide 4

- Identifying the location where a crew will begin, progress, and end handline is an important decision which will establish crew safety, effectiveness, and the most efficient production rates.
- Selecting the best possible location will provide the greatest probability of success for the line to hold when impacted by the fire's edge while providing for personnel safety.

❑ Reference Fireline Location in the *Incident Response Pocket Guide (IRPG)*, PMS 461, https://www.nwcg.gov/publications/461.

❑ Discuss location considerations:

- Crew supervisor makes decisions regarding location of the handline.
- Line scout starts well ahead of the crew, marking the line's location with flagging in visible, easy to identify locations while also attaining intelligence on and identifying hazards along the route and communicating findings to the crew's leadership.

❑ Discuss strategies of attack pertaining to line location:

- Direct - Considered the most advised method regarding line location due to increased safety to personnel.
- Indirect - Should be used based on factors such as rapid rates of growth and spread, difficult access, heavy fuel loading, and long-distance spotting potential.

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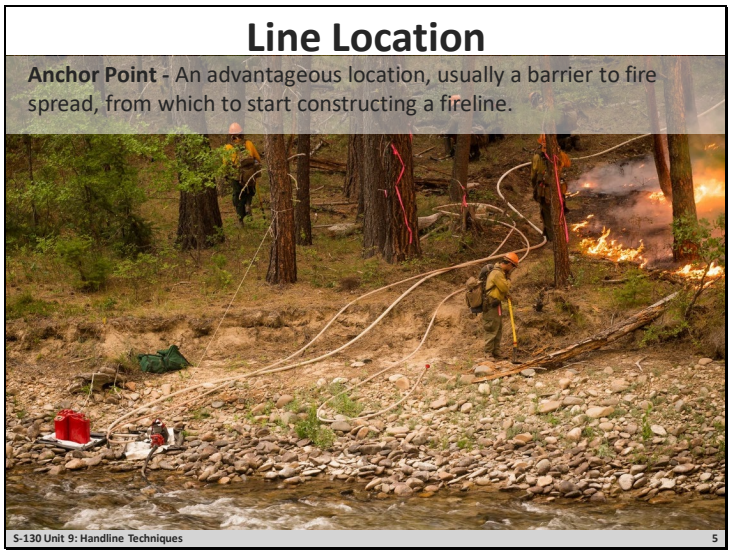

- ❑ Discuss the importance of a strong anchor point in order to minimize the chance of being out-flanked by the fire while the line is being constructed.
- ❑ Discuss the use of natural barriers:
  - Water features.
  - Areas void of fuels such as rock outcroppings.
  - Previously burned areas of the fire that are cold.
  - Areas where fuel is sparse and not receptive to fire spread.
- ❑ Discuss the use of constructed barriers:
  - Roads.
  - Parking areas.
  - Trailheads can often provide an anchor point.
- ❑ Discuss protocol if the anchor point is jeopardized and no longer viable. An example is choosing a safe route to bump back to and reestablish or relocate the anchor point.

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- ❑ Discuss how topography plays a role in identifying line location:
  - Fireline should provide the most direct route to the end point to reduce weak points in the line such as fingers.
  - Find routes that minimize impact and maximize safety for access and egress.
  - Use existing natural and constructed barriers to reduce the amount of work needed to contain a fire.
  - Locate line on top of a ridge or just on the lee side away from the main fire, and avoid underslung or mid-slope line in steep terrain.
- ❑ Discuss how fuels play a role in identifying line location:
  - Routes through light fuels provide advantages without sacrificing holding capability or significant resource values.
  - Avoid sharp turns near dense fuel pockets to reduce spotting potential and maximizing line integrity.
  - For efficiency in highly receptive fuels where spot fires are frequent, build indirect fireline or relocate line to encompass multiple spots, then burn out any unburned fuel to complete and strengthen the line.
- It's important to locate a route where hazards are minimal or can be easily removed.
- ❑ Discuss potential hazards encountered when identifying line location and how to mitigate them:
  - Snags – remove snags or locate the line a safe distance away.
  - Terrain – locate line away from features such as drop offs, steep slopes, chimneys, and chutes; where rolling debris hazards exist; and areas where footing can be a challenge.
  - Downhill line construction – reference Downhill Checklist in the *Incident Response Pocket Guide (IRPG)*, PMS 461, https://www.nwcg.gov/publications/461.

