

**PHOENIX REGIONAL  
STANDARD OPERATING PROCEDURES**

**BRUSH/WILDLAND FIRE**

**M.P. 202.15**

**04/20-R**

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**PURPOSE**

This plan is intended to serve as an operational guide when serious dry vegetation fires are encountered. All Phoenix Regional standard operating procedures are in effect for WILDLAND fire fighting except as amended or superseded by this plan.

**OVERVIEW**

The desert areas near Phoenix and surrounding communities occasionally see vegetation fires that grow in complexity and resource needs. Oftentimes, these fires burn across jurisdictional boundaries with state, tribal and federal lands. These fires typically are responded to by agencies from the Phoenix Regional Dispatch System and create a low frequency, high risk incident for our personnel. Firefighter safety is the primary objective for brush/wildland fire incidents.

Several jurisdictions of the Phoenix metropolitan area experience these types of incidents more so than others. With this in mind, agencies with brush/wildland areas may have additional training, capabilities and guidelines specific to their agency. Some agencies may constant staff water tenders and brush trucks during brush fire season as conditions dictate.

Brush/wildland fires that occur on state, tribal or federal lands may have resources respond for suppression and command needs. The agencies include the Arizona Department of Forestry and Fire Management, Bureau of Indian Affairs, Bureau of Land Management, U.S. Forest Service, and resources include engines, hand crews, aircraft and supervisory personnel. In some cases, these agencies may prefer to form Unified Command with initial Phoenix Regional Dispatch units or relieve the command when the fire is exclusively on state, tribal or federal jurisdiction.

**DEFINITIONS**

1. Air Attack - Aerial reconnaissance aircraft which can provide information from above the fire by an observer.
2. Air Tanker -Fixed wing aircraft certified by the FAA as being capable of transport and delivery of fire retardant solutions.
3. VLAT – Very Large Air Tanker – Fixed wing heavy Air Tanker DC10, 737, and larger in some cases.
4. Buoy Wall Tank (Pumpkin)- Large 1500 to 4000-gallon collapsible water tank carried on some water tenders used for a remote water source or fill station for Bambi Bucket operations. These are not to be confused with a Fol-Da-Tank not designed for Bambi Bucket operations.
5. Bambi Bucket – Small 65 to 95-gallon bucket, externally attached to helicopters for water drops on brush fires.
6. Division - Similar to a “sector”. A geographic work assignment (example East Division, or Division A)
7. Group - Similar to a “sector”. A functional work assignment (example Water Supply Group)
8. LCES - Lookouts, Communications, Escape Routes, Safety Zones. A basic safety measure that must be in place at all times for firefighter safety.
9. Red Flag Warning - A weather announcement made by the National Weather Service when fire danger is Very High or Extreme. Sustained winds  $\geq$  20 mph and relative humidity  $\leq$  20%,

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scattered thunderstorms, increased thunderstorm activity after a prolonged dry period, abrupt change in wind speed and direction that may affect the area.

10. SEAT - Single Engine Air Tanker (similar to a crop duster) A fixed wing aircraft capable of transport and delivery of fire retardant solutions of about 800 gallons.
11. Type 1 Engine - A typical structure engine. Crew of 4 personnel, minimum 400-gallon tank and 1000 gpm pump.
12. Type 3 Engine- Typically a short wheelbase engine capable of both structure and wildland fire operations. Commonly 4-wheel drive, 500-gallon tank, 250 gpm pump.
13. Type 6 Engine- Approx. 200-gallon tank and 50 gpm pump with higher pump pressure capacity than an engine and pump-and-roll capability. Typically, 4-wheel drive for off-road fire suppression.
14. Water Tender ("Tender") - A water transport and delivery fire apparatus. Capable of carrying 1000 to 5000 gallons of water. Pumps may range from 50 to 1500 gpm.
15. Tactical Tender – Has pump and firefighting capabilities.
16. Support Tender – Delivery of water only.
17. Wildland Fire - Any non-structure fire that occurs in the wildland.

**POLICY**

Resources responding to a brush/wildland fire will be familiar with National Incident Management System (NIMS) terminology and practices. Resources should be prepared to work in Sector/Division/Group assignments or other positions with resources from outside the regional dispatch system.

Wildland fires typically demand a significant command and support staff to manage and will often require resources from other Fire Departments and Government agencies. Command will be responsible for requesting all needed resources.

Any WORKING FIRST ALARM BRUSH assignment or greater will be deemed a wildland fire and receive appropriate additional resources. Dispatch will activate the "All Call," announce a wildland fire, and provide the incident address. Dispatch will contact the Arizona Department of Forestry and Fire Management to inform them of the location/jurisdiction of the incident, the ID and location of the incident commander, and fire spread potential.

