Incident Response Pocket Guide

PMS 461
NFES 1077
January 2010

SIZEUP REPORT

- Incident Type (wildland fire, vehicle accident, HazMat spill, search and rescue, etc.)
- Location/Jurisdiction
- Incident Size
- Incident Status
- Establish IC and Fire Name
- Weather Conditions
- Radio Frequencies
- Best Access Routes
- Special Hazards or Concerns
- Additional Resource Needs

This reference is intended to assist in reporting key information regarding incident conditions when first arriving on-scene. All agencies will have specific information requirements that may involve additional reports.

Incident Response Pocket Guide

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Preface

The intent of this guide is to provide a wildland fire job aid and training reference for operational personnel from Firefighter Type 2 through Division Supervisor and initial attack/extended attack Incident Commanders. It also has a secondary application for all-hazard incident response.

Some fireline decisions may be relatively simple, many are not. These decisions often require individual judgment and creativity — skills developed through extensive training, dedicated practice, and experience.

This guide provides a collection of best practices that have evolved over time within the wildland fire service. It does not provide absolute solutions to the unlimited number of situations that will occur.

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Operational Leadership

The most essential element of successful wildland firefighting is competent and confident leadership.

Leadership means providing purpose, direction, and motivation for wildland firefighters working to accomplish difficult tasks under dangerous, stressful circumstances.

In confusing and uncertain situations, a good operational leader will:

- TAKE CHARGE of assigned resources.
- MOTIVATE firefighters with a “can do safely” attitude.
- DEMONSTRATE INITIATIVE by taking action in the absence of orders.
- COMMUNICATE by giving specific instructions and asking for feedback.
- SUPERVISE at the scene of action.

DUTY

Be proficient in your job, both technically and as a leader

- Take charge when in charge.
- Adhere to professional standard operating procedures.
- Develop a plan to accomplish given objectives.

Make sound and timely decisions

- Maintain situation awareness in order to anticipate needed actions.
- Develop contingencies and consider consequences.
- Improvise within the leader's intent to handle a rapidly changing environment.

Ensure tasks are understood, supervised, and accomplished

- Issue clear instructions.
- Observe and assess actions in progress without micro-managing.
- Use positive feedback to modify duties, tasks, and assignments when appropriate.

Develop your subordinates for the future

- Clearly state expectations.
- Delegate tasks that you are not required to do personally.
- Consider individual skill levels and developmental needs when assigning tasks.

R E S P E C T

Know your subordinates and look out for their well-being

- Put the safety of your subordinates above all other objectives.
- Take care of your subordinate's needs.
- Resolve conflicts between individuals on the team.

Keep your subordinates informed

- Provide accurate and timely briefings.
- Give the reason (intent) for assignments and tasks.
- Make yourself available to answer questions at appropriate times.

Build the team

- Conduct frequent debriefings with the team to identify lessons learned.
- Recognize individual and team accomplishments and reward them appropriately.
- Apply disciplinary measures equally.

Employ your subordinates in accordance with their capabilities

- Observe human behavior as well as fire behavior.
- Provide early warning to subordinates of tasks they will be responsible for.
- Consider team experience, fatigue, and physical limitations when accepting assignments.

I N T E G R I T Y

Know yourself and seek improvement

- Know the strengths/weaknesses in your character and skill level.
- Ask questions of peers and superiors.
- Actively listen to feedback from subordinates.

Seek responsibility and accept responsibility for your actions

- Accept full responsibility for poor team performance.
- Credit subordinates for good performance.
- Keep your superiors informed of your actions.

Set the example

- Share the hazards and hardships with your subordinates.
- Don't show discouragement when facing setbacks.
- Choose the difficult right over the easy wrong.

Communication Responsibilities

All firefighters have five communication responsibilities:

- Brief others as needed
- Debrief your actions
- Communicate hazards to others
- Acknowledge messages
- Ask if you don't know

Leader's Intent

In addition, all leaders of firefighters have the responsibility to provide complete briefings and ensure that their subordinates have a clear understanding of their **intent** for the assignment:

- Task = What is to be done
- Purpose = Why it is to be done
- End State = How it should look when done

Human Factor Barriers to Situation Awareness

Low Experience Level with Local Factors

- Unfamiliar with the area or the organizational structure.

Distraction from Primary Task

- Radio traffic
- Conflict
- Previous errors
- Collateral duties
- Incident within an incident

Fatigue

- Carbon Monoxide
- Dehydration
- Heat stress
- Poor fitness level can reduce resistance to fatigue
- 24-hours awake affects your decisionmaking capability like .10 blood alcohol content.

Stress Reactions

- Communication deteriorates or grows tense.
- Habitual or repetitive behaviors.
- Target fixation – Locking into a course of action, whether it makes sense or not, just try harder.
- Action tunneling – Focusing on small tasks, but ignoring the big picture.
- Escalation of commitment – Accepting increased risk as completion of task gets near.

Hazardous Attitudes

- Invulnerable – That can't happen to us
- Anti-authority – Disregard of the team effort
- Impulsive – Do something even if it's wrong
- Macho – Trying to impress or prove something
- Complacent – Just another routine fire
- Resigned – We can't make a difference
- Group Think – Afraid to speak up or disagree

After Action Review

The climate surrounding an AAR must be one in which the participants openly and honestly discuss what transpired, in sufficient detail and clarity, so everyone understands what did and did not occur and why.

Most importantly, participants should leave with a strong desire to improve their proficiency.

- An AAR is performed as immediately after the event as possible by the personnel involved.
- The leader's role is to ensure skilled facilitation of the AAR.
- Reinforce that respectful disagreement is OK. Keep focused on the *what*, not the *who*.
- Make sure everyone participates.
- End the AAR on a positive note.

What was planned?

What actually happened?

Why did it happen?

What can we do next time?
(Correct weaknesses/sustain strengths)

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Risk Management

Situation Awareness

Gather Information

- ☐ Objective(s)
- ☐ Communication
- ☐ Who's in Charge
- ☐ Previous Fire Behavior
- ☐ Weather Forecast
- ☐ Local Factors

Scout the Fire

Hazard Assessment

Estimate Potential Fire Behavior Hazards

- ☐ Look Up/Down/Around Indicators

Identify Tactical Hazards

- ☐ Watch Outs

What other safety hazards exist?

Consider severity vs. probability?

Hazard Control

Firefighting Orders ➔ LCES

- ☐ Anchor Point
- ☐ Downhill Checklist (if applicable)

What other controls are necessary?

Decision Point

Are controls in place for identified hazards?
NO - Reassess situation YES - Next question

Are selected tactics based on expected fire behavior?
NO - Reassess situation YES - Next question

Have instructions been given and understood?
NO - Reassess situation YES - Initiate action

Evaluate

Human Factors:	Low experience level?
	Distracted from primary tasks?
	Fatigue or stress reaction?
	Hazardous attitude?
The Situation:	What is changing?
	Are strategy and tactics working?

Look Up, Down and Around

(Pay special attention to indicators in bold print.)

Fire Environment Factors	Indicators
Fuel Characteristics Assess	**Continuous fine fuels** Heavy loading of dead and down Ladder fuels Tight crown spacing (<20 ft) Special conditions: Firebrand sources Numerous snags Preheated canopy Frost and bug-kill Unusual fine fuels High dead to live ratio
Fuel Moisture Feel and measure	**Low RH and 10-hr FMC (check local thresholds)** Drought conditions Seasonal drying
Fuel Temperature Feel and measure	**High temps (>85F)** High % of fuels w/direct sun Aspect fuel temp increasing
Terrain Scout	**Steep slopes (>50%)** **Chutes/chimneys** Box canyons Saddles Narrow canyons

Look Up, Down and Around

(Pay special attention to indicators in bold print.)

Fire Environment Factors	Indicators
Wind Observe	**Surface winds above 10 mph** Lenticular clouds High, fast-moving clouds Approaching cold fronts Cumulonimbus development Sudden calm **Battling or shifting winds**
Atmospheric Instability Observe	Good visibility Gusty winds and dust devils Cumulus clouds Castellatus clouds in the a.m. Smoke rises straight up Inversion beginning to lift Thermal belt **High Haines Index**
Fire Behavior Watch	Leaning column Sheared column **Well-developed column** Changing column **Trees torching** Smoldering fires picking up Small firewhirls beginning **Frequent spot fires**

Common Denominators of Fire Behavior on Tragedy Fires

There are four major common denominators of fire behavior on fatal and near-fatal fires. Such fires often occur:

1. On relatively small fires or deceptively quiet areas of large fires.

2. In relatively light fuels, such as grass, herbs, and light brush.

3. With unexpected shifts in wind direction or wind speed.

4. When fire responds to topographic conditions and runs uphill.

Alignment of topography and wind during the burning period should be considered a trigger point to reevaluate tactics.

Common Tactical Hazards

Position

- Building fireline downhill.
- Building underslung or mid-slope fireline.
- Building indirect fireline, or unburned fuel remains between you and the fire.
- Attempting frontal assault on the fire, or you are delivered by aircraft to the top of the fire.
- Depending on escape routes that are uphill or difficult to travel.

Situation

- Poor communication due to a rapidly emerging small fire or an isolated area of a large fire.
- Suppression resources are fatigued or inadequate.
- Assignment or escape route depends on aircraft support.
- Nighttime operations.
- Wildland/urban interface operations.

When selected tactics put firefighters in these positions or situations, a higher level of risk is involved. Consider additional hazard controls that may be needed.

LCES

LCES must be established and known to **ALL** firefighters **BEFORE** it is needed.

Lookout(s)

- Experienced, competent, trusted
- Enough lookouts at good vantage points
- Knowledge of crew locations
- Knowledge of escape and safety locations
- Knowledge of trigger points
- Map, Weather Kit, Watch, IAP

Communication(s)

- Radio frequencies confirmed
- Backup procedures and check-in times established
- Provide updates on any situation change
- Sound alarm early, not late

Escape Route(s)

- More than one escape route
- Avoid steep uphill escape routes
- Scouted for loose soils, rocks, vegetation
- Timed considering slowest person, fatigue, and temperature factors
- Marked for day or night
- Evaluate escape time vs. rate of spread
- Vehicles parked for escape

Safety Zone(s)

- Survivable without a fire shelter
- Back into clean burn
- Natural features (rock areas, water, meadows)
- Constructed sites (clearcuts, roads, helispots)
- Scouted for size and hazards
- Upslope?
- Downwind?
- Heavy Fuels?

More heat impact → Larger safety zone

Escape time and safety zone size requirements will change as fire behavior changes.

Safety Zones

A safety zone is an area where a firefighter can survive without a fire shelter. Considerations for effective safety zones:

- Take advantage of heat barriers such as lee side of ridges, large rocks, or solid structures.
- When possible, burn out safety zones prior to arrival of fire front.
- Avoid locations upslope or downwind from the fire; chimneys, saddles, or narrow canyons; and steep uphill escape routes.
- Not intended for structure protection.

Separation distance between the firefighter and the flames should be at least four times the maximum continuous flame height. Distance separation is the radius from the center of the safety zone to the nearest fuels.

Flame Height	Separation Distance (firefighters to flames)	Area in acres*
10 ft	40 ft	1/10 acre
20 ft	80 ft	1/2 acre
50 ft	200 ft	3 acres
100 ft	400 ft	12 acres
200 ft	800 ft	46 acres

*Area in acres is calculated to allow for distance separation on all sides for a 3-person engine crew (1 acre is approximately the size of a football field, or 208 feet by 208 feet).

Calculations are based on radiant heat only and do not account for convective heat from wind and/or terrain influences. Since calculations assume no wind and no slope, safety zones downwind or upslope from the fire may require larger separation distances.

Downhill Checklist

Downhill fireline construction is hazardous in steep terrain, fast-burning fuels, or rapidly changing weather. It should not be attempted unless there is no tactical alternative. When building downhill fireline, the following is required:

1. Discuss assignments with crew supervisor(s) and fireline overhead prior to committing crew(s). Responsible overhead individual stays with job until completed (TFLD or ICT4 qualified or better).
2. Decision is made after proposed fireline has been scouted by supervisor(s) of involved crew(s).
3. Coordinate LCES for all personnel involved.
   - Crew supervisor(s) is in direct contact with lookout who can see the fire.
   - Establish communication between all crews.
   - Rapid access to safety zone(s) in case fire crosses below crew(s).
4. Use direct attack whenever possible. If not possible, the fireline should be completed between anchor points before being fired out.
5. Fireline will not lie in or adjacent to a chute or chimney.
6. Starting point will be anchored for crew(s) building fireline down from the top.
7. Monitor bottom of fire; if potential exists for the fire to spread, take action to secure the fire edge.

INCIDENT COMPLEXITY ANALYSIS (TYPE 3,4,5)	Yes	No
Fire Behavior		
Fuels extremely dry and susceptible to long-range spotting or you are currently experiencing extreme fire behavior.		
Weather forecast indicating no significant relief or worsening conditions.		
Current or predicted fire behavior dictates indirect control strategy with large amounts of fuel within planned perimeter.		
Firefighter Safety		
Performance of firefighting resources affected by cumulative fatigue.		
Overhead overextended mentally and/or physically.		
Communication ineffective with tactical resources or dispatch.		
Organization		
Operations are at the limit of span of control.		
Incident action plans, briefings, etc. missing or poorly prepared.		
Variety of specialized operations, support personnel or equipment.		
Unable to properly staff air operations.		
Limited local resources available for initial attack.		
Heavy commitment of local resources to logistical support.		
Existing forces worked 24 hours without success.		
Resources unfamiliar with local conditions and tactics.		
Values to be protected		
Urban interface; structures, developments, recreational facilities, or potential for evacuation.		
Fire burning or threatening more than one jurisdiction and potential for unified command with different or conflicting management objectives.		
Unique natural resources, special-designation areas, critical municipal watershed, T&E species habitat, cultural value sites.		
Sensitive political concerns, media involvement, or controversial fire policy.		

If you have checked "Yes" on 3 or more of the analysis boxes– consider next level of incident management support

Wildland/Urban Interface Firefighting

Structure protection is inherently dangerous because it involves indirect firefighting.

Do not commit to stay and protect a structure unless a safety zone for firefighters and equipment has been identified at the structure during sizeup and triage. Move to the nearest safety zone, let the fire front pass, and return as soon as conditions allow.

