
APPENDIX E

Minimum Impact Suppression Tactics (MIST) Guidelines

MINIMUM IMPACT SUPPRESSION TACTICS GUIDELINES

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CONCEPT

The concept of Minimum Impact Suppression Tactics (MIST) is to use the minimum amount of forces necessary to effectively achieve the fire management protection objectives consistent with land and resource management objectives. It implies a greater sensitivity to the impacts of suppression tactics and their long-term effects when determining how to implement an appropriate suppression response. In some cases MIST may indicate cold trailing or wet line may be more appropriate than constructed hand line. In another example, the use of an excavator may be used rather than a dozer. Individual determinations will be dependent on the specific situation and circumstances of each fire.

MIST is not intended to represent a separate or distinct classification of firefighting tactics but rather a mind set of how to suppress a wildfire while minimizing the long-term effects of the suppression action. When the term MIST is used in this document it reflects the above principle.

Suppression actions on all wildfires will be those having a minimum impact on the physical resources associated with each site. In so doing, the principle of fighting fire aggressively but providing for safety first will not be compromised.

The key challenge to the line officer, fire manager and firefighter is to be able to select the wildfire suppression tactics that are appropriate given the fire's probable or potential behavior. The guiding principle is always least cost plus loss while meeting land and resource management objectives. It is the second part of this statement which must be recognized more than it has in the past. Appreciations of the values associated with wilderness have been more difficult to articulate but, nevertheless, are important. As this recognition emerges, actions must be modified to accommodate a new awareness of them.

These actions, or MIST, may result in an increase in the amount of time spent watching, rather than disturbing, a dying fire to insure it does not rise again. They may also involve additional rehabilitation measures on the site that were not previously carried out.

When selecting an appropriate suppression response, firefighter safety must remain the highest concern. In addition, fire managers must be assured the planned actions will be effective and will remain effective over the expected duration of the fire.

Other guides, like the grizzly bear or salmon guides, will also have a bearing on what type of tactics are used.

GOAL

The goal of MIST is to halt or delay fire spread in order to maintain the fire within predetermined parameters while producing the least possible impact on the resource being protected. These parameters are represented by the initial attack incident commander's size-up of the situation in the case of a new start or by the escaped fire situation analysis (EFSA) in case of an escaped fire.

It is important to consider probable rehabilitation need as a part of selecting the appropriate suppression response. Tactics that reduce the need for rehab are preferred whenever feasible.

SUPPRESSION RESPONSIBILITY

As stated previously, safety is the highest priority. All action will be anchored to the standard fire orders and watch out situations. Safety will remain the responsibility of each person involved with the incident.

Initial/Extended Attack

Incident Commander – To understand and carry out an appropriate suppression response, which will best meet the land management objectives of the area at the least cost plus loss. Insure all forces used on the fire understand the plan for suppressing the fire in conjunction with MIST.

Keep in communication with responsible fire management or line officer to insure understanding and support of tactics being used on the fire. Evaluate and provide feedback as to the tactical effectiveness during and after fire incident.

Project Fire

Type 1/ Type 2 Incident Commander – To carry out instructions given by the responsible line officer both verbally and through the EFSA. Establish and nurture a close dialogue with the resource advisor assigned to the fire team. Review actions on site and evaluate for compliance with land line officer direction and effectiveness at meeting fire management protection objectives.

Responsible Line Officer – To transmit the land management objectives of the fire area to the fire team and to define specific fire management protection objectives. Periodically review for compliance.

Resource Advisor – To insure the interpretation and implementation of EFSA and other oral or written line officer direction is adequately carried out. Provide specific direction and guidelines as needed. Participate at fire team planning sessions, review incident action plans and attend daily briefings to emphasize resource concerns and management's expectations. Provide assistance in updating EFSA when necessary. Participate in incident management team debriefing and assist in evaluation of team performance related to MIST.

GUIDELINES

Following is a list of considerations for each fire situation.