- ❑ Discuss how the fire location (slope and aspect) is related to fire behavior and how it plays a role in identifying line location:
  - Spread direction, specifically relating to when and where the fire will impact the fireline.
  - Rate of spread, focusing on the timing regarding indirect and direct line construction.
  - Rule of thumb for the capabilities of hand tools is 4-foot flame length or less.
  - Spot fires can affect the line location depending on the fuel conditions in the receptive fuels near the potential line.
  - Weather may affect the line location. For example, increases in wind speed and direction could trigger a need for a change in suppression approach.
- ❑ Always have a contingency plan to put in place if the planned fireline location is compromised for any reason, including hazards, changes in fire behavior, etc.

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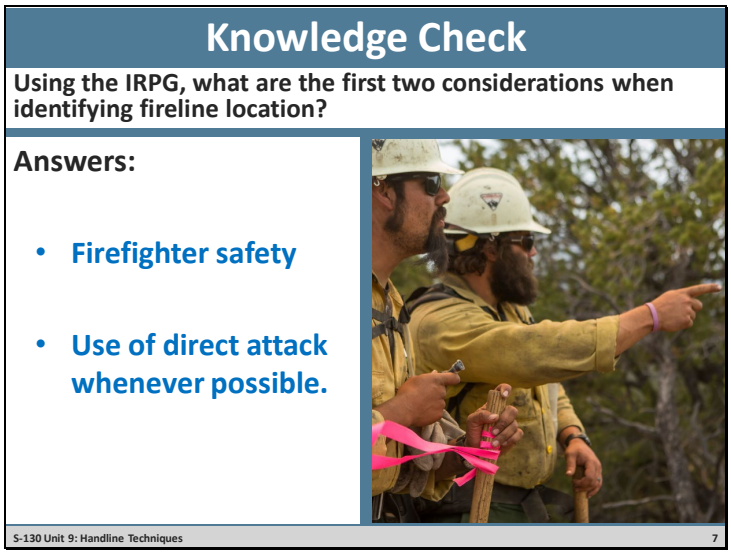

Question: Using the IRPG, what are the first two considerations when identifying fireline location?

Answers: Firefighter safety and use of direct attack whenever possible.

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- ❑ Discuss the tool order as the strategic arrangement of saws and hand tools that will provide the most effective, efficient, and safe handline construction operation depending on fuel type and density.
- ❑ Some geographic areas require different or additional tools based on fuel characteristics.
- ❑ Discuss tool order given the following examples:
  - Light fuel type – Type 2 IA crews with two saw/swamper teams, fewer cutters, and a larger contingent of scrapers.
  - Moderate fuel type – Type 2 IA crews with two saw/swamper teams and an equal number of cutters and scrapers.
  - Heavy fuel type – Type 2 IA crews with 3-4 saw/swamper teams, more cutters, and fewer scrapers.

Exercise

- ❑ Provide the students a scenario focusing on a specific fuel type.
- ❑ Have them determine a tool order based on the specific fuel type.
- ❑ Follow with discussion about what they produce.

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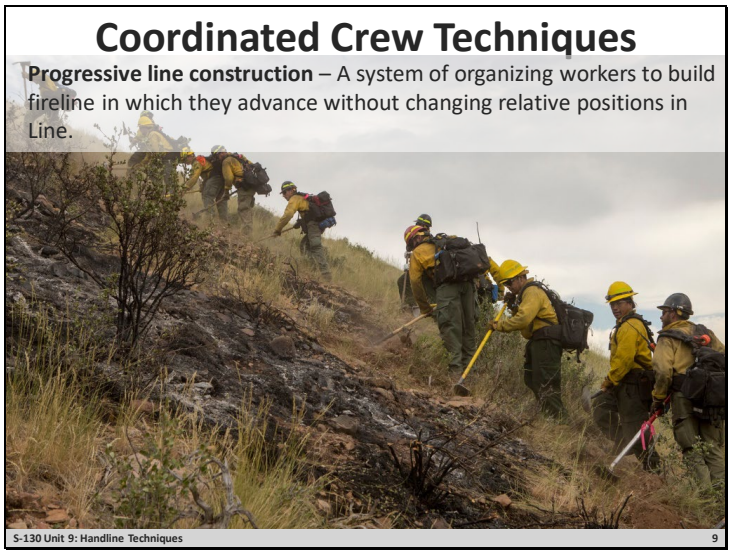

- ❑ Discuss the "swing-n-step" or "one-lick" method of progressive line construction:
  - Swing-n-step or one-lick - Each person starts from the front of the line and improves the condition of the line until it meets standards by the time the last tool is engaged. No one person is responsible for a specific chunk of line.
- ❑ Discuss the bump up method of progressive line construction:
  - Bump up - Work is begun with a suitable space between workers; whenever one worker overtakes another, all of those ahead move one space foreword and resume work on the uncompleted part of the line. The last worker does not move ahead until work is completed on the piece of line they are responsible for. Forward progress of the crew is coordinated by a Crew Boss.