Fire Behavior Prediction

- Base all actions on current and expected fire behavior – do this first!
- An estimate must be made of the approaching fire intensity to determine if there is an adequate safety zone and time available before the fire arrives.
- Due to the dynamic nature of fire behavior, intensity estimates are difficult to make with absolute certainty. It is imperative that firefighters consider the worst case and build contingency actions into their plan to compensate for the unexpected.

Structure Sizeup

Site considerations

- Adequate safety zone based on fire behavior prediction.
- Adequate lookout and communication capability.
- Adequate defensible space based on surrounding wildland vegetation.
- Avoid narrow canyon bottoms, mid-slope with fire below, and narrow ridges near chimneys and saddles.

Tactical challenges and hazards

(Firefighters with a safety zone can safely defend structures with some challenges)

- Narrow roads, unknown bridge limits, and septic tank locations.
- Ornamental plants and combustible debris next to structure.
- Wooden siding and/or wooden roof materials.
- Open vents, eaves, decks, and other ember traps.
- Fuel tanks and hazardous materials.
- Power lines
- Limited water sources.
- Property owners remaining onsite.

Structure Triage

Defensible – Prep and Hold

- Determining factor: Safety zone present.
- Sizeup: Structure has some tactical challenges.
- Tactics: Firefighters needed onsite to implement structure protection tactics during fire front contact.

Defensible – Standalone

- Determining factor: Safety zone present.
- Sizeup: Structure has very few tactical challenges.
- Tactics: Firefighters may not need to be directly assigned to protect structure as it is not likely to ignite during initial fire front contact. However, no structure in the path of a wildfire is completely without need of protection. Patrol following the passage of the fire front will be needed to protect the structure.

Non-Defensible – Prep and Leave

- Determining factor: NO safety zone present.
- Sizeup: Structure has some tactical challenges.
- Tactics: Firefighters not able to commit to stay and protect structure. If time allows, rapid mitigation measures may be performed. Set trigger point for safe retreat. *Remember, pre-incident preparation is the responsibility of the homeowner.* Patrol following the passage of the fire front will be needed to protect the structure.

Non-Defensible – Rescue Drive-by

- Determining factor: NO safety zone present.
- Sizeup: Structure has significant tactical challenges.
- Tactics: Firefighters not able to commit to stay and protect structure. If time allows, ensure people are not present in the threatened structure (especially children, elderly, and invalid). Set trigger point for safe retreat. Patrol following the passage of the fire front will be needed to protect the structure.

Structure Protection Tactics

Rapid mitigation measures

- Remove small combustibles immediately next to structure.
- Close windows and doors, including garage (leave unlocked).
- Clean area around fuel tank and shut off tank.
- Charge garden hoses.
- Apply CAF, foam, or gel retardants if available.

Equipment and water use

- Mark entrance to indicate a staffed location if it is not obvious.
- Charge hose lines.
- Long hose lays are not recommended.
- Keep 100 gallons of water in reserve.
- Identify a backup water source.
- Identify power lines for aerial resources.
- Never rely on water for firefighter safety.

Patrol following the fire front

- Most structures do not burn until after the fire front has passed.
- Move to closest safety zone and let fire front go through.
- Return as soon as conditions allow safe access to structures.
- Secondary ignition is usually due to residual spot fires or creeping ground fire.
- Take suppression actions within your capability.
- Call for assistance if needed.

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How to Properly Refuse Risk

Every individual has the right and obligation to report safety problems and contribute ideas regarding their safety. Supervisors are expected to give these concerns and ideas serious consideration.

When an individual feels an assignment is unsafe they also have the obligation to identify, to the degree possible, safe alternatives for completing that assignment. Turning down an assignment is one possible outcome of managing risk.

A “turn down” is a situation where an individual has determined they cannot undertake an assignment as given and they are unable to negotiate an alternative solution.

The turn down of an assignment must be based on an assessment of risks and the ability of the individual or organization to control those risks. Individuals may turn down an assignment as unsafe when:

1. There is a violation of safe work practices.
2. Environmental conditions make the work unsafe.
3. They lack the necessary qualifications or experience.
4. Defective equipment is being used.

- The individual directly informs their supervisor they are turning down the assignment as given. Use the criteria outlined in the Risk Management Process (Firefighting Orders, Watch Out Situations, etc.) to document the turn down.
- The supervisor notifies the Safety Officer immediately upon being informed of the turn down. If there is no Safety Officer, the appropriate Section Chief or the Incident Commander should be notified. This provides accountability for decisions and initiates communication of safety concerns within the incident organization.
- If the supervisor asks another resource to perform the assignment, they are responsible to inform the new resource that the assignment was turned down and the reasons why it was turned down.
- If an unresolved safety hazard exists or an unsafe act was committed, the individual should also document the turn down by submitting a SAFENET (ground hazard) or SAFECOM (aviation hazard) form in a timely manner.

These actions do not stop an operation from being carried out. This protocol is integral to the effective management of risk as it provides timely identification of hazards to the chain of command, raises risk awareness for both leaders and subordinates, and promotes accountability.

Thunderstorm Safety

Approaching thunderstorms may be noted by a sudden reverse in wind direction, a noticeable rise in wind speed, and a sharp drop in temperature. Rain, hail, and lightning occur only in the mature stage of a thunderstorm.

Situation Awareness

Observe the 30/30 rule: If you see lightning and hear the thunderclaps follow in less than 30 seconds, take the storm precautions identified below. Do not resume work in exposed areas until 30 minutes after storm activity has passed.

Hazard Control

- Take shelter in a vehicle or building if possible.
- If outdoors, find a low spot away from tall trees, wire fences, utility lines and other elevated conductive objects. Make sure the place you pick is not subject to flooding.
- If in the woods, move to an area with shorter trees.
- If only isolated trees are nearby, keep your distance twice the tree height.
- If in open country, crouch low, with feet together, minimizing contact with the ground. You can use a pack to sit on, but never lay on the ground.
- If you feel your skin tingle or your hair stand on end, immediately crouch low to the ground. Make yourself the smallest possible target and minimize your contact with the ground.
- Don't group together.
- Don't stay on ridgetops, wide open areas, or near ledges or rock outcroppings.
- Don't operate landline telephones, machinery, or electric motors.
- Don't handle flammable materials in open containers or metal handtools.

Hazard Tree Safety

Hazard trees, both dead snags and live green trees, are one of the most common risks encountered on the fireline. All firefighters should frequently survey their work area for potential hazard trees.

Situation Awareness

Environment:

- Current and forecasted winds
- Night operations
- Steep slopes
- Diseased or bug-kill areas
- Number and height of hazard trees
- Anticipated burn-down time
- Potential for trees to domino

Hazard tree indicators:

- Trees burning for any period of time
- High risk tree species (rot and shallow roots)
- Numerous downed trees
- Dead, broken, or burning tops and limbs overhead
- Accumulation of downed limbs
- Absence of needles, bark, or limbs
- Leaning or hung-up

Hazard Control

- Eliminate the hazards with qualified sawyers, blasters/explosives, or heavy equipment.
- Avoid hazards by designating "No Work Zones" (flag, sign, and map).
- Modify suppression tactics or fireline location to avoid high risk areas.
- Post lookouts to help secure high risk areas.
- Use road/traffic controls in high risk areas.
- Fireproof potential hazard trees to prevent ignition.
- Keep clear of bucket drops near trees/snags.
- Reposition firefighters to secure areas in response to high winds forecast.
- Provide timely feedback to others regarding any hazard trees.

In addition to suppression and mopup operations, assess, control, and monitor hazard trees along roads and when selecting break areas or campsites.

Power Line Safety

Fire activity near high voltage electrical transmission/ distribution lines can cause multiple hazards and electrocute or seriously injure firefighters. The IC and line supervisors must be aware and communicate power line hazards to all resources. Contact power companies when power lines are threatened or involved.

Down Power Lines

- Communicate: Notify all responders of down electrical lines. Obtain radio check-back.
- Identify: Determine *entire* extent of hazard by visually tracking all lines, two poles in each direction, from the downed wire.
- Isolate: Flag area around down wire hazards; post guards.
- Deny entry: Delay firefighting actions until hazard identification and flagging is complete and/or confine actions to safe areas.
- Downed line on vehicle: Stay in vehicle until the power company arrives. If vehicle is on fire, jump clear, but don't hang on. Keep feet together and shuffle or hop away.
- **Always treat downed wires as energized!**

Ground Tactics

- Normal tactics apply when fire is more than 100 feet from power lines.
- Heavy smoke and flames can cause arcs to ground. Direct attack must be abandoned within 100 feet of transmission lines.
- Spot fires or low ground fires can be fought with hose lines if heavy smoke or flame is not within 100 feet of power lines.
- Always maintain 35 feet distance from transmission towers.
- Never use straight stream or foam—use a fog pattern.
- Use extreme caution if engaging in tactical firing operations.
- Extinguish wooden poles burning at the base to prevent down wire hazards.

Aerial Tactics

- Communicate locations of all transmission lines to air resources.
- Aerial drops onto power lines will cause arcing to ground or arcing to power line towers and poles.
- Drops should be parallel to lines and avoid towers.

ALWAYS!

- ***L*ook Out** for any power lines near the incident.
- ***C*ommunicate** location of all power lines that present a hazard.
- ***E*scape Routes** should not be under or near overhead power lines.
- ***S*afety Zones, ICP, and staging areas** should not be located under or near overhead power lines.

Roadside Response Safety

- Anytime traffic flow is affected by the incident, contact the jurisdictional law enforcement agency for assistance.
- Conduct all operations as far from traffic lanes as possible.
- When working in traffic and not involved in fire suppression activities, high visibility vests must be worn.
- Park vehicles on the same side of the roadway.
- Exit the vehicle away from the roadway whenever possible.
- Post lookouts to watch for and control traffic in both directions.
- Use road flares or other traffic warning signs.
- Operate pumps from the non-traffic side or from the cab of the fire apparatus.
- Keep all hose, fire tools, and equipment out of traffic lanes.

Unexploded Ordnance Safety

Unexploded ordnance (UXO) is most likely to be encountered on military or former military sites. UXO poses risk of injury or death to anyone in the vicinity.

Situation Awareness

- Early identification of potential UXO is the first and most important step in reducing risks posed by UXO.
- Many types of UXO may be encountered:

Small arms munitions	Projectiles
Grenades	Rockets
Mortars	Guided missiles
Bombs	Submunitions

- UXO may be found fully intact or in fragments. All UXO, whether intact or in fragments, presents a potential hazard and should be treated as such.
- Deteriorated UXO presents a particular hazard because it may contain chemical agents that could become exposed.

Hazard Control

- If you see UXO, stop and do not move closer.
- Isolate and clearly mark the area.
- Deny entry to others.
- Never transmit radio frequencies near UXO.
- Never remove anything near UXO.
- Never touch, move, or disturb UXO.
- Keep a minimum of 1000 feet away from areas on fire that contain suspected UXO.
- Report discovery of UXO to your immediate supervisor.
- U.S. Army Operations Center for incidents involving explosives and ammunition: (703) 697-0218

Oil and Gas Site Safety

When responding to an incident with oil and gas fields and/or coal seams, you must receive the appropriate training or a briefing before your operational assignment. Primary hazards include toxic gases as well as industrial operations and facilities.

Situation Awareness

Methane (CH4):

- Toxic, flammable, odorless, and colorless.
- Unlikely to cause physical problems in open environment, but does pose a fire risk in high concentrations.
- Beware of enclosed buildings/vehicles if gas is suspected.

Hydrogen Sulfide Gas (H2S):

- Highly toxic, flammable, and colorless gas.
- Odor of rotten eggs at low concentrations.
- Sense of smell rapidly deteriorates at higher concentrations.
- Exposure indicators include high heart rate, respiratory paralysis, seizures, and rapid incapacitation.

Hazard Control

- Ensure contact is made with the appropriate authorities before engaging in suppression activities.
- Ask for H2S monitor/breathing apparatus and adequate briefing.
- Do not depend on sense of smell for warning.
- Avoid low lying areas during stagnant air conditions.
- Anticipate industry traffic on narrow, unimproved roads.
- Be aware of exposed pipes and utility lines.
- Park at least 20 feet away from facilities and equipment. Avoid tampering with the oil and gas pumping equipment.
- Avoid open pits/dumps.
- Before starting dozer operations, ask your local Dispatch to notify the appropriate utility representative. Don't assume pipelines are buried deeply or directly under their markers.
- **Seek immediate medical care at a hospital if H2S exposure is suspected.**

Last Resort Survival

Escape if you can

- Use all your PPE and act immediately on your best option.
- Drop your gear (keep your fire shelter, handtool, quart of water, and radio).
- You may be able to use the fire shelter for a heat shield as you move.
- In LIGHT FUELS, you may be able to move through the flames into the black.
- If you are on the flank of the fire, try to get below the fire.
- Consider vehicles or helicopters for escape.

Find a survivable area

- Stay out of hazardous terrain features.
- Use bodies of water that are more than 2 feet deep.
- In LIGHT FUELS, you may be able to light an escape fire. In other fuels, you may be able to light a backfire.
- Call for helicopter or retardant drops.
- Cut and scatter fuels if there is time.
- Use any available heat barriers such as large rocks and dozer berms.
- Consider vehicle traffic hazards on roads.
- Structures and vehicles may be an option for temporary refuge.

Pick a fire shelter deployment site

- Find the lowest point available.
- Maximize distance from nearest aerial fuels, heavy fuels, and snags.
- Pick a surface that allows the fire shelter to seal and remove ground fuels.
- Get into the fire shelter before the flame front hits.
- Position your feet toward the fire and hold down the fire shelter.
- Keep your face pressed into the ground and protect your airway.
- Deploy next to each other and keep talking.

Expect

- Extremely heavy ember showers.
- Superheated air blast to hit before the flame front hits.
- Noise and turbulent powerful winds hitting the fire shelter.
- Heat and fire glow inside the fire shelter.
- Long deployment times…WHEN IN DOUBT WAIT IT OUT.

NOTES

Vehicle Accident Operations

Report on Conditions

- Hazards (fuel, electrical, traffic, access, etc.).
- Need for law enforcement, ambulance, helicopter, tow truck, extrication tools.
- Injuries (number of victims, severity).
- Vehicles (number, type).