Hot-Line/Ground Fuels

- Allow fire to burn to natural barriers.
- Use cold-trail, wet line or combination when appropriate.
- If constructed fireline is necessary, use only width and depth to check fire spread.
- Consider use of fireline explosives for line construction.
- Burn out and use low impact tools like swatter or 'gunny' sack.
- Minimize bucking and cutting of trees to establish fireline; build line around logs when possible.
- Use alternative mechanized equipment such as excavators, rubber tired skidders, etc. rather than tracked vehicles. Use high pressure type sprayers on equipment prior to assigning to incident to help prevent spread of noxious weeds.
- Constantly re-check cold trailed fireline.

Hot-Line/Aerial Fuels

- Limb vegetation adjacent to fireline only as needed to prevent additional fire spread.
- During fireline construction, cut shrubs or small trees only when necessary. Make all cuts flush with the ground.
- Minimize felling of trees and snags unless they threaten the fireline or seriously endanger workers. In lieu of felling, identify hazard trees with a lookout or flagging.
- Scrape around tree bases near fireline if it is likely they will ignite.
- Use fireline explosives for felling when possible to meet the need for more natural appearing stumps.

Mopup/Ground Fuels

- Do minimal spading; restrict spading to hot areas near fireline.
- Cold-trail charred logs near fireline; do minimal tool scarring.
- Minimize bucking of logs to extinguish fire or to check for hotspots; roll the logs instead if possible.
- Return logs to original position after checking and when ground is cool.
- Refrain from making bone yards; burned and partially burned fuels that were moved should be returned to a natural arrangement.
- Consider allowing large logs to burnout. Use a lever rather than bucking to manage large logs which must be extinguished.
- Use gravity socks in stream sources and/or a combination of water blivits and fold-a-tanks to minimize impacts to streams.
- Consider using infrared detection devices along perimeter to reduce risk.
- Personnel should avoid using rehabilitated firelines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehab work, i.e. water bars.

Mopup/Aerial Fuels

- Remove or limb only those fuels which if ignited have potential to spread fire outside the fireline.
- Before felling consider allowing ignited tree/snag to burn itself out. Ensure adequate safety measures are communicated if this option is chosen.
- Identify hazard trees with a lookout or flagging.
- If burning trees/snag pose a serious threat of spreading fire brands, extinguish fire with water or dirt whenever possible. Consider felling by blasting when feasible. Felling by crosscut or chainsaw should be the last resort.
- Align saw cuts to minimize visual impacts from more heavily traveled corridors. Slope cut away from line of sight when possible.

LOGISTICS

Campsite Considerations

- Locate facilities outside of wilderness whenever possible.
- Coordinate with the Resource Advisor in choosing a site with the most reasonable qualities of resource protection and safety concerns.
- Evaluate short-term low impact camps such as coyote or spike versus use of longer-term higher impact camps.
- Use existing campsites such as reserved sites used by outfitters if possible.
- New site locations should be on impact resistant and naturally draining areas such as rocky or sandy soils, or openings with heavy timber.
- Avoid camps in meadows, along streams or on lakeshores. Located at least 200 feet from lakes, streams, trails, or other sensitive areas.
- Consider impacts on both present and future users. An agency commitment to wilderness values will promote those values to the public.
- Lay out the camp components carefully from the start. Define cooking, sleeping, latrine, and water supply.
- Minimize the number of trails and ensure adequate marking.
- Consider fabric ground cloth for protection in high use areas such as around cooking facilities.
- Use commercial portable toilet facilities where available. If these cannot be used a latrine hole should be utilized.
- Select latrine sites a minimum of 200 feet from water sources with natural screening.
- Do not use nails in trees.
- Constantly evaluate the impacts which will occur, both short and long term.