Staff Officers will respond to multiple alarm wildland and brush fires as they do other multiple alarm incidents and report to their pre-assigned responsibilities or staging. Command will assign this staff support as needed.

The following resources will be dispatched for a brush/wildland incident:

***STILL BRUSH***

- Engine
- Brush

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*BRUSH ASSIGNMENT*

- 2 - Engines
- 2 - Brush Trucks
- 1 - Water tender
- 1 - Command Officer
- 1 - Rescue (or ambulance)

*FIRST ALARM BRUSH*

- 5 - Engines
- 4 - Brush Trucks
- 2 - Water tenders
- 3 - Command Officers
- 1 - Shift Commander
- 1 - Command Van
- 1 - Safety Officer
- 1 - Rehab Unit
- 1 - Canteen Unit
- 1 - Rescue (or ambulance)
- 2 - CXX19

*The following support resources will be dispatched for SECOND ALARM BRUSH assignments or greater:*

*GREATER ALARM BRUSH*

- 5 - Engines
- 4 - Brush Trucks
- 2 - Water tenders
- Staff and Command Officer Response
- Port-A-Potties
- Refueling Truck
- Mechanics
- Radio Technician
- Multiple Spare Radios
- All available CXX19s
- Weather Reports

**FIRE FIGHTER SAFETY**

**PPE**

In the brush/wildland fire setting, proper personal protective equipment (PPE) is essential to fire fighter safety. Structural turnout coats, pants and boots are not designed for brush/wildland fire suppression.

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Wildland PPE is designed to be more comfortable and functional while reducing fire fighter fatigue and heat-related injuries.

A proper brush/wildland fire protective ensemble will consist of a helmet, fire resistive brush shirt/jacket, fire resistive brush pants, eye and hearing protection, work gloves and leather ankle high boots. Nylon hiking boots are inappropriate because of the melting and sticking potential of nylon.

Some regional agencies may have additional protective equipment guidelines that exceed these minimum standards.

### **Hydration**

Remember that heat is a major safety problem and all personnel should be kept well hydrated. Personnel should have access to drinking water and carry canteens or similar water containers. Sterile water bottles can be cleaned, filled with drinking water, and carried in the brush jacket pockets.

Wildland fire fighting is a physically demanding operation and members should be fit and prepared mentally for a very hot, fast moving, and dangerous environment.

### **Crew Safety**

Wildland fires demand that Company Officers maintain a high level of awareness regarding crew accountability. Crew members can easily become spread out and not visible in rugged and rocky terrain. Company Officers must maintain LCES (Lookouts, Communication, Escape Routes, and Safety Zones) and control over crew members to ensure a safe operation. Wildland fire fighting will still employ the buddy system. Watch out for each other.

**ANY DEPARTMENT UTILIZING DRONES DURING A BRUSH/WILDLAND FIRE INCIDENT WILL IMMEDIATELY LAND THE DRONE AS SOON AS ANY AIRCRAFT HAS BEEN ORDERED. THIS WILL ENSURE THE SAFETY OF INCOMING AIRCRAFT AND EXPEDITE THE USE OF AIRCRAFT FOR FIREFIGHTING OPERATIONS. REMEMBER: NO AIRCRAFT CAN FLY ON A FIRE IF A DRONE IS UP.**

### **Ten Standard Fire Orders**

Wildland fires are fast moving and extremely dangerous. These scenes require that all personnel understand these basic wildland fire fighting orders:

1. Keep informed on fire weather conditions and forecasts.
2. Know what the 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. Act decisively.
7. Maintain prompt communications with your forces, supervisor, and adjoining forces.
8. Give clear instructions and insure they are understood.

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

**Eighteen Watch Out Situations**

Several situations have been found to increase the chance of injuries or fatalities on brush/wildland fires. These include:

1. Fire not scouted or 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 communications link with crewmembers/supervisor.
8. Constructing line without a safe anchor point.
9. Building fire line downhill with fire below.
10. Attempting a frontal assault on the fire.
11. Unburned fuel between you and the fire.
12. Cannot see the main fire or not in contact with anyone who can.
13. You are on a hillside where rolling material can ignite fuel below.
14. Weather is getting hotter and drier.
15. Wind increases and/or changes direction.
16. Getting frequent spot fires across the line.
17. Terrain and fuels make escape to safety zones difficult.
18. Taking a nap near the fire line.

**FIRE BEHAVIOR**

The following factors have a critical effect on the fire behavior of a wildland fire. Command must maintain an awareness of these conditions and be prepared to react quickly, pessimistically and well ahead of the fire. The factors are: WEATHER, FUEL, and TOPOGRAPHY.