Establish Traffic Control

- Place apparatus between oncoming traffic and rescuers. Keep exhaust from pointing at scene and victims.
- Place warning devices.
- Establish positive communications.
- Consider the use of high visibility vests.

Assess Fire Hazard or Potential

- Take suppression action as needed if trained, equipped, and authorized.
- Be aware of fuels running downgrade.

Perform Patient Assessment

- Provide first aid or triage assessment.
- If there are fatalities, do not give names or other information over radio that would reveal identity, and do not move body.

Keep dispatcher advised of changes

Document all actions taken

HazMat Incident Operations

Think Safety

- Assess situation.
- Safe approach; upwind/upgrade/upstream.
- Identify, isolate, and establish perimeter; deny entry.
- Notify agency dispatcher.
- Exact location; use GPS.
- Request needed assistance; identify a safe route.

Scene Management

- Goal is to protect life, environment, and property.
- Attempt to identify substance using DOT North American Emergency Response Guide (use binoculars, placards/labels, container shapes/colors, Material Safety Data Sheets, shipping papers, or license plate).
- Assess quantity of material involved.
- Identify exposures and hazards surrounding the site.
- Anticipate weather influences.

Organizational Responsibilities

- Establish command including an IC and Safety Officer.
- Develop action plan for area security and evacuation.
- Advise all on scene and responding resources of changes in situation.
- Keep dispatcher advised of changes.
- Document all actions taken.
- Make special note of any responder exposures.

HazMat Isolation Distances

- Minor event (1 drum, 1 bag, etc.) = 150 feet
- Major event (1 drum or more, etc.) = 500 feet
- Residential and light commercial = 300 feet
- Open areas = 1000 feet
- BLEVE (Boiling Liquid Expanding Vapor Explosion) potential = 2500 feet (one-half mile)
- Stage arriving units 2500 feet upwind
- Position vehicles headed out

The following 24-hour emergency response communication services have agreed to provide immediate information about chemicals and/or assistance from manufacturers:

CHEMTREC **1-800-424-9300**
CHEMTEL **1-888-255-3924**
INFOTRAC **1-800-535-5053**
3E COMPANY **1-800-451-8346**

Defense Logistics Agency for incidents involving dangerous goods other than explosives and ammunition: **1-800-851-8061**

24-hour emergency and information calls to the nearest Poison Center: **1-800-222-1222**

Federal law requires all spills of hazardous substances be immediately reported to the U.S. Coast Guard/National Response Center: **1-800-424-8802**

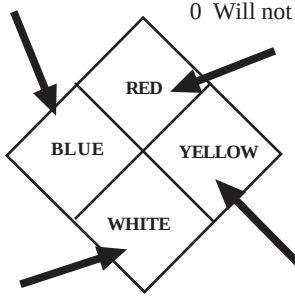
NFPA 704 HazMat Classification for Fixed Facilities

HEALTH HAZARD

4 Deadly
3 Extreme Danger
2 Hazardous
1 Slightly Hazardous
0 Normal Material

FIRE HAZARD

4 Below 73° F
3 Below 100° F
2 Above 100° F not exceeding 200° F
1 Above 200° F
0 Will not burn



SPECIFIC HAZARD

ACID - Acid
ALK - Alkali
COR - Corrosive
OXY - Oxidizer
P - Polymerization
☢ - Radioactive
W - Use no water

REACTIVITY

4 May detonate
3 Shock & heat may detonate
2 Violent chemical change
1 Unstable if heated
0 Stable

Local Disaster Response

- Assess crew for injuries.
- Move apparatus out of station if possible.
- Determine if phones are working.
- Check for power.
- Assess the station for damage.
- Monitor phone and radio for dispatch information.
- Report by radio to dispatch or IC if established.
- Initiate a “windshield survey” of first response area.
- Do not fully commit to any incident.
  - Prioritize incidents with respect to life, hazard, property.
  - Note any damage to infrastructure (roads, bridges, etc.).
  - Check for hazardous utility situations (gas, electric, water).
  - Note structural instability/collapse of any buildings.
  - Expect malfunctioning automatic alarms.
  - Use “negative reporting.” Only report things out of the ordinary.
- Follow local disaster plans.

All Hazard Incident Response

Wildland firefighters often respond to large-scale disasters that can cover extensive geographic areas and impact many people. Often times, these impacts are to large urban centers. Typical assignment tasks include search and rescue, debris clearing, and distribution of basic necessities. When responding, consider that basic services, utilities, transportation, medical care, credit card/ATM capability, law enforcement and security will likely be disrupted. Be considerate of those impacted by the disaster.

- Plan to be self sufficient for 24 to 48 hours.
- Bring a GPS unit if possible.
- Be prepared for extreme weather conditions associated with storm disasters.
- Establish central rally points for assigned responders.
- Develop local contacts for information gathering.
- Dust and debris may interfere with respiration and visibility.
- Weakened structures, fires, leaking hazardous materials, raw sewage contamination, and waterborne diseases may pose additional risks.
- Mobility and access may be impaired by critical infrastructure damage, disrupted utilities, structural collapse, flooding, ice covered roads, or other barriers.
- In the case of natural disasters, be aware of the additional threats following the initial storm or earthquake.

Structure Hazard Marking System

Never enter a damaged structure unless trained, equipped, and authorized. You may find a 2' x 2' box at the entrance to indicate the condition of the structure. Use orange spray paint or a lumber crayon to mark inside the box.


Structure is safe for Search and Rescue (SAR) with minor damage, or structure is fully collapsed.


Structure is significantly damaged with some safe areas, but other areas that need to be shored up or braced. Falling and collapse hazards need to be removed.


Structure is unsafe for SAR. May collapse suddenly.

Entrance is located in direction of the arrow.

HM Hazardous material is present (note type of material). Consult HazMat team and cooperate.

The information below should be found outside the upper right portion of the box:

- Specialist ID
- Time and date of assessment
- Hazardous materials identified

SAR teams should mark structures as they conduct operations.


Single slash (2' long) indicates SAR team is currently in structure conducting operations.


Cross slash (2' x 2') indicates SAR team has left structure/area.

The information below should be found in the four quadrants of the cross slash:

- SAR team ID — Left quadrant
- Time and date team left structure — Upper quadrant
- Personnel hazards — Right quadrant
- Number of victims still inside structure ("X" indicates no victims remaining) — Lower quadrant

Missing Person Search Urgency

Factor	Rating
AGE	
Very young	1
Very old	1
Other	2-3
MEDICAL CONDITION	
Known/suspected injured, ill or mental problem	1-2
Healthy	3
Known Fatality	3
NUMBER OF SUBJECTS	
One alone	1
More than one (unless separated)	2-3
SUBJECT EXPERIENCE PROFILE	
Inexperienced, does not know area	1
Not experienced, knows area	1-2
Experienced, not familiar with area	2
Experienced, knows area	3
WEATHER PROFILE	
Past and/or existing hazardous weather	1
Predicted hazardous weather (less than 8 hours away)	1-2
Predicted hazardous weather (more than 8 hours away)	2
No hazardous weather predicted	3
EQUIPMENT PROFILE	
Inadequate for environment and weather	1
Questionable for environment and weather	1-2
Adequate for environment and weather	3
TERRAIN/HAZARDS PROFILE	
Known terrain or other hazards	1
Few or no hazards	2-3
TOTAL	

(Range = 7-21, with 7 the highest urgency and 21 the lowest urgency)

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First Aid Guidelines

Legality

Do only what you know how to do and keep records of what you do for the patient.

Bloodborne Pathogens

Use PPE (pocket mask, waterproof gloves, goggles) if contact with body fluids is possible.

Treatment Principles

- Prevent further injury by removing from danger.
- Rapid assessment: Airway, Breathing, Circulation and life threatening injuries.
- Thorough exam: Look for method of injury. Check for deformities, contusions, abrasions, punctures, burns, tenderness, lacerations, or swelling.
- Stabilize patient and make a transport decision.
- Document on-scene observations and treatment (send with patient).

Medical Response Procedures

- All injuries must be reported to direct supervisor.
- In case of medical emergency, contact incident supervisor or communications dispatcher.
- Medevac is an incident within an incident…one on-scene point of contact needs to take charge.
- Identify nature of incident, number injured, patient assessment(s), and location (geographic and GPS coordinates).
- Do not use patient names on the radio.
- Determine transport plan (limited visibility or darkness may delay or negate air transport).

Patient Assessment

Initial Patient Assessment
- General impression of patient
- Airway
- Breathing
- Circulation
- Wrist or neck pulse
- Major bleeding

Patient Information
- Chief complaint
- Age & weight

Level of Consciousness
- Alert & oriented
- Verbal (responds to voice)
- Pain (responds to painful stimuli)
- Unresponsive

Breathing
- Normal
- Difficult/labored breathing
- Not breathing – start rescue breathing

Pulse
- Present
- Absent – **Start CPR**

Skin Color
- Normal
- Pale
- Bluish
- Flushed/red

Skin Moisture
- Normal
- Dry
- Moist/clammy
- Profuse sweating

Skin Temperature
- Normal/warm
- Hot
- Cool
- Cold

Pupils
- Equal and reactive to light
- Fixed
- Slow response
- Unequal
- Dilated
- Constricted

Make a transport decision

Specific Treatments

Bleeding: Direct pressure, elevate, and pressure point.

Shock: Lay patient down, elevate feet, keep warm and replace fluids if conscious.

Fractures: Splint joints above and below injury. Monitor pulse and sensation past the injury away from the body.

Head Injury: Stabilize patients head and neck, maintain airway.

Bee Sting (or other allergic reaction with rash, face or airway swelling, difficulty talking/breathing): If the patient has a bee sting kit, assist them in using the medication.

Burns: Remove heat source, cool with water, dry wrap, and replace fluids if conscious.

Eye Injuries: Wash out foreign material, don't open swollen eyes, leave impaled objects. Pad and bandage both eyes.

Heat Stroke: Cool body as quickly as possible.

The above injuries will usually merit immediate transport of the victim.

CPR

1. **Scene Safety:** Look for any dangers or hazards.
2. **Determine Responsiveness:** Tap on both of the victim's shoulders; shout in both ears "Are you OK?"
3. **Call for Help:** Call for advance medical care. Many 911 Dispatch centers can provide additional guidance. If available, obtain an automatic external defibrillator (AED).
4. **Airway:** Open the victim's airway by tilting their head back and lifting the chin.
5. **Breathing:** Look, listen, and feel for respiration. If the patient is not breathing, pinch the victim's nose, cover the victim's mouth with your mouth, and give two breaths until chest rise occurs. **The use of a pocket mask or barrier device is recommended**.
6. **Circulation:** Place your hands on the victim's chest between the nipples. Push down 1½ - 2 inches at a ratio of 30 compressions with 2 breaths (30:2) at rate of 100 compressions per minute. Use only one hand or 2-3 fingers when performing child or infant CPR, noting the compressions are not as deep.
7. **Continue CPR until help arrives**. If help arrives, two-rescuer CPR can be started using the same ratio, 30:2, with one person providing ventilations and one performing compressions. Change positions every two minutes.

Heat-Related Injuries

Heat-related injuries (heat cramps, heat exhaustion, and heat stroke) are most likely to occur when it's hot and humid, but can occur in any environmental condition.

Heat Cramps

Signs/Symptoms:

- Sweating
- Dehydration
- Transient muscle cramps

Treatment:

- Place in shade
- Loosen clothing and stretch muscles
- Slowly give fluids
- Monitor

Heat Exhaustion

Signs/Symptoms:

- Profuse sweating with cool, clammy skin
- Dehydration
- Persistent muscle cramps
- Dizziness and headache
- Decreased urine output

Treatment:

- Place in shade
- Loosen clothing and stretch muscles
- Slowly give fluids
- Monitor; medevac if no improvement

Heat Stroke

Signs/Symptoms:

- Hot, dry skin
- Rapid, weak pulse (100–120 at rest)
- Hyperventilation
- Vomiting
- Involuntary bowel movement
- Dizziness, confusion, and irritability
- Seizures or loss of consciousness

Treatment:

- Cool body as quickly as possible with water (river, fold-a-tank, canteens, etc.)

MEDEVAC IMMEDIATELY

Burn Injuries

- Remove person from heat source.
- Examine airway for burns (singed facial hair, nasal hairs, soot or burns around or in nose, mouth, or black sooty sputum).
- Examine for other injuries.
  - Provide basic first aid.
  - Maintain airway, breathing, circulation (ABCs).
  - Treat for shock by keeping person warm, feet elevated.
  - Provide oxygen, if available and trained to administer.
- Assess degree of burn and area affected.

  Superficial (First Degree): Affects only the outer layer of skin. Redness, mild swelling, tenderness, and mild to moderate pain.

  Partial Thickness (Second Degree): Extends through entire outer layer and into inner layer of skin. Blisters, swelling, weeping of fluids, and severe pain.

  Full Thickness (Third Degree): Extends through all skin layers and into underlying fat, muscle, bone. Discoloration (charred, white, or cherry red), leathery, parchment-like, dry appearance. Pain is absent.

Rule of Palms: Patients palm = 1% of their body surface. Estimate how many times the patients palm could be placed over the burned areas to estimate the % of body that has been burned.

- Cut away only burned clothing. **Do not** cut away clothing stuck to burned skin.
- Apply cool, clear water over burned area. **Do not** soak person or use cold water and ice packs. This encourages hypothermia.
- Cover burned area with sterile dressing, moisten with saline solution, and apply dry dressing on top. Burns are prone to infection.
- For severe burns or burns covering large area of body:
  - Wrap in clean, sterile sheet followed by plastic sheet.
  - Place inside sleeping bag or cover with insulated blanket.
- Monitor ABCs and keep burn areas moist.
- Avoid hypothermia and overheating.
- **MEDEVAC IMMEDIATLY**

Multi-Casualty Triage System

Color	Priority	Description
Red	Immediate	Serious, life-threatening injury. Breathing but unconscious; respirations more than 30/minute. Radial pulse absent, capillary refill more than 2 seconds. **Or** can't follow simple commands.
Yellow	Delayed	Treatment and transport delayed. Respirations less than 30/minute. Radial pulse present, capillary refill less than 2 seconds. **And** can follow simple commands.
Green	Minor	All walking wounded; treatment can be delayed.
Black	Deceased/ Dying	Dead or with injuries likely to result in death. No respirations after repositioning airway.