Personal Camp Conduct

- Use “leave no trace” camping techniques.
- Minimize disturbance to land when preparing bedding site. Do not clear vegetation or trench to create bedding sites.
- Use stoves for cooking, when possible. If a campfire is used limit to one site and keep it as small as reasonable. Build either a “pit” or “mound” type fire. Avoid use of rocks to ring fires.
- Use down and dead firewood. Use small diameter wood, which burns down more cleanly.
- Don’t burn plastics or aluminum – “pack it out” with other garbage.
- Keep a clean camp and store food and garbage so it is unavailable to bears. Ensure items such as empty food containers are clean and odor free, never bury them.
- Select travel routes between camp and fire and define clearly.
- Carry water and bathe away from lakes and streams. Personnel must not introduce soaps, shampoos or other personal grooming chemicals into waterways.

AVIATION MANAGEMENT

One of the goals of wilderness managers is to minimize the disturbance caused by air operations during an incident.

Aviation Use Guidelines

- Maximize back haul flights as much as possible.
- Use long line remote hook in lieu of constructed helispots for delivery or retrieval of supplies and gear.
- Take precautions to insure noxious weeds are not inadvertently spread through the deployment of cargo nets and other external loads.
- Use natural openings for helispots and paracargo landing zones as far as practical. If construction is necessary, avoid high visitor use areas.
- Consider maintenance of existing helispots over creating new sites.
- Obtain specific instructions for appropriate helispot construction prior to the commencement of any ground work.
- Consider directional falling of trees and snags so they will be in a natural appearing arrangement.
- Buck and limb only what is necessary to achieve safe/practical operating space in and around the landing pad area.

Retardant Use

During initial attack, fire managers must weigh the non-use of retardant with the probability of initial attack crews being able to successfully control or contain a wildfire. If it is determined that use of retardant may prevent a larger, more damaging wildfire, then the manager might consider retardant use even in sensitive areas. This decision must take into account all values at risk and the consequences of larger firefighting forces' impact on the land.

- Consider impacts of water drops versus use of foam/retardant. If foam/retardant is deemed necessary, consider use of foam before retardant use.

HAZARDOUS MATERIALS

Flammable/Combustible Liquids

- Store and dispense aircraft and equipment fuels in accordance with National Fire Protection Association (NFPA) and Health and Safety Handbook requirements.
- Avoid spilling or leakage of oil or fuel, from sources such as portable pumps, into water sources or soils.
- Store any liquid petroleum gas (propane) downhill and downwind from firecamps and away from ignition sources.

Flammable Solids

- Pick up residual fusees debris from the fireline and dispose of properly.

Fire Retardant/Foaming Agents

- Do not drop retardant or other suppressants near surface waters.
- Use caution when operating pumps or engines with foaming agents to avoid contamination of water sources.

Fireline Explosives

- Remove all undetonated fireline explosives from storage areas and fireline at the conclusion of the incident and dispose of according to Bureau of Alcohol, Tobacco, and Firearms (BATF) and Fireline Blaster Handbook requirements. Properly dispose of all packaging materials.

FIRE REHABILITATION

Rehabilitation is a critical need. This need arises primarily because of the impacts associated with fire suppression and the logistics that support it. The process of constructing control lines, transport of personnel and materials, providing food and shelter for personnel, and other suppression activities has a significant impact on sensitive resources regardless of the mitigating measures used. Therefore, rehabilitation must be undertaken in a timely, professional manner.

During implementation, the resource advisor should be available for expert advice and support of personnel doing this work as well as quality control.