**Weather**

Command must be aware of constantly changing weather conditions. During a normal day, local winds will change 180 degrees near midday and usually become gusty during the afternoon. Morning winds are normally East to West and afternoon winds are usually West to East. Fire spread will usually slowdown in the evening AS HUMIDITY INCREASES (25%) and increase during the midmorning hours AS THE HUMIDITY DECREASES (15%).

A Red Flag Warning issued by the National Weather Service indicates when conditions are present that may have substantial effects on any brush/wildland fire incidents during that period. Crews should give special consideration to any fire incident under these conditions.

Command should always be aware of the fire conditions, weather conditions and time of day. Remember that a large WILDLAND fire can create dangerous convection currents that cause erratic

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fire behavior and spot fires far in advance of the fire head. Heavy winds also produce similar results.

Hot and dry conditions produce extremely rapid-fire spread. A slight decrease in relative humidity will cause a significant increase in fire intensity. During extreme days surface-wetted fuel will dry in a few minutes.

### **Fuel**

Most of the fuel in the Phoenix area is relatively light and burns very rapidly. Fires will be mostly wind driven and depending on fuel loading could require extensive overhaul. Fuels in the river bottoms are usually a mix of grass, brush, and trees which will increase fire behavior and the time it takes to extinguish them.

### **Topography**

Fire burns uphill much more rapidly than downhill. On an uphill slope, the fire will tend to crown over the top and start spot fires a considerable distance down the receding slope. A large free-burning fire will tend to create its own convection currents and spot fires may be started. Access is often the most serious problem with topography.

Companies with considerable brush fire potential should size-up areas with regard to fuel, topography and extent of exposure to structures. Particular attention should be paid to access roads and accessible areas where apparatus may travel. Natural fire breaks and potential exposure problems should be noted on the area maps provided for this purpose.

### **COMMAND**

The first arriving company officer who assumes Command must address the values at risk. This includes life safety, structures threatened, fire control, and property conservation benchmarks. In a wildland fire setting the life safety benchmarks must include fire fighters as well as civilians. Command must have a plan that includes LCES (Lookouts, Communications, Escape Routes and Safety Zones) for fire fighters and equipment. LCES should be in place prior to any fire suppression operations. Individual sectors can establish escape routes and safety zones depending on need or location. Escape routes and safety zones should be easily accessible and large enough to prevent radiant heat injuries or direct flame impingement. Aerial operations should not be located near safety zones.

- Command should concern itself with strategy and allow sectors to dictate tactics
- Make early offensive/defensive (direct attack or indirect attack) decisions
- Gather adequate resources
- Think ahead - way ahead
- Support sectors
- Protect and rehab fire fighters
- Consider assigning an ALS company and a rescue for medical response for firefighters
- Consider filling the operations chief and/or logistics chief position early into the incident

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On major incidents, establish a Command Post and sectors/divisions/groups as soon as possible. The Command Post should be in a location which will be safe and not have to move if the fire changes direction. Supporting elements should be able to set up at the Command Post. Select a site where a helicopter may land in close proximity to the Command Post.

The Command Post will need to plot progress, exposures and access. The units in the field, particularly geographic sectors/divisions/groups, will have to report this information back to Command via radio or personal contact.

As fire spread becomes critical, Command must be prepared to special call additional attack units by specific companies or to request assistance by standardized alarm responses. This determination must be made early.

When brush/wildland fires begin to threaten homes, Command must be prepared to readjust and develop a defensive strategy to protect exposures while allowing the fire to burn to a location better suited for control.

### **TACTICS AND STRATEGY**

Brush fires often present a large area of rapidly spreading fire. The critical decision is often where to attack the fire to the best advantage. Protection of exposures is the primary goal when immediate control is not possible.

#### **Size Up**

A deliberate and thorough initial size up is extremely important on significant or potentially significant fire incidents in order to develop a fire fighting plan. The initial incident commander should take the necessary time to gather pertinent information on the fires location, spread rates and direction, identified hazards, any threats to improvements (structures, power lines, etc) and anticipated needed resources. The following is a list of size-up considerations that greatly affect tactics and strategy:

#### **Fire:**

- Location of fire head or heads
- Size of fire and rate of speed
- Flame length
- Spot fires
- Accessibility into fire area

#### **Fuel:**

- Fuel continuity
- Type of fuel—grass, brush, trees
- Fuel loading - light, heavy

#### **Weather:**

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- Temperature
- Wind speed and direction
- Relative Humidity

**Topography:**

- Is it flat ground or on hillside
- Bottom, middle or top of hill

**Hazards:**

- Exposures--improvements, buildings, crops, etc.
- Special hazards (e.g., spot fires, hazardous materials, etc.)

**Resources**

- Manpower needs
- Water resource (e.g., tenders, hydrants, etc.)