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Aviation User Checklist

- Pilot Card—qualified and current for aircraft type and mission?
- Aircraft Card—aircraft approved for mission?
- Flight Plan/Following—filed (FAA/Agency/Bureau)?
- Personal Protective Equipment—available and worn by all passengers and pilot?
- Pilot briefed on mission objectives, parameters of flight, known hazards, and aerial hazard map?
- Pilot briefing provided to passengers?

Aviation Watch Out Situations

- Is this flight necessary?
- Who is in charge?
- Are all hazards identified and have you made them known?
- Should you stop the operation or flight due to change in conditions?
  - Communications
  - Confusion
  - Conflicting Priorities
  - Weather
  - Turbulence
  - Personnel
- Is there a better way to do it?
- Are you driven by an overwhelming sense of urgency?
- Can you justify your actions?
- Are there other aircraft in the area?
- Do you have an escape route?
- Are any rules being broken?
- Are communications getting tense?
- Are you deviating from the assigned operation or flight?

Helicopter Passenger Briefing and PPE

Pilot or designated helitack must brief all passengers prior to flight.

Personal Protective Equipment

- Nomex clothing (long-sleeved shirt and pants, or flight suit).
- Approved helicopter flight helmet or hardhats for fire crew transport from managed sites.
- All-leather boots.
- Hearing protection.
- Eye protection.
- Nomex or leather gloves.

Approach and Departure

- Stay clear of landing area during approach/ departure.
- Always approach/depart from the downslope (lower) side as directed by pilot/helitack.
- Approach/depart helicopter in a crouched position.
- Do not run.
- Keep in pilot's view at all times.
- Do not reach up or chase after loose objects.
- Never approach the tail section of the helicopter.
- **NO SMOKING** within 50 feet of the aircraft.

Tools and Equipment

- Secure light/loose items awaiting transport.
- Assign personnel for carrying tools and equipment to and from helicopter.
- Carry tools and long objects parallel to the ground, never on shoulder.
- All tools and equipment loaded/unloaded by qualified personnel.
- Portable radios turned off.

Helicopter Doors

- Location and how to operate.

In-Flight Discipline

- Follow pilot instructions.
- Loose items inside of aircraft secured and manageable.
- All baggage secured in aircraft or cargo compartment.
- No movement inside aircraft, once seated.
- Never throw objects from the helicopter.
- Keep clear of the flight controls at all times.
- Unbuckle only when directed to do so by pilot or helitack.
- Wait for helitack personnel to open/close doors.
- Know location of first aid kit, survival kit, fire extinguisher, ELT (emergency locator transmitter), fuel and battery shutoff switch location and operation, radio operation.

In-Flight Emergency Procedures

- Emergency exit location and how to operate.
- Follow instructions of pilot/helitack personnel.
- Snug seatbelt and shoulder harness; secure gear.
- Emergency seating position WITH SHOULDER HARNESS (four point OR single diagonal strap): Sit in full upright position with head and back pressed against seat and use arms to brace in position. If time permits and so equipped, lock the inertial reel.
- Emergency seating position WITH LAP BELT ONLY: Bend over as far as possible and wrap your arms around your legs.
- Move clear of the aircraft only after rotor blades stop or when instructed by the pilot or helicopter crew.
- Assist injured personnel.
- Assess situation, remove first aid kit, survival kit, radio, ELT, and fire extinguisher. Render first aid. Attempt to establish contact.

Flight Following

Flight following, resource tracking, and communications are key components in employee and aircraft mission safety and efficiency. Flight following, whether performed from a dispatch office or other facility, or a remote location in the field, must be given a high priority by all personnel involved.

Identification of flight following requirements:

- At the time the flight is planned, flight following requirements should be clearly identified.
- Requirements should identify check-in procedures, including time and locations, dispatch office(s) or other flight following facilities involved, individuals responsible for flight following, frequencies to be used, and any special circumstances requiring check-ins (for example, to military facilities within Special Use Airspace).

Check-in requirements:

- Check-in intervals or times must be specified in the agency's flight following procedures.
- Check-ins must be documented and provide enough information so the aircraft can be easily located if it is overdue or missing.

Failure to meet check-in requirements:

- The dispatch or other flight following facility shall implement response procedures for overdue or missing aircraft.

Helicopter Landing Area Selection

Choosing a Landing Area

- Locate a reasonably flat area clear of people, vehicles, and obstructions such as trees, poles, and overhead wires.
- The area must be free of stumps, brush, posts, large rocks or anything over 18 inches high.
- Consider wind direction. Helicopters land and take off into the wind. Choose an approach free of obstructions.
- Any obstruction should be relayed to the helicopter crew on initial radio contact.
- Remove or secure any loose items in and around the landing area such as trash, blankets, hats, or equipment.
- Wet down the landing area if dusty conditions are present.
- Address LCES prior to staffing existing or proposed helicopter landing areas.

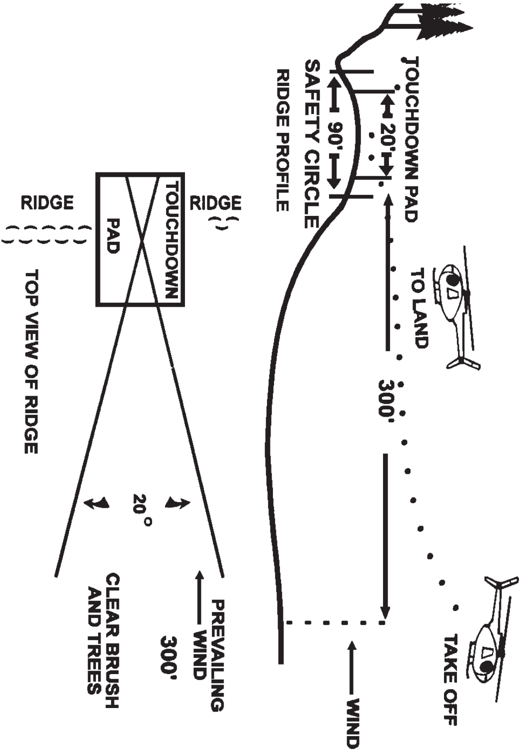
Fixed Helispots

- Type I Helicopters:
  - Safety circle: 110'
  - Touchdown pad: 30' x 30', clear and level
- Type II Helicopters:
  - Safety circle: 90'
  - Touchdown pad: 20' x 20', clear and level
- Type III Helicopters:
  - Safety circle: 75'
  - Touchdown pad: 15' x 15', clear and level

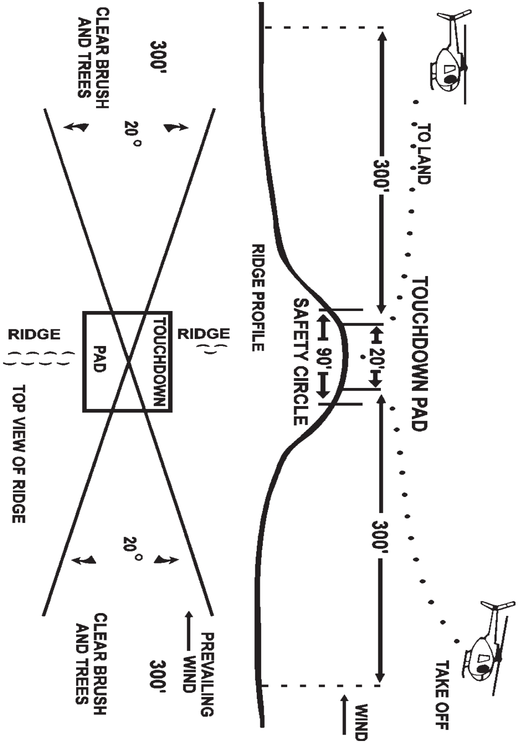
Items Needed

- 40 BC fire extinguisher (20 lb.)
- Wind indicator
- Radio (compatible with helicopter)
- Pad marker
- Allowable payloads (HIGE & HOGE) for all helicopters using helispot
- Passenger/cargo manifest book
- Dust abatement, as needed

One-Way Helispot



Two-Way Helispot



Longline Mission

- All individuals involved in longline missions will have been trained in longline operations.
- If you are on the receiving end or backhaul end of a longline load, you must be able to communicate to the pilot where you want the load delivered or picked up.
- Use a signal mirror to identify your position to the pilot.
- The drop-off/pick-up area should be as open and free of obstacles as possible.
- Once you have contacted the pilot by radio, provide specific load and site information (cargo weight, any hazardous materials, wind speed and direction, etc.).
- Mark the drop-off spot with flagging (large "X" on the ground) if possible.
- Keep pilot informed of load status (height above the ground, clear of obstacles, etc.).
- Let the hook land on the ground before attaching load.
- If the electrical release does not release the load, you must manually release it; wait until the hook lands on the ground before releasing.
- For ALL backhaul, a "swivel" must be connected to the cargo/longline hook. NO EXCEPTIONS! (When you request nets, request swivels also.)
- Load cargo net with heavy items in the center, light items on top. Tape all boxes and loose items.
- Pull the "purse strings" of the cargo net to equal length and attach a swivel to the steel rings. It's not necessary to "cross" the purse strings with an overhand wrap.

Helicopter Hand Signals

Clear to Start
Make circular motion above head w/arm

Hold on Ground
Extend arms at 45 thumbs down

Move Upward
Arms extended sweeping up

Move Downward
Arms extended sweeping down

Hold Hover
Arms extended w/clenched fists

Clear to Take-Off
Arms extended in take-off direction

Land Here
Extend arms w/wind at back

Move Forward
Arms extended & wave copter toward you

Move Rearward
Arms downward using shoving motion

Move Left
Right arm extended left arm sweeps overhead

Move Right
Opposite of move left

Move Tail Rotor
Rotate body w/one arm extended

Shut Off Engine
Cross neck w/hand palm down

Fixed Tank Doors
Open arms outward
Close arms inward

Release Sling Load
Contact forearm w/other hand

Wave Off Don't Land
Wave arms & cross overhead

Paracargo Operations Safety

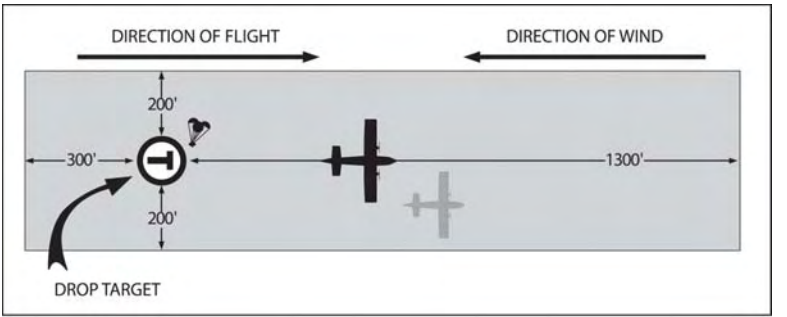
The paracargo danger zone is a strip of 200' on each side of the flight path, 300' in the direction of approach, and 1300' in the direction of the aircraft when it leaves the target. The following should be observed at all times:

- Mark target area with white or orange “T” in open or cleared area with top of “T” into the wind. Erect paper streamer or flagging on long pole to indicate wind direction.
- An individual should be in charge at drop site.
- All persons, vehicles, and animals should be cleared from the danger zone prior to arrival of the cargo aircraft.
- Camps should be at least 600' from target area and outside of danger zone.
- Allow no one in danger zone until drop is complete.
- Beware of “streamers” or parachutes that don’t open.

Aerial Retardant Safety

Clear personnel out of target area prior to drops. If you can’t escape:

- Hold your handtool away from your body.
- Lie face down with head toward oncoming aircraft and hardhat in place. Grasp something firm to prevent being carried or rolled about by the dropped liquid.
- Do not run unless escape is assured.
- Get clear of dead snags, tops, and limbs in drop area.
- Working in an area covered by wet retardant should be done with caution due to slippery surfaces.



Pararcargo drop zone

Weight Estimates

(use only if scale is not available)

Item	Weight
Backpack pump (full)	45 lbs.
Cargo net 12 x 12	20 lbs.
Cargo net 20 x 20	45 lbs.
Cargo net (fish net)	5 lbs.
Cargo hook (1 hook)	35 lbs.
Jerry can/fuel (5 gal.)	45 lbs.
Canteen (1 gal.)	10 lbs.
Dolmar (full)	15 lbs.
Drip torch (full)	15 lbs.
Fusee (1 case)	36 lbs.
Hand tool (each)	8 lbs.
Leadline (12 ft.)	10 lbs.
Longline (50 ft.)	30 lbs.
Swivel	5 lbs.
Chain saw	25 lbs.
Hose, 1½" syn. 100'	23 lbs.
Hose, 1" syn. 100'	11 lbs.
Hose, 3/4" syn. (1000'/case)	30 lbs.
Hose, suction, 8 ft.	10 lbs.
Mark 3 Pump w/kit	150 lbs.
Stokes w/backboard	40 lbs.
Trauma bag	35 lbs.
MRE, 1 case	25 lbs.
Cubee/water (5 gal.)	40 lbs.

Directing Retardant and Bucket Drops

- **Give general location** on incident to aerial resource – division / head / heel / flank.
- **Finalize location** with:
  - Clock position from pilot's perspective (see IRPG front cover).
  - Description of prominent landmarks.
  - Target position on slope – lower 1/3, upper 1/3, mid-slope, top of ridge, etc.
  - **Use signal mirrors whenever possible.**
  - Use panels or flagging to mark target as needed.
- **Describe target** from your location and explain mission. The pilot will decide drop technique and flight path.
- **Know the pilot's intentions** prior to the drop. Clear the area to avoid direct flights over ground personnel and equipment.
- **Give feedback** to pilot about drop accuracy. Be honest and constructive. Let pilot know if drop is early, late, uphill, downhill, on target, too high, too low, etc. Report low drops immediately.