Rehabilitation Guidelines

- Pick up and remove all flagging, garbage, litter, and equipment. Dispose of trash appropriately.
- Clean fire pit of unburned materials and fill back in.
- Discourage use of newly established trails created during the suppression effort by covering with brush, limbs, small diameter poles, and rotten logs in a naturally appearing arrangement.
- Replace dug-out soil and/or duff and obliterate any berms created during the suppression effort.
- If impacted trails have developed on slopes greater than six percent, construct waterbars according to the following waterbar spacing ([see IV.E](#)):
- Where soil has been exposed and compacted, such as in camps, on user-trails, at helispots and pump sites, scarify the top 2-4 inches and scatter with needles, twigs, rocks, and dead branches. It is unlikely that seed and fertilizer for barren areas will be appropriate, in order to maintain the genetic integrity of the area. It may be possible, depending on the time of year and/or possibility of a rainy period, to harvest and scatter nearby seed, or to transplant certain native vegetation.
- Blend campsites with natural surroundings, by filling in and covering latrine with soil, rocks, and other natural material. Naturalize campfire area by scattering ashes in nearby brush (after making sure any sparks are out) and returning site to a natural appearance.

- Where trees were cut or limbed, cut stumps flush with ground, scatter limbs and boles, out of sight in unburned area. Camouflage stumps and tree boles using rocks, dead woody material, fragments of stumps, bolewood, limbs, soil and fallen or broken green branches. Scattered sawdust and shavings will assist in decomposition and be less noticeable. Use native materials from adjacent, unimpacted areas if necessary.
- Remove newly cut tree boles that are visible from trails or meadows. Drag other highly visible woody debris created during the suppression effort into timbered areas and disburse. Tree boles that are too large to move should be slant cut so a minimal amount of the cut surface is exposed to view. Chopping up the surface with an axe or pulaski, to make it jagged and rough, will speed natural decomposition.
- Leave tops of felled trees attached. This will appear more natural than scattering the debris.
- Consider using explosives on some stumps and cut faces of the bolewood for a more natural appearance.
- Consider, if no other alternatives are available, helicopter sling loading rounds and tops from a disturbed site when there has been an excessive amount of bucking, limbing and topping.
- Tear out sumps or dams, where they have been used, and return site to natural condition. Replace any displaced rocks or streambed material that has been moved. Reclaim streambed to its predisturbed state, when appropriate.
- Walk through adjacent undisturbed area and take a look at your rehab efforts to determine your success at returning the area to as natural a state as possible. Good examples should be documented and shared with others!

DEMOBILIZATION

Because demob is often a time when people are tired or when weather conditions are less than ideal, enough time must be allowed to do a good job. When moving people and equipment, choose the most efficient and least impactful method to both the landscape and fire organization mission. An on-the-ground analysis of "How Things Went" will be important.

POST-FIRE EVALUATION

Post-fire evaluation is important for any fire occurrence so management can find out how things went. Identify areas needing improvement, to formulate strategies and to produce quality work in the future. This activity is especially important in wilderness and like sensitive areas due to their fragility and inclination to long-term damage by human impacts.

Resource advisors and functional specialists such as wilderness rangers will be responsible for conducting the post-fire evaluation. They are the people who have the experience and knowledge to provide information required to make the evaluation meaningful and productive.

Post-fire evaluation will consist of data collection, documentation and recommendations. This process and report will, in most cases, be fairly simple and to the point. It should be

accomplished before an overhead team departs from the fire. The evaluation emphasis should be on the MIST actions and not on the effects on the fire.

Evaluation will be completed on wildfires exceeding 100 acres and on a sample of fires less than 100 acres. It is appropriate to evaluate a diversity of fires, ranging from a spot fire suppressed by smokechasers or jumpers to a large project fire managed by an overhead team.

Region 1 is proposing a post-fire evaluation of sites, which includes data collection on campsites and helispots, using Cole's Site Inventory System report INT-259, "Wilderness Campsite Monitoring Methods: A Source Book". Data collected will be added to inventories already completed for recreational impacts in wilderness. This information should provide managers with a clearer picture of which activities affect these "last, best places".

Data Collection/Documentation/Recommendations

This phase will be completed by a review of the rehab plan and visit to the fire site as soon after demobilization as possible. An inventory of comps and helispots will be completed using Cole's Inventory System. This will also include an objective overview of other areas covered by the rehab plan.