Command must then quickly develop an incident action plan based on this size up.

**Direct Attack (Offensive)**

Direct attack should be used whenever fire conditions allow fire personnel to work directly and safely on the fires edge. Personnel should “anchor and flank” a fire by first establishing a safe location, or anchor point, to start the attack without being outflanked by fire. An example of an anchor point would be a road or green farm field.

Fire suppression personnel on fires in light fuels should use the “one foot in the black” method in an inside out attack where the safety zone is the previously burned area adjacent to the burning fire front. Unlike a structural fire attack, a brush/wildland fire attack should be from the BURNED (black) side where possible. Structural fire fighters can find themselves entrapped by fire when attacking a fire head-on from the unburned side where fire can quickly overrun them.

A direct water attack is the fastest control evolution available to counteract wildfire spread. Brush trucks can accomplish this through pump-and-roll tactics. Apparatus and personnel should be in the burned (black) area as opposed to the unburned fuels.

**Indirect Attack (Defensive)**

Indirect attack methods are used when fire personnel are prohibited from direct attack due to fire conditions or access to the fire. For indirect attack strategy, fire personnel work some distance away from the fires edge. This may be in support of wildland fire crew burnout operations, structure protection or another tactic.

On large open grass fires, Command must take advantage of natural fire barriers that will assist in control measures, such as: dry sandy washes, roads, trails, rock outcroppings, patch fuels, etc.



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**Structure Protection/Interface Operations**

During interface fires involving brush and structures it may be necessary to retain a 3-1 structural assignment in staging and be prepared to assign those units to conduct structural firefighting if needed. These staged resources will be turned out and equipped to carry out interior structural firefighting.

Units assigned to protect a structure or improvement should first thoroughly size up the site to ensure firefighter safety can be maintained. The Company Officer should walk the driveway or access road to ensure apparatus have good access and clearance and that the site is deemed safe to protect. Apparatus should back-in to allow for quick egress is necessary.

During structure protection, crews should plan to remain as mobile as possible in case escape is necessary. Hose lays should be as short as possible and limited to one or two at most. "Bump bags" or other hose packs may be used by some regional departments that have more frequent or substantial interface areas. These hose packs consist of 1 ½" "trunk" line with a gated "y" and one or two 1" forestry hose lines with nozzle.

When water is in short supply, it is usually most effective when applied to burning material instead of wetting fuel in advance. Seriously exposed structures should be kept wet, using appropriate foam if possible.

Tactical challenges and hazards for structure protection:

(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 roof vents, eaves, decks, and other ember traps
- Fuel tanks and hazardous materials
- Power lines
- Limited water sources
- Property owners remaining onsite

**MOP-UP**

After direct or indirect line work is completed and a fire is called "Under Control," many things remain to be done to make the fire line safe and put the fire out. This work is called mop up. The objective of mop up is to put out all fire embers or sparks to prevent them from crossing the fire line.

A certain amount of mop up work is done along with line building. Mop up becomes an independent part of firefighting as soon as the spread of the fire is stopped, and all line has been completed. Ordinarily, mop up is composed of two actions; putting the fire out, and disposing of fuel either by burning to eliminate it, or removing the fuel so it cannot burn. The principles of mop up follow:

1. Start work on each position of line just as soon as possible after line construction and burning out are completed. Treat most threatening situations first.

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2. Allow fuel to burn up if it will do so promptly and safely.
3. On small fires, all fire should be extinguished in the mop up, where quantities of burning material are not so large as to make this impractical.
4. On large fires, completely mop up enough of the area adjacent to the line to be certain no fire can blow, spot, or roll over the fire line under the worst possible conditions.
5. Search for smoldering spot fires.
6. All smoldering material that is not put out with water or dirt should be spread well inside of lines.
7. Eliminate or put into a safe area all less flammable fuels, such as rotten logs and snags, which are outside, but near the control line.
8. Eliminate all burned trees inside of line that could throw sparks over line or fall over the line.
9. Put all rolling material in a position that it cannot possibly roll across the line.
10. Look for indications of hot spots. Some are gnats swarming, white ash, ground which shows pin holes, and wood boring insects.
11. Use water wherever possible and practical in mop up.
12. Use water sparingly but use enough to do the job. Match the amount of water to the job.
13. Adding Class A foam to water will greatly increase effectiveness in mop up of deep-burning fuels.

When addressing mop up operations, Command should:

1. Determine the distance inside the control line to be overhauled (for small fires, this may be the entire burn area).
2. During rehab of mop up crews, ensure at least two fire fighters remain in the area to monitor for re-ignition or spread of fire.
3. Schedule for follow-up checks by crews to ensure the fire is out in mopped up perimeter.