Working with Airtankers

- Have a plan; determine tactics based on strategy – direct or indirect based on fire sizeup.
- Order appropriate aircraft for mission; aircraft should support ground resource tactics.
- Establish effective communication with ATGS, ASM, or pilot.
- Discuss strategy, tactics, wind conditions, and hazards with ATGS, ASM, or pilot.
- Establish an anchor point and work from it or towards it with aircraft.
- Order aircraft early; aircraft are most effective during initial attack.
- Let ground resources know when there is aircraft inbound.
- Ensure approach, departure, and line is clear of personnel and equipment.
- Inform ATGS, ASM, or pilot when the drop area is clear.
- Let ground resources know when drops are completed on a division or segment of line.
- Get feedback from on-scene ground resources regarding drop effectiveness.
- Relay feedback to aerial resource.

Retardant use reminders

- Direct attack with close ground support = Suppressant
- Direct attack with delayed ground support = Retardant with suppressants to hold
- Indirect attack = Retardant
- Minimum retardant drop heights
  - SEAT = 60 ft. AGL
  - Super Scooper (CL 215/415) = 100 ft. AGL
  - LAT = 150 ft. AGL
  - VLAT = 300 ft. AGL

ATGS = Air Tactical Group Supervisor

ASM = Aerial Supervision Module

SEAT = Single Engine Airtanker = 800 gallons

LAT = Large Air Tanker = 1800-3000 gallons (P2, SP2H, P3, DC7, C130)

VLAT = Very Large Air Tanker (DC10, 747)

AGL = Above Ground Level

Aircraft Mishap Response Actions

Time is extremely critical when responding to an emergency. Immediate positive action is necessary; delay may affect someone's survival.

Rescue Operations

- Preserve life.
- Do whatever is necessary to extricate injured occupants and to extinguish fires.
- Secure the area.
- Document and/or photograph the location of any debris that must be disturbed in order to carry out rescue and/or fire suppression activities.
- Identify witnesses and get contact information.

Site Safety Precaution

Aircraft wreckage sites can be hazardous for many reasons other than adverse terrain or climatic conditions. Personnel involved in the recovery, examination, and documentation of wreckage may be exposed to physical hazards such as hazardous cargo, flammable and toxic fluids, sharp or heavy objects, and disease. It's important to exercise good judgment, use available protective devices and clothing, and use extreme caution when working in the wreckage.

SAFECOM Reporting System

The purpose of the SAFECOM system is for accident prevention. It is a tool used to encourage the reporting of any condition, observance, act, maintenance problem, or circumstance that has the potential to cause an aviation or aviation-related accident. It can also be used for reporting positive safety actions and mishap prevention measures.

Submitting a SAFECOM is **not** a substitute for "on-the-spot" correction(s) to a safety concern. While it is imperative that problems and issues be addressed at the local level, it is beneficial to share problems and solutions systemwide.

The SAFECOM system is **not** intended for initiating punitive actions. SAFECOM managers are responsible for protecting personal data and sanitizing SAFECOMs prior to posting to the public.

Submit SAFECOMs online at www.safecom.gov.

FAX hard copies to AMD 208-433-5069 or USFS 208-387-5735, or submit through the local Aviation Officer.

Report any interagency aircraft mishap to 888-464-7427 (888-4MISHAP).

NOTES

Fire Danger Pocket Card

As a situational awareness tool, the card provides a method for those involved with wildland and prescribed fire operations to communicate a common understanding of key index values provided by the National Fire Danger Rating System.

The card shows seasonal changes in fire danger and provides historical context for local weather thresholds.

Firefighters should reference the card when indices are broadcast, comparing current and forecasted index values to historic trends, thresholds, and associated significant events.

An interpretive briefing should accompany the distribution of any pocket cards to firefighters.

Regardless of the index used, firefighters should always assess the fire environment they are working in, the observed fire behavior, and the expected fire behavior based on forecasted conditions.

Spot Weather Forecast

Spot weather forecasts should always be requested for fires that have the potential for active fire behavior, exceed initial attack, or are located in areas where Red Flag Warnings have been issued.

In addition, personnel should consider requesting a spot weather forecast for non-fire incidents including HazMat or search and rescue activities.

The basic elements needed for a spot weather request include:

- Name and type of incident (wildland fire, prescribed fire, HazMat, SAR)
- Location by latitude/longitude or by ¼ section
- Incident size
- Elevation (at top and bottom of incident)
- Fuel type
- Sheltering (full, partial, unsheltered)
- Fire character (ground fire, crowning, spotting, etc.)

Weather observations need to include:

- Location on the fire
- Elevation of observation
- Aspect of observation
- Time of observation
- Wind direction
- Wind speed
- Dry bulb
- Wet bulb
- RH
- Dew point
- Sky conditions (cloud types, dust devils, precipitation, etc.)

Finally, after you've received the spot forecast, consider providing feedback to forecaster, especially if conditions on the ground do not match those in the forecast.

Energy Release Component (ERC)

Serves as a good characterization of local seasonal fire danger trends resulting from the area's fuel moisture conditions. The ERC is a relative index and should be compared to historic trends and thresholds on the corresponding area's pocket card. The ERC relies heavily on large and live fuels, has low variability, and is not affected by wind speed.

Burning Index (BI)

Reflects the changes in fine fuel moisture content and wind speed and is highly variable day to day. The BI is more appropriate for short-term fire danger and can be loosely associated with flame length by dividing the BI by 10. The BI is readily affected by wind speed and fine fuel moisture.

Haines Index (HI)

Used to indicate the potential for rapid fire growth due to dry and unstable atmospheric conditions over a fire area. The index is a simple way to measure the atmosphere's contribution to the fire's growth potential. A high Haines Index is correlated with large fire growth where winds do not dominate fire behavior.

2	Very Low Potential (Moist and stable lower atmosphere)
3	Very Low Potential
4	Low Potential
5	Moderate Potential
6	High Potential (Dry and unstable lower atmosphere)

Keetch-Byrum Drought Index (KBDI)

The KBDI is a daily value representative of the water balance where yesterday's drought index is balanced with today's drought factor (precipitation and soil moisture). The drought index ranges from 0 to 800; an index of 0 represents no moisture depletion and an index of 800 represents absolutely dry conditions.

0-200	Soil and large class fuel moistures are high. Most fuels will not readily ignite or burn.
200-400	Lower litter and duff layers are drying and beginning to contribute to fire intensity. Heavier fuels will still not readily ignite and burn.
400-600	Lower litter and duff layers actively contribute to fire intensity and will burn actively. Expect complete consumption of all but the largest fuels. Drying of soil will lower live fuel moistures allowing live fuels to become available to burn.
600-800	Often associated with severe drought and increased wildfire occurrence. Expect intense deep burning fires with significant spotting problems. Live fuels will burn actively at these levels and expect fires to be difficult to contain and control.

Lightning Activity Level (LAL)

LAL 1	• No thunderstorms
LAL 2	• Isolated thunderstorms. • Light rain occasionally reaches the ground. • Lightning very infrequent. • 1-5 strikes in 5 minutes.
LAL 3	• Widely scattered thunderstorms. • Light to moderate rain will reach the ground. • Lightning is infrequent. • 6-10 strikes in 5 minutes.
LAL 4	• Scattered thunderstorms. • Moderate rain is commonly produced. • Lightning is frequent. • 11-15 strikes in 5 minutes.
LAL 5	• Numerous thunderstorms. • Rainfall is moderate to heavy. • Lightning is frequent and intense. • More than 15 strikes in 5 minutes.
LAL 6	• Widely scattered dry thunderstorms. • No rain reaches the ground. • Lightning is infrequent. • May constitute the issuance of a Red Flag Warning.

Weather Watch/Weather Warning

A **Watch** is used when the risk of a hazardous weather or hydrologic event has increased significantly, but its occurrence, location, and/or timing is still uncertain. A **Warning** is issued when a hazardous weather or hydrologic event is occurring, is imminent, or has a very high probability of occurring. A warning is used for conditions posing a threat to life or property.

Windspeed Ranges

Foehn ..... 40 to 60 mi/hr common; up to 90 mi/hr reported at 20 ft.
Land breeze ..... 2 to 3 hours after sunset, 3 to 5 mi/hr at 20 ft.
Sea breeze ..... 10 to 15 mi/hr at 20 ft.
Up-valley wind ...10 to 15 mi/hr, early afternoon and evening at 20 ft.
Upslope winds ..... as high as 4 to 8 mi/hr at midflame height
Downslope winds ..... 3 to 6 mi/hr at midflame height

BEAUFORT SCALE FOR ESTIMATING 20-FT WINDSPEED

Wind Class	Wind Speed (mph)	Nomenclature
1	<3	Very light - smoke rises nearly vertically. Leaves of quaking aspen in constant motion; small branches of bushes sway; slender branches and twigs of trees move gently; tall grasses and weeds sway and bend with wind; wind vane barely moves.
2	4-7	Light - trees of pole size in the open sway gently; wind felt distinctly on face; loose scraps of paper move; wind flutters small flag.
3	8-12	Gentle breeze - trees of pole size in the open sway very noticeably; large branches of pole size trees in the open toss; tops of trees in dense stands sway; wind extends small flag; a few crested waves form on lakes.
4	13-18	Moderate breeze - trees of pole size in the open sway violently; whole trees in dense stands sway noticeable; dust is raised on the road.
5	19-24	Fresh - branchlets are broken from trees; inconvenience is felt in walking against wind.
6	25-31	Strong - tree damage increases with occasional breaking of exposed tops and branches; progress impeded when walking against wind; light structural damage to buildings.
7	32-38	Moderate gale - severe damage to tree tops; very difficult to walk into wind; significant structural damage occurs.
8	>39	Fresh gale - surfaced strong Santa Ana; intense stress on all exposed objects, vegetation, buildings; canopy offers virtually no protection; wind flow is systematic in disturbing everything in its path.

Source: Fire Behavior Field Reference

Severe Fire Behavior Potential Related to Relative Humidity and Fuel Moisture Content

R.H. %	1-HR F.M.%	10-HR F.M.%	Relative ease of chance ignition and spotting; general burning conditions
>60	>20	>15	Very little ignition; some spotting may occur with winds above 9 mi./h.
45-60	15-19	12-15	Low ignition hazard--campfires become dangerous; glowing brands cause ignition when relative humidity is <50 percent.
30-45	11-14	10-12	Medium ignitability--matches become dangerous; "easy" burning conditions.
26-40	8-10	8-9	High ignition hazard--matches always dangerous; occasional crowning, spotting caused by gusty winds; "moderate" burning conditions.
15-30	5-7	5-7	Quick ignition, rapid buildup, extensive crowning; any increase in wind causes increased spotting, crowning, loss of control; fire moves up bark of trees igniting aerial fuels; long distance spotting in pine stands; dangerous burning conditions.
<15	< 5	< 5	All sources of ignition dangerous; aggressive burning, spot fires occur often and spread rapidly, extreme fire behavior probable; critical burning conditions.

Fire Behavior Hauling Chart

Tactical Interpretations from Flame Length

Flame Length	Interpretations
Less than 4 feet	Fires can generally be attacked at the head or flanks by firefighters using hand tools. Handline should hold fire.
4 to 8 feet	Fires are too intense for direct attack on the head with hand tools. Handline cannot be relied on to hold the fire. Dozers, tractor-plows, engines and retardant drops can be effective.
8 to 11 feet	Fire may present serious control problems: torching, crowning, and spotting. Control efforts at the head will probably be ineffective.
Over 11 feet	Crowning, spotting, and major fire runs are probable. Control efforts at the head of the fire are ineffective.