Observations will be documented in a brief report to the line officer with a copy to the appropriate incident commander. In the report, the evaluator will include recommendations for ensuing fire suppression activities on similar lands. It is important that the evaluator recognize and commend the initial attack forces or overhead team for positive activities. Make special note of the extra efforts and sensitivity to suppression impacts.

Attached is a sample format for a Post-Fire Evaluation Report:

POST-FIRE EVALUATION

**for
(Name of Fire)**

EXISTING DIRECTION PERTINENT FOR FIRE

Forest Land Use Plan Allocation: Management Area
(THIS SPACE CAN BE USED TO INSERT THE GENERAL AND SPECIFIC FOREST PLAN DIRECTION FOR THE MANAGEMENT AREA)
Other Management Concerns/Guides: T & E Plants and Animals:

FINDINGS

- A. Resource Advisor Input and/or Actions:
(SHOULD INCLUDE A SYNOPSIS OF THE ACTIONS OF THE RESOURCE ADVISOR AND HIS INPUT INTO SUPPRESSION STRATEGIES/TACTICS)
- B. Escaped Fire Situation Analysis (EFSA)
(HOW DID THE EFSA RESPOND TO THE SENSITIVITIES OF THIS FIRE AREA)
- C. Line Direction to Incident Commander
(SYNOPSIS OF WHAT THE LINE OFFICER TOLD THE INCIDENT COMMANDER TO DO)
- D. Incident Action Plan
(SYNOPSIS OF HOW INCIDENT ACTION PLAN RESPONDED TO FIRE AREA)

ON-SITE VERIFICATION

(STATE HERE WHO MADE THE FIELD VISIT, THE DATE, AND WHAT OBSERVATIONS WERE MADE IN TERMS OF MEETING THE GUIDELINES FOR MIST)

OVERALL REVIEW EVALUATION

(INCLUDE OVERALL FINDINGS OF HOW WELL OBJECTIVES WERE ACCOMPLISHED IN TERMS OF MINIMUM IMPACT ACTIVITIES)

FOLLOWING IS AN EXAMPLE FROM A FIRE IN THE HELL’S CANYON NATIONAL RECREATION AREA:

“Although not specifically documented as stated in the Forest Plan, Manuals or other directives, nor clearly visible in all the documents reviewed, the majority of pertinent management direction/resource objectives for this fire appeared to have been known, and were implemented.”

“Although it was recognized that the fire’s location may not result in adverse impact to salmon habitat, it wasn’t clear that the Operation or Logistics sections were aware that some of the ‘Wildfire Suppression Guidelines for Salmon Habitat’ relate to potential stream contamination during activities not directly performed on the fire site. (It is realized that these “Regional Guidelines” were issued 8/11/92 via D.G. and have not yet had wide distribution; therefore it is the intent of this review to help increase the awareness of the recent guidelines).”

REVIEW RECOMMENDATIONS

(WHAT AREAS CAN WE IMPROVE ON, WHERE DID WE DO GOOD, ETC.)

STANDARD FIRE ORDERS

- F** Fight fire aggressively but provide for safety first.
- I** Initiate all actions based on current and expected fire behavior.
- R** Recognize current weather conditions and obtain forecast.
- E** Ensure instructions are given and understood.

- O** Obtain current information on fire status.
- R** Remain in communication with crew members, your supervisor, and adjoining forces.
- D** Determine safety zones and escape routes.
- E** Establish lookouts in potentially hazardous situations.
- R** Retain control at all times.
- S** Stay alert, keep calm, think clearly, act decisively.

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 crew members/supervisor.
8. Constructing fireline without safe anchor point.
9. Building fireline downhill with fire below.
10. Attempting frontal assault on fire.
11. Unburned fuel between you and the fire.
12. Cannot see main fire, not in contact with anyone who can.
13. On a hillside where rolling material can ignite fuel below.
14. Weather is getting hotter and drier.
15. Wind increases and/or changes direction.
16. Getting frequent spot fires across line.
17. Terrain and fuels make escape to safety zone difficult.