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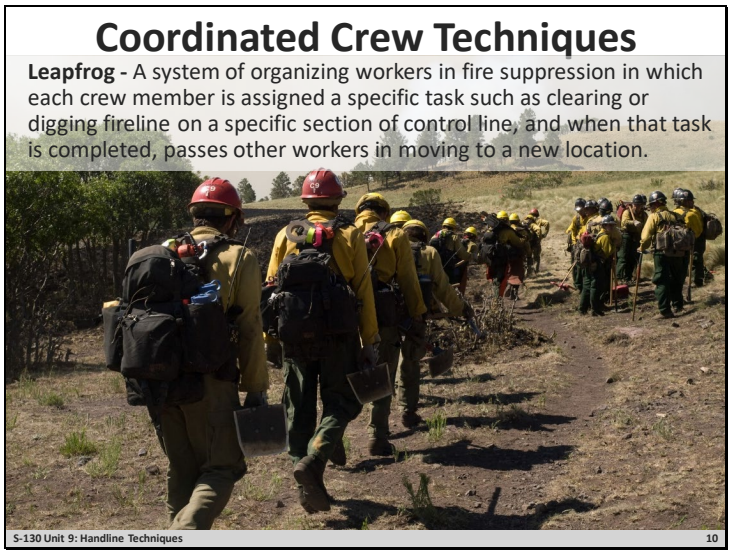

- ❑ Discuss how leapfrog can be equally effective within your own crew (by squad) or when working in tandem with another crew.
- ❑ Discuss communication while using the leapfrog technique:
  - It can be effective to hang a piece of flagging at the starting point of your line with the crew's name, division identifier, and date so the crew that supersedes the original crew knows they are in the right place and to move ahead.
  - This technique is not advised when working in timber or heavy brush where the potential for danger could exceed the safety of a retreat to the black or a safety zone.
  - When the leapfrog method is used, lookouts are essential to maintain safety.

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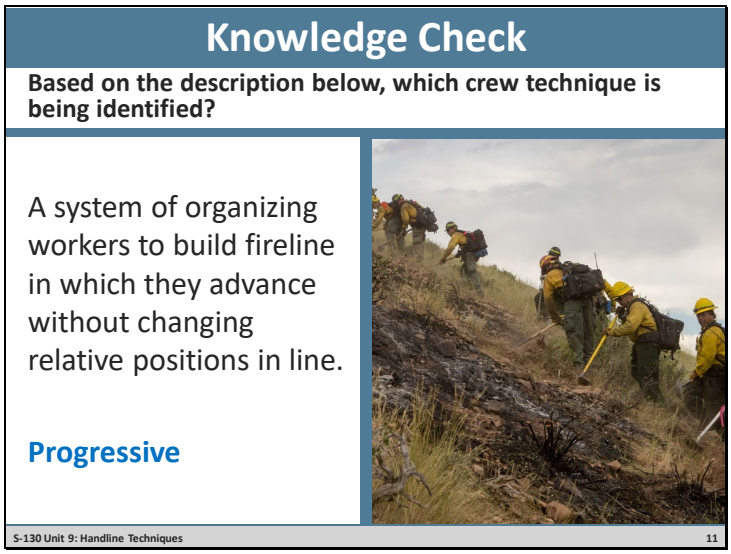

Question: Based on the description below, which crew technique is being identified?

A system of organizing workers to build fireline in which they advance without changing relative positions in line.

Answer: Progressive

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- ❑ Discuss the saw team role in setting the pace for the rest of the line construction operation:
  - There are times the saw team can progress with incredible efficiency, depending on fuel loading, at which point small gaps may form between the saws and diggers.
  - Other times, the saw team workload may be large and production rate slows, at which point diggers can improve their current location until the saws make more progress. Diggers may also systematically and temporarily separate from the dig to help swampers remove and place cut material.
- ❑ Discuss fuel characteristics:
  - Depending on the fuel type, size, and continuity, plan ahead for the number of saw teams needed to effectively remove fuels while maintaining production rates that reflect objectives.
  - The width of the saw swath may vary from 8 to 20 feet depending on fuel height, crown spacing, weather, and fire behavior.
- ❑ Discuss independent actions and techniques used by saw teams:
  - Progressive saw line construction can be used for both direct and indirect attack methods and is useful in heavy, continuous fuels. Only cut enough vegetation to control the fire. This lessens exertion and exposure time and increases fireline production rates. Each saw team cuts a swath of fireline, with the lead team only cutting enough fuel to establish the fireline, and the following saw teams complete fireline to standard with hand tools.
  - Leapfrog saw line construction is when a saw team cuts a chain of fuel and them bumps a chain ahead, followed by hand crews to complete the fireline. Leapfrog works well in light fuels or during mop up and is not advised in heavy brush or timber where the potential for danger could exceed the safety of a retreat to the black or safety zones.
- ❑ Discuss hazard trees:

- Avoid any unnecessary felling. Identify and remove only those trees that present a real hazard based on their condition and proximity to line construction activities. Hazard trees could include trees on fire, unsound snags or live trees, trees with a severe lean, or trees hung up.
- If a hazard tree can't be safely removed, flag the area, re-route the line, and burn out any unburned fuels to secure the line.

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- ❑ Discuss the standards for safe, effective, and efficient handline:
  - Established from the anchor point.
  - Exposes mineral soil to eliminate potential for combustible material to continue burning in the ground fuels, compromising line integrity.
  - Handline width is dependent on fuel size, flame length, slope, weather, and spread potential.
  - Only as wide as necessary to conserve energy and save time.
- ❑ Discuss areas of concern when constructing handline:
  - Leaf litter and needle cast are fine fuels that can threaten the line by igniting and easily crossing the line in adverse conditions. Monitoring areas like this is advised.
  - Deep duff layers must be excavated until mineral soil is exposed.
  - A cup trench is required when constructing underslung line. The steeper the slope the wider the line should be.
  - Always refer to the Downhill Checklist in the *IRPG* before attempting downhill line construction. Discuss hazards such as rolling material, poor footing, and escape route and safety zone locations.
- ❑ Discuss the use of natural and constructed barriers:
  - Existing barriers can be a great option to increase production rates as well as conserve effort and energy by bumping past these areas and continuing on the opposite side of the barrier.

Question: What are examples of natural or constructed barriers that can be used to increase line construction production rates?

Answers: Rocks, lakes, bald ridges, scree fields, etc.

- ❑ Discuss production rates pertaining to a linear measure of distance and why it's used:
  - 1 chain = 66 feet

- 1 mile = 80 chains or 5,280 feet
- 1 acre = 17 square chains, or approximately the size of a football field
- 1 square mile = 640 acres

❑ Reference Average Perimeter in Chains in the *Incident Response Pocket Guide (IRPG)*, PMS 461, https://www.nwcg.gov/publications/461.

❑ Discuss the reasons for variances in production rates between Type 1, Type 2 IA, and Type 2 crews (chains per hour and feet per hour).

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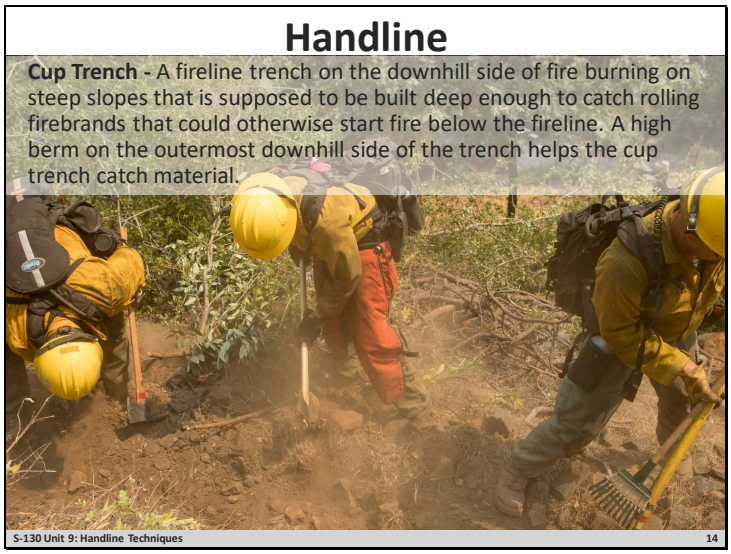

- ❑ Discuss underslung line:
  - A fireline below a fire on a slope.
  - Hazards, such as rolling material, are more present when working with this type of line (logs, stumps, rocks).
  - Potential for spot fires developing below you is greater.
- ❑ Discuss the purposes of constructing a cup trench when line is underslung:
  - A standard technique to catch rolling debris.
  - To retain embers from burning fuels, preventing them from crossing the line, resulting in spot fires.
- ❑ Discuss cup trench standards:
  - Cup trench depth, width, and berm height will vary depending on the percent of slope and size of material needing to be stopped.
  - The berm must be maintained, travel down the line should be done in the black or in the trench, not on top of the berm.