Relative Humidity: 1400-4999' Elevation

1. Find current dry bulb reading in left column.

2. For wet bulb depression on top-subtract wet bulb reading from dry bulb reading.

3. Read RH% where they intersect.

DRY BULB	WET BULB DEPRESSION, DEGREES F.																														
t°F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
34	91	82	73	64	55	46	38	30	21	13	5																				
35	91	82	74	65	56	48	40	32	24	16	8	0																			
36	91	83	75	66	58	50	42	34	26	18	10	3																			
37	92	84	75	67	59	51	43	35	28	20	13	5																			
38	92	84	76	68	61	53	45	37	30	22	15	8	1																		
39	92	84	76	69	62	54	47	39	32	24	17	10	3																		
40	92	84	77	69	62	55	48	41	33	26	19	13	6																		
41	92	85	77	70	63	56	49	42	35	28	22	15	8	2																	
42	92	85	78	71	64	57	50	44	37	30	24	17	11	4																	
43	92	86	78	71	65	58	51	45	38	32	26	19	13	7	1																
44	93	86	79	72	66	59	52	46	40	33	27	21	15	9	3																
45	93	86	79	72	66	60	53	47	41	35	29	23	17	11	5																
46	93	86	80	73	67	60	54	48	42	36	30	24	19	13	8	2															
47	93	86	80	74	67	61	55	49	43	37	32	26	20	15	10	4															
48	93	87	80	74	68	62	56	50	44	39	33	27	22	17	11	6	1														
49	93	87	81	74	69	63	57	51	45	40	34	29	24	18	13	8	3														
50	94	87	81	75	69	63	57	52	46	41	35	30	25	20	15	10	5	0													
51	94	88	82	76	70	64	58	53	47	42	37	31	26	21	17	12	7	2													
52	94	88	82	76	70	65	59	53	48	43	38	33	28	23	18	13	9	4													
53	94	88	82	76	71	65	60	54	49	44	39	34	29	24	20	15	10	6	2												
54	94	88	82	77	71	66	60	55	50	45	40	35	30	26	21	17	12	8	3												
55	94	88	82	77	72	66	61	56	51	46	41	36	31	27	23	18	14	9	5	1											
56	94	89	83	77	72	67	62	57	52	47	42	37	33	28	24	20	15	11	7	3											
57	94	89	83	78	72	67	62	57	52	48	43	38	34	30	25	21	17	12	8	4	0										
58	94	89	83	78	73	68	63	58	53	49	44	39	35	31	27	22	18	14	10	6	2										
59	95	89	84	78	74	68	64	59	54	49	45	40	36	32	28	24	19	15	11	8	4	0									
60	95	89	84	79	74	69	64	59	55	50	46	41	37	33	29	25	21	17	13	9	5	2									
61	95	90	84	79	74	69	65	60	55	51	46	42	38	34	30	26	22	18	14	11	7	3									
62	95	90	84	79	75	70	65	61	56	52	47	43	39	35	31	27	23	19	16	12	8	5	1								
63	95	90	85	80	75	70	66	61	57	52	47	44	40	36	32	28	24	21	17	13	10	6	3								
64	95	90	85	80	75	71	66	62	57	53	49	45	41	37	33	29	26	22	18	15	11	8	5	1							
65	95	90	85	80	76	71	67	62	58	54	50	46	42	38	34	30	27	23	19	16	12	9	6	3							
66	95	90	85	81	76	72	67	63	59	54	50	46	42	39	35	31	28	24	21	17	14	11	7	4	1						
67	95	90	85	81	76	72	68	63	59	55	51	47	43	40	36	32	29	25	22	18	15	12	9	6	3						
68	95	90	86	81	77	72	68	64	60	56	52	48	44	40	37	33	30	26	23	20	16	13	10	7	4	1					
69	95	91	86	81	77	73	68	64	60	56	52	49	45	41	38	34	31	27	24	21	17	14	11	8	5	2					
70	95	91	86	82	77	73	69	65	61	57	53	49	46	42	39	35	32	28	25	22	19	16	13	10	7	4	1				
71	95	91	86	82	77	73	69	65	61	57	54	50	46	43	39	36	32	29	26	23	20	17	14	11	8	5	2				
72	95	91	86	82	78	74	70	66	62	58	54	50	47	44	40	37	33	30	27	24	21	18	15	12	9	6	4	1			
73	95	91	87	82	78	74	70	66	62	59	55	51	48	44	41	38	34	31	28	25	22	19	16	13	10	8	5	2			
74	95	91	87	83	78	74	70	66	63	59	55	52	48	45	42	38	35	32	29	26	23	20	17	14	12	9	6	4	1		
75	96	91	87	83	79	75	71	67	63	59	56	52	49	46	42	39	36	33	30	27	24	21	18	15	13	10	7	5	2		
76	96	91	87	83	79	75	71	67	64	60	56	53	50	46	43	40	37	34	30	27	25	22	19	16	14	11	9	6	4	1	
77	96	91	87	83	79	75	71	68	64	60	57	53	50	47	44	40	37	34	31	28	25	23	20	17	15	12	10	7	5	2	
78	96	91	87	83	79	75	72	68	64	61	58	54	51	47	44	41	38	35	32	29	26	24	21	18	16	13	11	8	6	4	1
79	96	92	88	84	80	76	72	68	65	61	58	54	51	48	45	42	39	36	33	30	27	25	22	19	17	14	12	9	7	5	2
80	96	92	88	84	80	76	72	69	65	62	58	55	52	49	45	42	39	36	34	31	28	26	23	20	18	15	13	10	8	6	4
82	96	92	88	84	80	77	73	69	66	62	59	56	53	50	47	44	41	38	35	32	30	27	24	22	20	17	15	12	10	8	6
84	96	92	88	84	81	77	74	70	67	63	60	57	54	51	48	45	42	39	36	34	31	29	26	24	21	19	17	14	12	10	8
86	96	92	88	85	81	77	74	71	67	64	61	58	55	52	49	46	43	40	38	35	33	30	28	25	23	21	18	16	14	12	10
88	96	92	89	85	81	78	75	71	68	65	62	59	56	53	50	47	44	42	39	36	34	31	29	27	24	22	20	18	16	14	12
90	96	92	89	85	82	78	75	72	68	65	62	59	56	54	51	48	45	43	40	38	35	33	30	28	26	24	21	19	17	15	13
92	96	92	89	85	82	79	75	72	69	66	63	60	57	54	52	49	46	44	41	39	36	34	32	29	27	25	23	21	19	17	15
94	96	93	89	86	82	79	76	73	69	66	64	61	58	55	52	50	47	45	42	40	37	35	33	31	28	26	24	22	20	18	16
96	96	93	89	86	83	79	76	73	70	67	64	61	59	56	53	51	48	46	43	41	38	36	34	32	30	28	26	24	22	20	18
98	96	93	90	86	83	80	77	74	71	68	65	62	59	57	54	51	49	46	44	42	39	37	35	33	31	29	27	25	23	21	19
100	96	93	90	86	83	80	77	74	71	68	65	63	60	57	55	52	50	47	45	43	40	38	36	34	32	30	28	26	24	22	21
102	97	93	90	87	83	80	77	74	71	69	66	63	61	58	55	53	50	48	46	44	41	39	37	35	33	31	29	27	25	23	22
104	97	93	90	87	84	81	78	75	72	69	66	64	61	59	56	54	51	49	47	44	42	40	38	36	34	32	30	28	26	25	23
106	97	93	90	87	84	81	78	75	72	70	67	64	62	59	57	54	52	50	47	45	43	41	39	37	35	33	31	29	28	26	24
108	97	93	90	87	84	81	78	75	73	70	67	65	62	60	57	55	53	50	48	46	44	42	40	38	36	34	32	30	29	27	25
110	97	94	90	87	84	81	79	76	73	70	68	65	63	60	58	56	53	51	49	47	45	43	41	39	37	35	33	31	29	28	26

Relative Humidity: 5000-9200' Elevation

1. Find current dry bulb reading in left column.
2. For wet bulb depression on top-subtract wet bulb reading from dry bulb reading.
3. Read RH% where they intersect.

DRY BULB	WET BULB DEPRESSION, DEGREES F.																															
t °F	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
34	92	84	75	67	59	51	43	35	28	21	13																				
35	92	84	76	68	60	52	45	37	30	23	16	9	2																		
36	92	84	77	69	61	54	46	39	32	25	18	11	4																		
37	93	85	78	70	63	55	48	41	34	27	20	13	7	0																	
38	93	85	78	71	64	57	49	42	36	29	22	16	9	3																	
39	93	85	78	71	65	57	51	44	37	31	24	18	12	5																	
40	93	85	79	72	65	58	52	45	39	32	26	20	14	8	2																
41	93	86	79	72	66	59	53	47	41	34	28	22	16	10	4																
42	93	86	80	73	67	60	54	48	42	36	30	24	18	12	6	1															
43	93	87	80	73	67	61	55	49	43	37	31	26	20	14	8	3															
44	94	87	80	74	68	62	56	50	44	39	33	27	22	16	11	5															
45	94	87	81	74	68	62	57	51	45	40	34	28	24	18	13	7															
46	94	87	81	75	69	63	57	52	46	41	35	30	25	20	15	9	4														
47	94	87	81	75	70	64	58	53	47	42	37	31	26	21	17	11	6	2													
48	94	88	82	76	70	65	59	54	48	43	38	32	28	23	18	13	9	4													
49	94	88	82	76	71	65	60	54	49	44	39	34	29	24	20	15	10	6	1												
50	94	88	82	77	71	66	60	55	50	45	40	35	30	26	21	17	12	8	3												
51	94	88	83	77	72	66	61	56	51	46	41	36	32	27	23	18	14	9	5	1											
52	94	89	83	78	72	67	61	57	52	47	42	37	33	28	24	20	15	11	7	3											
53	94	89	83	78	72	67	62	57	52	48	43	38	34	29	25	21	17	13	9	5	1										
54	94	89	83	78	73	68	63	58	53	48	44	39	35	31	26	22	18	14	10	6	2										
55	95	89	84	78	73	69	63	59	54	49	45	40	36	32	28	24	20	16	12	8	4	0									
56	95	89	84	79	74	69	64	59	55	50	46	41	37	33	29	25	21	17	13	9	6	2									
57	95	89	84	79	74	69	65	60	55	51	47	42	38	34	30	26	22	18	14	11	7	3									
58	95	89	84	79	74	70	65	61	56	52	48	43	39	35	31	27	23	20	16	12	9	5	2								
59	95	90	85	80	75	70	65	61	57	53	48	44	40	36	32	28	24	21	17	14	10	6	3								
60	95	90	85	80	75	71	66	62	57	53	49	45	41	37	33	29	26	22	18	15	11	8	5	1							
61	95	90	85	80	75	71	66	62	58	54	50	46	42	38	34	30	27	23	20	16	13	9	6	3							
62	95	90	85	81	76	72	67	63	59	54	50	46	43	39	35	31	28	24	21	17	14	11	8	4	1						
63	95	90	85	81	76	72	67	63	59	55	51	47	43	40	36	32	29	25	22	19	15	12	9	6	3						
64	95	90	86	81	77	72	68	64	60	56	52	48	44	40	37	33	30	26	23	20	16	13	10	7	4	1					
65	95	91	86	81	77	73	69	65	61	57	54	50	46	42	38	35	31	28	25	21	18	15	12	9	6	3					
66	95	91	86	82	77	73	69	65	61	57	53	49	46	42	38	35	32	28	25	22	19	16	13	10	7	4	1				
67	95	91	86	82	77	73	69	65	61	57	54	50	46	43	39	36	33	29	26	23	20	17	14	11	8	5	3				
68	95	91	86	82	78	74	70	66	62	58	55	51	47	44	40	37	34	30	27	24	21	18	15	12	9	7	4	1			
69	96	91	87	82	78	74	70	66	62	58	55	52	48	44	41	38	34	31	28	25	22	19	16	13	11	8	5	3	0		
70	96	91	87	83	78	74	70	66	63	59	55	52	48	45	42	38	35	32	29	26	23	20	17	14	12	9	6	4	1		
71	96	91	87	83	79	75	71	67	63	59	56	52	49	46	42	39	36	33	30	27	24	21	18	15	13	10	8	5	3	0	
72	96	91	87	83	79	75	71	67	64	60	56	53	50	46	43	40	37	34	31	28	25	22	19	16	14	11	9	6	4	1	
73	96	91	87	83	79	75	71	68	64	60	57	53	50	47	43	40	37	34	31	29	26	23	20	17	15	12	10	7	5	3	0
74	96	91	87	83	79	75	72	68	64	61	57	54	51	47	44	41	38	35	32	29	27	24	21	18	16	13	11	9	6	4	2
75	96	91	87	83	79	76	72	68	65	61	58	55	51	48	45	42	39	36	33	30	28	25	22	19	17	14	12	10	7	5	3
76	96	92	88	84	80	76	72	69	65	62	58	55	52	49	45	42	39	37	34	31	28	22	23	20	18	15	13	10	8	6	4
77	96	92	88	84	80	76	72	69	66	62	59	55	52	49	46	43	40	37	34	32	29	26	24	21	19	16	14	12	9	7	5
78	96	92	88	84	80	76	73	69	66	62	59	56	53	50	47	44	41	38	35	32	29	27	25	22	20	17	15	13	10	8	6
79	96	92	88	84	80	77	73	70	66	63	60	56	53	50	47	44	41	39	36	33	30	28	25	23	21	18	16	14	11	9	7
80	96	92	88	84	80	77	73	70	67	63	60	57	54	51	48	45	42	39	37	34	31	29	26	24	21	19	17	15	12	10	8
82	96	92	88	85	81	77	74	71	67	64	61	58	55	52	49	46	43	40	38	35	33	30	28	25	23	21	19	16	14	12	10
84	96	92	89	85	81	78	74	71	68	65	61	58	55	53	50	47	44	42	39	36	34	31	29	27	24	22	20	18	16	14	12
86	96	92	89	85	81	78	75	71	68	65	62	59	56	53	50	48	45	43	40	38	35	33	30	28	26	24	22	20	18	16	14
88	96	92	89	85	82	79	75	72	69	66	63	60	57	54	51	49	46	44	41	39	36	34	32	29	27	25	23	21	19	17	15
90	96	93	89	86	82	79	76	73	69	66	63	61	58	55	52	50	47	45	42	40	37	35	33	31	28	26	24	22	20	18	17
92	96	92	89	86	83	79	76	73	70	67	64	61	58	56	53	51	48	46	43	41	38	36	34	32	30	28	26	24	22	20	18
94	96	93	89	86	83	80	76	73	70	67	65	62	59	56	54	51	49	46	44	42	39	37	35	33	31	29	27	25	23	21	19
96	96	93	90	86	83	80	77	74	71	68	65	62	60	57	55	52	50	47	45	43	40	38	36	34	32	30	28	26	24	22	21
98	97	93	90	87	83	80	77	74	71	68	66	63	60	58	55	53	50	48	46	43	41	39	37	35	33	31	29	27	25	24	22
100	97	93	90	87	84	80	77	75	72	69	66	64	61	58	56	53	51	49	46	44	42	40	38	36	34	32	30	28	26	25	23
102	97	93	90	87	84	81	78	75	72	69	67	64	61	59	57	54	52	50	47	45	43	41	39	37	35	33	31	29	27	26	24
104	97	93	90	87	84	81	78	75	72	70	67	65	62	59	57	55	52	50	48	46	44	42	40	38	36	34	32	30	28	27	25
106	97	94	90	87	84	81	78	76	73	70	68	65	62	60	58	55	53	51	49	47	44	42	40	38	37	35	33	31	29	28	26
108	97	94	90	87	84	82	79	76	73	71	68	65	63	61	58	56	54	51	49	47	45	43	41	39	37	36	34	32	30	29	27
110	97	94	91	88	85	82	79	76	74	71	68	66	63	61	59	56	54	52	50	48	46	44	42	40	38	36	35	33	31	30	28

Probability of Ignition Tables

1. Using Table A, determine Reference Fuel Moisture (RFM) % from intersection of temperature and relative humidity. Record this RFM percentage.
2. Select Table B, C, or D to adjust RFM for local conditions by finding current month in table title.
   - Are the fine fuels more than 50% shaded by canopies and clouds? If yes, use bottom (**shaded**) portion of table. If no, use top (**exposed**) portion of table.
   - Determine the appropriate row based on aspect and slope. Determine the appropriate column based on time of day and elevation of area of concern when compared to the wx site elevation.
   - Obtain the Dead Fuel Moisture Content Correction (%) from the intersection of row and column.
3. Add the resulting Dead Fuel Moisture Content Correction (%) to the Reference Fuel Moisture (%).

Table A

REFERENCE FUEL MOISTURE

Day Time 0800 - 1959

	Relative Humidity (Percent)																				
Dry Bulb Temperature (F)	0-4	5-9	10-14	15-19	20-24	25-29	30-34	36-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-99	100
10 - 29	1	2	2	3	4	5	5	6	7	8	8	8	9	9	10	11	12	12	13	13	14
30 - 49	1	2	2	3	4	5	5	6	7	7	7	8	9	9	10	10	11	12	13	13	13
50 - 69	1	2	2	3	4	5	5	6	6	7	7	8	8	9	9	10	11	12	12	12	13
70 - 89	1	1	2	2	3	4	5	5	6	7	7	8	8	8	9	10	10	11	12	12	13
90 - 109	1	1	2	2	3	4	4	5	6	7	7	8	8	8	9	10	10	11	12	12	13
109+	1	1	2	2	3	4	4	5	6	7	7	8	8	8	9	10	10	11	12	12	12

Go to Tables B, C, or D for Corrections

Table B
DEAD FUEL MOISTURE CONTENT CORRECTIONS
MAY JUNE JULY

		Exposed - Less than 50% Shading of Surface Fuels																					
		0800 >			1000 >			1200 >			1400 >			1600 >			1800 >					
	% Slope	B	L	A	B	L	A	B	L	A	B	L	A	B	L	A	B	L	A	B	L	A
N	0 - 30%	2	3	4	1	1	1	0	0	1	0	0	1	1	1	1	2	3	4			
	31% +	3	4	4	1	2	2	1	1	2	1	1	2	1	2	2	3	4	4			
E	0 - 30%	2	2	3	1	1	1	0	0	1	0	0	1	1	1	2	3	4	4			
	31% +	1	2	2	0	0	1	0	0	1	1	1	2	2	3	4	4	5	6			
S	0 - 30%	2	3	3	1	1	1	0	0	1	0	0	1	1	1	1	2	3	3			
	31% +	2	3	3	1	1	2	0	1	1	0	1	1	1	1	2	2	3	3			
W	0 - 30%	2	3	4	1	1	2	0	0	1	0	0	1	0	1	1	2	3	3			
	31% +	4	5	6	2	3	4	1	1	2	0	0	1	0	0	1	1	2	2			
	Shaded - Greater than or Equal to 50% Shading of Surface Fuels																					
N	0% +	4	5	5	3	4	5	3	3	4	3	3	4	3	4	5	4	5	5			
E	0% +	4	4	5	3	4	5	3	3	4	3	4	4	3	4	5	4	5	6			
S	0% +	4	4	5	3	4	5	3	3	4	3	3	4	3	4	5	4	5	5			
W	0% +	4	5	6	3	4	5	3	3	4	3	3	4	3	4	5	4	4	5			

B = Area of concern 1000'-2000' below wx site location
L = Area of concern within +/- 1000' of wx site location
A = Area of concern 1000'-2000' above wx site location

Table C
DEAD FUEL MOISTURE CONTENT CORRECTIONS
FEBRUARY MARCH APRIL/AUGUST SEPTEMBER OCTOBER

		Exposed - Less than 50% Shading of Surface Fuels																					
		0800 >			1000 >			1200 >			1400 >			1600 >			1800 >					
	% Slope	B	L	A	B	L	A	B	L	A	B	L	A	B	L	A	B	L	A	B	L	A
N	0 - 30%	3	4	5	1	2	3	1	1	2	1	1	2	1	2	3	3	4	5			
	31% +	3	4	5	3	3	4	2	3	4	2	3	4	3	3	4	3	4	5			
E	0 - 30%	3	4	5	1	2	3	1	1	1	1	1	2	1	2	3	3	4	5			
	31% +	3	3	4	1	1	1	1	1	1	1	2	3	3	4	5	4	5	6			
S	0 - 30%	3	4	5	1	2	2	1	1	1	1	1	1	1	2	3	3	4	5			
	31% +	3	4	5	1	2	2	0	1	1	0	1	1	1	2	2	3	4	5			
W	0 - 30%	3	4	5	1	2	3	1	1	1	1	1	1	1	2	3	3	4	5			
	31% +	4	5	6	3	4	5	1	2	3	1	1	1	1	1	1	3	3	4			
	Shaded - Greater than or Equal to 50% Shading of Surface Fuels																					
N	0% +	4	5	6	4	5	5	3	4	5	3	4	5	4	5	5	4	5	6			
E	0% +	4	5	6	3	4	5	3	4	5	3	4	5	4	5	6	4	5	6			
S	0% +	4	5	6	3	4	5	3	4	5	3	4	5	3	4	5	4	5	6			
W	0% +	4	5	6	4	5	6	3	4	5	3	4	5	3	4	5	4	5	6			

B = Area of concern 1000'-2000' below wx site location
L = Area of concern within +/- 1000' of wx site location
A = Area of concern 1000'-2000' above wx site location

Table D
DEAD FUEL MOISTURE CONTENT CORRECTIONS

November December January

		Exposed - Less than 50% Shading of Surface Fuels																	
		0800 >			1000 >			1200 >			1400 >			1600 >			1800 >		
	% Slope	B	L	A	B	L	A	B	L	A	B	L	A	B	L	A	B	L	A
N	0 - 30%	4	5	6	3	4	5	2	3	4	2	3	4	3	4	5	4	5	6
	31% +	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6
E	0 - 30%	4	5	6	3	4	4	2	3	3	2	3	3	3	4	5	4	5	6
	31% +	4	5	6	2	3	4	2	2	3	3	4	4	4	5	6	4	5	6
S	0 - 30%	4	5	6	3	4	5	2	3	3	2	2	3	3	4	4	4	5	6
	31% +	4	5	6	2	3	3	1	1	2	1	1	2	2	3	3	4	5	6
W	0 - 30%	4	5	6	3	4	5	2	3	3	2	3	3	3	4	4	4	5	6
	31% +	4	5	6	4	5	6	3	4	4	2	2	3	2	3	4	4	5	6
	Shaded - Greater than or Equal to 50% Shading of Surface Fuels																		
N	0% +	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6
E	0% +	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6
S	0% +	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6
W	0% +	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6	4	5	6

B = Area of concern 1000'-2000' below wx site location
L = Area of concern within +/- 1000' of wx site location
A = Area of concern 1000'-2000' above wx site location

Table E

Shading (Percent)	Dry Bulb Temp (F)	Probability of Ignition Table FINE DEAD FUEL MOISTURE PERCENT														
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Unshaded <50%	110+	100	100	80	70	60	60	50	40	40	30	30	20	20	20	20	10
	100-109	100	90	80	70	60	60	50	40	40	30	30	20	20	20	10	10
	90-99	100	90	80	70	60	50	40	40	30	30	30	20	20	20	10	10
	80-89	100	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10
	70-79	100	80	70	60	60	50	40	40	30	30	20	20	20	10	10	10
	60-69	90	80	70	60	50	50	40	30	30	20	20	20	20	10	10	10
	50-59	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10	10
	40-49	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10	10
	30-39	80	70	60	50	50	40	30	30	20	20	20	10	10	10	10	10
		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Shaded >50%	110+	100	90	80	70	60	50	50	40	40	30	30	20	20	20	10	10
	100-109	100	90	80	70	60	50	50	40	30	30	30	20	20	20	10	10
	90-99	100	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10
	80-89	100	80	70	60	60	50	40	40	30	30	20	20	20	10	10	10
	70-79	90	80	70	60	50	50	40	30	30	30	20	20	20	10	10	10
	60-69	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10	10
	50-59	90	80	70	60	50	40	40	30	30	20	20	20	10	10	10	10
	40-49	90	80	60	50	50	40	30	30	30	20	20	20	10	10	10	10
	30-39	80	80	60	50	50	40	30	30	20	20	20	10	10	10	10	10

Strategy - *Direct* Attack

Advantages:

- Minimal area is burned; no additional area is intentionally burned.
- Safest place to work; firefighters can usually escape into the burned area.
- The uncertainties of firing operations can be reduced/eliminated.

Disadvantages:

- Firefighters can be hampered by heat, smoke and flames.
- Control lines can be very long and irregular.
- Burning material can easily spread across mid-slope lines.
- May not be able to use natural or existing barriers.
- More mopup and patrol is usually required.

Strategy - *Indirect* Attack

Advantages:

- Control lines can be located using favorable topography.
- Natural or existing barriers can be used.
- Firefighters may not have to work in smoke and heat.
- Control lines can be constructed in lighter fuels.
- There may be less danger of slopovers.

Disadvantages:

- More area will be burned.
- Must be able to trade time and space for line to be constructed and fired.
- Firefighters may be in more danger because they are distant from the fire and have unburned fuels between them and the fire.
- There may be some dangers related to firing operations.
- Firing operations may leave unburned islands of fuel.
- May not be able to use control line already built.

Fireline Location

- The first consideration of line location is firefighter safety.
- Whenever possible, use direct attack and build line as close to fire edge as conditions safely permit.
- If indirect attack is required, locate line an adequate distance from the main fire so it can be completed, fired, and held considering the predicted rate of spread of the main fire.
- Allow adequate time to permit forces to complete the line and conduct any firing operations in advance of severe burning conditions.
- Make the line as short and straight as practical, using topography to your advantage.
- Use easiest routes, taking advantage of light fuels, without sacrificing holding capability or significant resource values.
- Use existing natural and human made barriers.
- Eliminate potential hazards from the fireline area whenever possible. If hazards must be left in the fire area, locate line a safe distance away.
- Avoid undercut and mid-slope line in steep terrain.
- Avoid sharp turns in the line.
- Encircle area where spot fires are so numerous that they are impractical to handle as individual fires, then burn out the unburned fuels.
- Lines that run along ridges should be located on the ridgetop or slightly to the lee side away from the main fire.
- Use the Downhill Checklist when considering building line from top to bottom in steep terrain.

Procedural Felling Operations

Assess the situation, complete a hazard analysis, and establish cutting area control.

Situational Assessment

- Evaluate tree characteristics
- Determine soundness or defects
- Analyze the tree base
- Check surrounding terrain
- Examine work area

Hazard Analysis

- Overhead hazards
- Ground hazards
- Environmental hazards
- Mental/physical hazards

Felling Operation Controls

- Use a lookout to help control felling area
- Check for nearby hazard trees (domino effect)
- Assess lean(s) and lay
- Swamp out base and escape route
- Brief swamper (role/responsibility)
- Face tree with adequate undercut
- Give warning yell
- Maintain holding wood and stump shot
- Frequently look up while cutting
- Use proper wedging procedure
- Use established escape route
- Analyze stump for lessons learned

Working with Heavy Equipment

- When working around heavy equipment, stay at least 100 feet in front or 50 feet behind the equipment. In timber, distances should be increased to 2½ times the canopy height.
- No one but the operator should ride on the equipment.
- Never approach equipment until you have eye contact with the operator, all implements have been lowered to the ground, and equipment is idled down.
- Avoid working below equipment where rolling material could jeopardize your safety.
- Night work is more dangerous due to reduced visibility. Use headlamp and/or glow sticks so the operator can see you.
- Establish visual and radio communication methods prior to engaging.
- Communicate all hazards to the operator (spot fires, firing operations, and obstacles).
- Equipment operators have difficulty seeing ground personnel; take responsibility for your safety and all those around you.

Water Delivery Information

- Pump Discharge Pressure (PDP) = Nozzle Pressure (NP) + Friction Loss (FL) of hoselay ± Head Pressure (HP)
- GPM (Gallons Per Minute) and NP:
  Forester
  3/16 tip: 7 gpm (50 psi NP)
  3/8 tip: 30 gpm (50 psi NP)
  Variable Pattern (Adjustable Barrel)
  1 inch: 20 gpm (100 psi NP)
  1½ inch: 60 gpm (100 psi NP)
- FL for 1" hose:
  10 gpm = 3 psi per 100 ft.
  20 gpm = 10 psi per 100 ft.
  30 gpm = 23 psi per 100 ft.
- FL for 1½" hose:
  20 gpm = 1 psi per 100 ft.
  30 gpm = 3 psi per 100 ft.
  60 gpm = 13 psi per 100 ft.
- HP: Add or subtract 1 psi for every 2 foot elevation change.
- Gallons of water to fill 100 feet of hose:
  ¾" hose ≈ 2 gals.
  1" hose ≈ 4 gals.
  1½" hose ≈ 9 gals.
- Maximum effective vertical height for drafting = 12 feet at sea level (Mark 3).
- Loss of 1 foot draft per 1000 feet elevation.
- Use check valve for pumping uphill to prevent back flow into the pump.
- Use hard suction hoses only for drafting (not designed to withstand positive pressures).
- A double hose lay will have ¼ the friction loss of a single hoselay.
- Use of two suction hoses on intake will increase gallons per minute.

Engine ICS Typing

Components	Structure		Wildland				
	1	2	3	4	5	6	7
Pump Rating							
Minimum Flow GPM	1000+	250+	150	50	50	30	10
at Rated Pressure PSI	150	150	250	100	100	100	100
Tank Capacity	400+	400+	500+	750+	400-750	150-400	50-200
Hose 1.5" (ft)	400	500	500	300	300	300	
Hose 1.0" (ft)			500	300	300	300	200
Min. Personnel	4	3	3	2	2	2	2

Water Tender ICS Typing

Components	Support			Tactical	
	1	2	3	1	2
Pump Rating					
Minimum Flow	300 gpm	200 gpm	200 gpm	250 gpm	250 gpm
at Rated Pressure	50 psi	50 psi	50 psi	150 psi	150 psi
Tank Capacity	4000+	2500+	1000+	2000+	1000+
Refill Time	30 min.	20 min.	15 min.		
Pump and Roll	No	No	No	Yes	Yes
Min. Personnel	1	1	1	2	2

Mark 3 Pump Information

Max psi: 380
Max gpm: 98 at free flow
Weight: 58 lbs. (without fuel can)
Fuel Consumption: ≈ 1.2 gal/hr
Pump Performance:

10 gpm at 345 psi	60 gpm at 170 psi
20 gpm at 310 psi	70 gpm at 130 psi
30 gpm at 285 psi	80 gpm at 85 psi
40 gpm at 240 psi	90 gpm at 35 psi
50 gpm at 210 psi	98 gpm at 0 psi (free flow)

Mark 3 Pump Starting Procedures:

- Verify correct fuel/oil mixture in fuel tank. Attach fuel line to tank and pump.
- Open fuel supply line valve and fuel tank vent.
- Attach discharge and suction hose with foot valve and prime pump.
- Move throttle lever to “Start” and “Warm Up” position (center).
- Verify the On/Off switch is at the “On” position and yellow Cut-Out switch is pushed in.
- Close choke if engine is cold.
- Slowly turn engine until resistance (past compression).
- Give starter rope several quick, steady pulls until engine “coughs.”
- Open choke slightly and pull starter rope until engine runs.