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- Discuss spacing with participants and impress upon them the importance as it relates to safety. Personnel should maintain a 10-foot minimum separation from others while walking and working for the following possible reasons:
  - Slips, trips, and falls (they happen!).
  - Maintains the ability to avoid and evade rolling material.
  - Provides for easy escape from potential aerial hazards.
  - Ability to avoid a tool strike should a ricochet or sudden shift in tool swing occur.
  - Provides sufficient clearance to swing a tool that requires more movement and effort.
  - Still close enough to communicate verbally and pass messages regarding hazards and direction.

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- Communication is one of the most important tasks and behaviors in wildland fire. Clear, concise, and effective communication relates directly to safe and effective suppression operations.

❑ Discuss common operational phrases and acronyms related to handline technique, what they mean, and how they are used.

- Examples to consider:
  - Reverse Tool Order (RTO) – An efficient acronym and phrase indicating a change in direction. Last tool in the order now becomes the first and the first tool becomes last. Direction of travel reverses 180 degrees. Commonly used in situations when flare ups or escapes occur, retreat to an escape route or safety zone is necessary, or a new objective has been given in an area previously worked.
  - Holding – Stop progression and maintain current location.
  - Hold and improve – A direction given by line supervisors to maintain the current position in line and continue to work on that section of line until instructed otherwise.
  - Moving – Direction given from the front of the line that the crew is moving location or continuing operations.
  - Whip – A branch of a tree, brush, or shrub that has been bent back under tension while walking and poses a threat to the safety of personnel behind the one who created the whip.
  - Bumping by – Letting personnel know that others are leapfrogging their current location.
  - Swinging – Letting others around you know you are about to use a more aggressive motion with the hand tool in order to cut.
  - Line out – Direction given by supervisor directing crew to line up in tool order.

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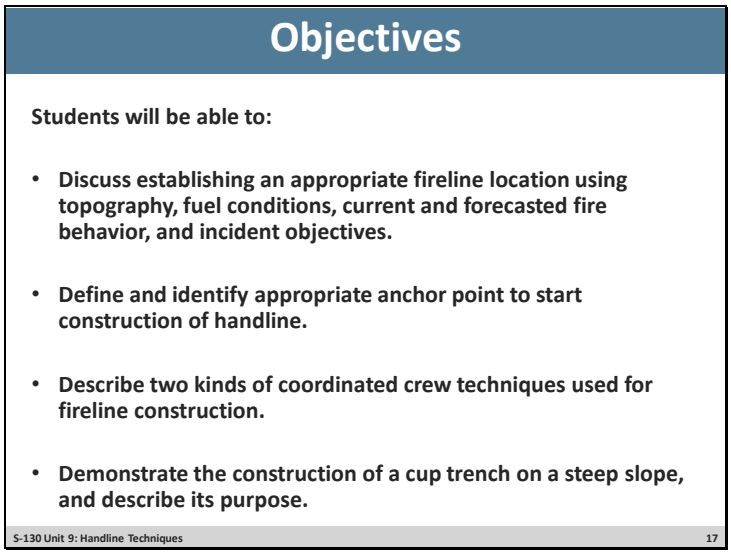
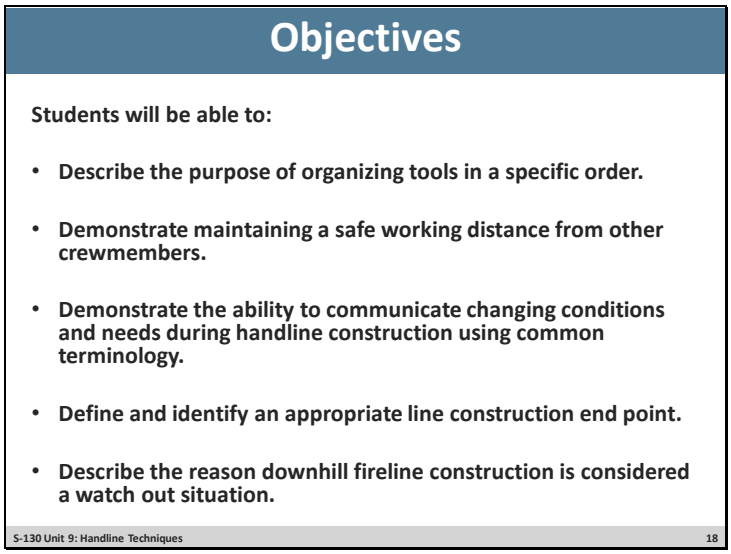


❑ Review unit objectives.

Slide 18



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