- Slowly open choke and allow engine to warm up for at least 2 minutes before moving the throttle to the full "Run" position (away from motor). The manufacturer suggests only running the pump in the full throttle "Run" position when pumping and setting up a valve with a recirculation hose to control pressure. Any other throttle position can foul the spark plug.

Troubleshooting a Mark 3 Pump:

Do not remove the spark plug wire while cranking or running the engine. This may damage the ignition system.

1. Check the yellow overspeed Reset Rod. If rod is pushed in, move on to **2**. If rod is out, check the following:
   - Pump not fully primed
   - Leaking suction hose connections
   - Defective suction hose
   - Loosen pump priming cap
   - Foot valve not fully submerged in water source (1 foot minimum)
   - Air locks in suction hose
   - Do not attempt to restart pump until the problem is located and corrected.
2. Check the spark plug by removing it from the engine. If the spark plug electrode is dry, move on to **3.** If it is wet with fuel, the engine could be flooded.
   - Remove fuel supply line from engine.
   - Remove spark plug and rest plug on top of cylinder head with spark plug wire attached.

- Remove crankcase drain plug and copper gasket from engine block to drain excess fuel.
- With choke and throttle in full open (RUN/ RUN) position, pull starter cord several times until fuel is exhausted.
- Reinstall crankcase plug with copper gasket attached.
- Reinstall clean, dry or new spark plug.

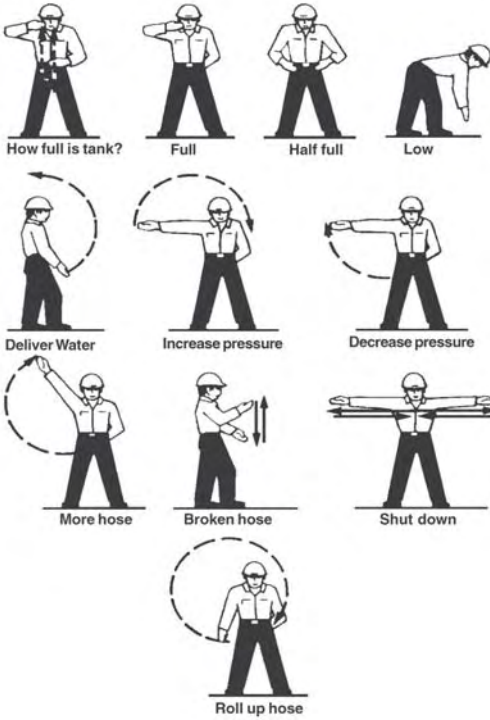
3. If the spark plug looks normal, move on to **4.** If the spark plug has an excess of carbon in the electrode replace the spark plug and try to start.

4. Check for ignition spark. If there is no spark, pump will need to be repaired.
   - Remove spark plug from engine.
   - Re-attach spark plug to spark plug wire.
   - Ground plug body to cylinder head.
   - Crank engine and look for spark across spark plug gap. A spark across the normal plug gap (.020") will not damage the ignition. The plastic cover on this IRPG is approximately .020" thick and can be used to check the spark plug gap if feeler guage is not available. **Do not use a dime to check the plug gap.**

Mixed fuel ratios:

- Mark 3 pumps (all years) – 24:1
- Shindaiwa pumps – 50:1
- Stihl and Husqvarna chainsaws (all years) – 50:1

Water Use Hand Signals



Average Perimeter in Chains

Acres	Perimeter	Acres	Perimeter
1	17	75	150
2	24	100	170
3	29	150	200
4	34	200	240
5	38	300	300
7	45	400	350
10	53	500	375
15	65	600	425
20	75	700	450
25	85	800	475
30	90	900	500
40	105	1000	525
50	120		
One Chain = 66 feet			

Fire Size Class

A	0 - 1/4 acre
B	1/4 - 10 acres
C	10 - 99 acres
D	100 - 299 acres
E	300 - 999 acres
F	1000 - 4999 acres
G	5000+ acres

Line Spike

The "Line Spike," or "Coyote," is a progressive line construction technique in which self-sufficient crews build fireline until the end of an operational period, remain overnight (RON) at or near that point, and then begin again the next operational period. Crews should be properly equipped and prepared to spend two or three shifts on the line with minimal support from the incident base.

Safety Considerations

- Can line spike locations maintain LCES at all times?
- Can emergency medical technicians be on the line?
- Can a timely medevac plan be implemented?
- Can daily communications (verbal and written) be maintained?
- Can food and water be provided daily?
- Is each crew boss comfortable with the assignment?

Operational Considerations

- Meals during line spike operational periods may consist of rations and/or sack lunches.
- The line spike generally will not last more than two or three operational periods for any one crew.
- Division Supervisors will be responsible for establishing on and off operational period times.
- Crews working line spike operational periods will be resupplied on the fireline as close as possible to the RON point.

Logistical Considerations

- Bring toothbrush/paste, extra socks/underwear, light coat, double lunch, space blanket, etc.
- Consider early in the operational period where the crew(s) will RON, and that the location provides for safety and logistical needs of the crew (main fire poses no threat, helicopters can longline or land at site, personnel are provided semi-flat ground to sleep on, adequate firewood exists for warming fires, etc.).
- Anticipate resupply needs and place those orders early in the operational period. Crew leaders should make arrangements to have qualified individuals at RON locations to accept those orders by longline or internal helicopter operations.
- Take measures to prevent problems with food, trash, etc., in areas where bears are a concern. It's a common practice to leave one or more individuals with radio communications at the RON location to coordinate the "back haul" of trash or the pre-positioning of reusable supplies to advanced RON locations.
- Determine how crew time and commissary items will be managed. Normally this function can be provided by using inbound/outbound helicopter flights at the RON location, or the time is turned in upon returning to the incident base.
- Determine how medical emergencies will be managed. An emergency medical technician may be needed at the RON location.

Minimum Impact Suppression Tactics

The intent of minimum impact suppression tactics is to manage a wildland fire with the least impact to natural and cultural resources. Firefighter safety, fire conditions, and good judgment dictate the actions taken.

By minimizing impacts of fire management actions, unnecessary resource damage is prevented and cost savings can be realized. These actions include, but are not limited to:

Line Construction and Mopup

- Consider:
  - Cold-trailing fireline.
  - Using wetline or sprinklers as control line.
  - Using natural or human made barriers to limit fire spread.
  - Burning out sections of fireline.
  - Limiting width and depth of fireline necessary to limit fire spread.
- Locate pumps and fuel sources to minimize impacts to streams.
- Minimize cutting of trees and snags to those that pose safety or line construction concerns.
- Move or roll downed material out of fireline construction area.
- In areas of low spotting potential, allow large-diameter logs to burn out.

- Limb only fuels adjacent to the fireline with potential to spread outside the line or produce spotting issues.
- Scrape around tree bases near fireline likely to cause fire spread or act as ladder fuel.
- Minimize bucking of logs to check/extinguish hot spots; preferably roll logs to extinguish and return logs to original position.
- Use extensive cold-trailing and/or hot-spot detection devices along perimeter.
- Increased use of fireline patrols/monitoring.
- Flush-cut stumps after securing fireline.

Long-Term Incidents

- Consult with Resource Advisor to locate suitable campsites. Scout thoroughly to avoid hazards (bee's nests, widowmakers, etc.).
- Plan for appropriate methods of:
  - Helispot locations
  - Supply deliveries
  - Trash back-haul
  - Disposal of human waste
- Minimize ground and vegetation disturbance when establishing sleeping areas.
- Use locally approved storage methods to animal-proof food and trash.
- When abandoning camp, rehab impacts created by fire personnel.

Reporting Fire Chemical Introductions

Reporting is required for all introductions of wildland fire chemicals into waterways, or within 300 feet of a waterway if aerially applied.

Waterway is any body of water including lakes, rivers, streams and ponds – whether or not they contain aquatic life.

Some agencies also require reporting for wildland fire chemicals applied in the habitats of specific threatened and endangered species (TES) identified by the U.S. Fish and Wildlife Service.

- If you see anything that suggests fire chemicals may have been introduced into a waterway, the 300-foot buffer zone, or a TES habitat, regardless of delivery method, inform your supervisor.
- Information is to be forwarded through the chain of command to the Incident Commander, local Agency Administrator, and/or the Resource Advisor.

Fire Cause Determination Checklist

- Take essential investigation materials to the incident.
- Make notes of all your actions and findings:
  - Time fire was reported.
  - Name and identification of reporting party.
  - En route observations (people and vehicles).
  - Name and identification of persons or vehicles in vicinity of fire origin.
  - Record the weather.
- Locate and protect fire origin.
- Search fire origin area for physical evidence of fire cause.
- Protect evidence. Do not remove unless necessary to prevent destruction.
- Make sketches of origin area with measurements of relative locations of all evidence.
- Take photographs from all angles including long and medium distance, and close-up views of fire origin area and evidence.
- Turn over all notes, information, and physical evidence to the responsible law enforcement representative, or make your notes part of the official fire record.

Media Interviews

- Ensure the appropriate Public Information Officer or the local Public Affairs office is aware of media visits.
- Be prepared. Know the facts. Develop a few key messages and deliver them. Prepare responses to potential tough questions. If possible, talk to reporter beforehand to get an idea of subjects, direction, and slant of the interview.
- Be concise. Give simple answers (10-20 seconds), and when you're done, be quiet. If you botch the answer, simply ask to start again.
- Be honest, personable, professional, presentable (remove sunglasses and hats).
- Look at the reporter, not the camera.
- Ensure media are escorted and wearing PPE when going to the fireline or hazardous sites.
- NEVER talk "off the record," exaggerate, or try to be cute or funny.
- DON'T guess or speculate or say "no comment." Either explain why you can't answer the question or offer to track down the answer.
- DON'T disagree with the reporter. Instead, tactfully and immediately clarify and correct the information.
- DON'T speak for other agencies or offices.
- DON'T use jargon or acronyms.

Phonetic Alphabet

	Law Enforcement	International
A	Adam	Alpha
B	Boy	Bravo
C	Charles	Charlie
D	David	Delta
E	Edward	Echo
F	Frank	Foxtrot
G	George	Golf
H	Henry	Hotel
I	Ida	India
J	John	Julliett
K	King	Kilo
L	Lincoln	Lima
M	Mary	Mike
N	Nora	November
O	Ocean	Oscar
P	Paul	Papa
Q	Queen	Quebec
R	Robert	Romeo
S	Sam	Sierra
T	Tom	Tango
U	Union	Uniform
V	Victor	Victor
W	William	Whiskey
X	X-Ray	X-Ray
Y	Young	Yankee
Z	Zebra	Zulu

NOTES

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2010 Revision Summary

This 2010 edition of the Incident Response Pocket Guide reflects feedback from the first national comprehensive review of this publication since it was initially put into service in 1999. To denote this, the cover color has been changed to orange. There are a number of changes and corrections from the previous 2006 edition. This page provides a summary of notable changes and may be removed if desired.

New References

Preface
Specific Hazards Section (gold pages)
Roadside Response Safety
Oil and Gas Site Safety
All Hazard Incident Response
Heat-Related Injuries
Fire Danger Pocket Card
Fire Behavior Hauling Chart
Probability of Ignition Charts
Fireline Location
Working with Heavy Equipment
Engine and Water Tender Typing
Mark 3 Pump Information
Reporting Fire Chemical Introductions

Deleted References
Sample Patient History (2006 edition page 36)
Start Patient Triage (2006 edition page 40)
Flight Manager (2006 edition page 47)
PPE for Flight (2006 edition page 50)
Effective Use of SEATs (2006 edition pages 62-63)
USFS Visual Signal Code (2006 edition page 66)
Line Production Rates (2006 edition pages 88-90)
Dozer Use Hand Signals (2006 edition page 91)
Radio Frequencies and Contact Lists (2006 edition pages 100-102)

Existing References with Significant Changes
Wildland Urban Interface Firefighting
Hazard Tree Safety
HazMat Isolation Distances
Helicopter Passenger Briefing and PPE
Working with Airtankers
Procedural Felling Operations
Water Handling Information
Minimum Impact Suppression Tactics

Existing References Moved
After Action Review (green section to front section)
Direct/Indirect Attack (green section to white section)
Power Line Safety (green section to gold section)
Thunderstorm Safety (white section to gold section)
Hazard Tree Safety (white section to gold section)

BRIEFING CHECKLIST

Situation

- ☐ Fire name, location, map orientation, other incidents in area
- ☐ Terrain influences
- ☐ Fuel type and conditions
- ☐ Fire weather (previous, current, and expected)
  Winds, RH, temperature, etc.
- ☐ Fire behavior (previous, current, and expected)
  Time of day, alignment of slope and wind, etc.

Mission/Execution

- ☐ Command
  Incident Commander/immediate supervisor
- ☐ Leader's intent
  Overall objectives/strategy
- ☐ Specific tactical assignments
- ☐ Contingency plans

Communications

- ☐ Communication plan
  Tactical, command, air-to-ground frequencies
  Cell phone numbers
- ☐ Medevac plan

Service/Support

- ☐ Other resources
  Working adjacent and those available to order
  Aviation operations
- ☐ Logistics
  Transportation
  Supplies and equipment

Risk Management

- ☐ Identify known hazards and risks
- ☐ Identify control measures to mitigate hazards/reduce risk
- ☐ Identify trigger points for reevaluating operations

Questions or Concerns?

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 be sure they are understood.
9. Maintain control of your forces at all times.
10. Fight fire aggressively, having provided for safety first.

WATCH OUT SITUATIONS

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 crewmembers or supervisor.
8. Constructing line without safe anchor point.
9. Building fireline downhill with fire below.
10. Attempting frontal assault on fire.
11. Unburned fuel between you and fire.
12. Cannot see main fire; not in contact with someone who can.
13. On a hillside where rolling material can ignite fuel below.
14. Weather becoming 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 fireline.