Appendix J: Minimum Impact Strategies and Tactics (MIST)

Sample Guidelines

Minimum Impact Strategies and Tactics (MIST) is the application of strategy and tactics that safely and effectively meet incident management objectives with the least environmental, cultural and social impacts. The principle of providing for safety first will not be compromised. For any wildland fire situation, protection of human life and property is the number one priority (after firefighter safety), and that the Incident Commander has the authority to implement ANY suppression tactic available when life and property are threatened, regardless of the presence of threatened and endangered or other sensitive species or cultural resources. When this happens, mitigation of the effects of those tactics must begin immediately after it is safe to do so.

Strategy is an overall plan of action which gives regard to the most cost efficient use of personnel and equipment in consideration of resource values threatened, nature and complexity of the incident, legal constraints, and objectives established for resource management. Tactics are the operational aspects. For example, determining exactly where and how to build a fire control line and what other suppression measures are necessary to extinguish a fire. Tactics must be consistent with the strategy.

MIST is an increased emphasis to do the job while maintaining a high standard of caring for the land. Actual ongoing conditions and your good judgment will dictate the actions you take. Consider what is necessary. It is important to consider probable rehabilitation needs as a part of selecting the appropriate response. Tactics that reduce the need for rehab are preferred whenever feasible. MIST is not intended to represent a separate or distinct classification of tactics but rather a mindset of how to manage an incident while minimizing the long-term effects management actions.

The selection of a MIST strategy and tactics can be relative based on urgency, complexity, and the values to be protected. For example on a wildfire, the situation may indicate that cold trailing or wet line can be a more appropriate approach than constructed hand line. If the fire is out of control and running towards a community, the use of heavy equipment may be necessary. Individual determinations will be dependent on the specific situation and circumstances of each fire.

Resource Advisor recommendations must be guided by Minimum Impact Strategies and Tactics. Keep this question in mind: What creates the greater adverse effect, the management effort or the nature of the incident?

Much of what is presented in this appendix was developed for response to wildland fire response, but has been modified to apply to all incident types. Become familiar with these guidelines and implement them according to the specifics of the response.

Always remember, Minimum Impact Strategies and Tactics are relative and must be safe.

Safety

- Remember that responder and public safety is the number one priority. Safety takes precedence over the protection and mitigation of resources.
- Apply principles of Lookouts - Communications - Escape Routes - Safety Zones (LCES) to all planned actions.
- Constantly review and mitigate all Watch-Out Situations found in Appendix A, Safety.
- Stay informed about issues and situations identified by the incident management team, safety officer, and those listed in incident action plans.

- Be particularly cautious when working near damaged infrastructure, trees, vegetation, and other damaged resources.

Escape Routes and Safety Zones

- The essential purpose for identifying or constructing escape routes and safety zones is to protect responders and fire fighters in deteriorating situations. In some cases it will not be possible to protect resources when identifying or constructing escape routes and safety zones. Yes, constructed escape routes and safety zones do have a greater impact, are more time consuming, and labor intensive but keep in mind the higher priority when damages cannot be mitigated.
- Identify escape routes that already exist. Identify existing roads, routes, trails, pathways, and natural openings.
- A safety zone should be large enough so that the distance between the firefighters and flames is at least four times the maximum flame height. For running crown fires on steep slopes and to accommodate large crews, the size of the safety zone can be large.

General MIST Considerations

- Select tactics, tools, and equipment that least impact the environment or identify other least damaging alternatives.
- Consider the potential for introduction of noxious weeds and mitigate by removing weed seed from vehicles, personal gear, cargo nets, etc. Equipment should be washed down before entering the incident and prior to leaving the incident in order to prevent the spread of noxious weeds.
- Consider effects to riparian areas when setting up mitigation operations.
- Ensure adequate spill containment at fuel transfer sites and pump locations. Stage spill containment kits at the incident.
- Report and protect any cultural resources discovered during incident activities.

Logistics, Camp Sites, and Personal Conduct

- Consider impacts on present and future visitors.
- Provide portable toilets at areas where crews are staged.
- Good campsites are found, not made. If an existing campsite is not available, select a campsite that is not likely to be observed by visitors.
- Select impact-resistant sites such as rocky or sandy soil, or openings within heavy timber. Avoid camping in meadows and along streams or shores.
- When there is a small group, try to disperse use. In the case of larger camps, concentrate, mitigate, and rehabilitate.
- Coordinate the layout of the camp components carefully from the start. Help to define cooking, sleeping, latrine, and water supplies areas.
- Prepare bedding and campfire sites with minimal disturbance to vegetation and ground.
- Personal Sanitation:
    - Designate a common area for personnel to wash up. Provide fresh water and biodegradable soap.

    - Do not introduce soap, shampoo, or other chemicals (even bio-degradable) into waterways.
    - Dispose of wastewater at least 200 feet from water sources.
    - Toilet sites should be located a minimum of 200 feet from water sources. Holes should be dug 6-8 inches deep.
- If more than one crew is camped at a site, strongly consider portable toilets and remove waste.
- Store food so that it is not accessible to wildlife, away from camp and in animal resistant containers. Approved bear resistant food and garbage storage containers may be required in grizzly bear and/or black bear habitat.
- Do not let garbage and food scraps accumulate in camp.
- Monitor travel routes for damage and mitigate by:
    - Dispersing on alternate routes or
    - Concentrating travel on one route and rehabilitate at end of use.
- If a campfire is built, leave no trace of it and avoid using rock rings. Use dead and down wood for the fire and scatter any unused firewood. Do not burn plastics or metal. Consider using a fire pan or "mound fire" in sensitive areas.
- Use "scrim" (porous ground cloth) to protect high traffic areas from trampling.

Aviation Management

Minimize the effects of air operations by incorporating MIST in conjunction with standard aviation risk assessment processes. Balance aircraft size and efficiency with operational needs.

- Possible aviation-related effects include:
    - Damage to soils and vegetation resulting from heavy vehicle traffic, noxious weed transport, and/or extensive modification of landing sites.
    - Effects on soil, fish and wildlife habitat, and water quality from hazardous material spills.
    - Chemical and fuel contamination.
    - Biological contamination to water sources; e.g., whirling disease.
    - Safety and noise issues associated with operations in proximity to populated areas, livestock interests, wildland-urban interface, and incident camps and staging areas.
- Helispot Planning
    - When planning for helispots, determine the primary function of each helispot; e.g., crew transport or logistical support.
    - Consider using long-line remote hook (sling load) in lieu of constructing a helispot.
    - Consult Resource Advisors in the selection and construction of helispots during incident planning.
    - Estimate the amount and type of use a helispot will receive and adapt features as needed.
    - Balance aircraft size and efficiency against the impacts of helispot construction.
    - Use natural openings as much as possible. If tree felling is necessary, avoid high visitor-

use locations unless the modifications can be rehabilitated. Fall, buck, and limb only what is necessary to achieve a safe and practical operating space.

Post-Event Cleanup

- Restore areas to pre-incident or natural conditions.
- Pack out all garbage and dispose of in an approved facility.
- Remove all flagging.
- Check infrastructure such as roads, culverts, land survey monuments and boundary line markers damaged by incident activities. Blade any non-surfaced roads that have been impacted by activity. Clean and grade ditch lines.
- Restore helicopter landing sites.
- Camps, high use areas, and staging areas:
    - Remove signs of human activity.
    - Scatter unnatural features such as fireplace rocks and charcoal from fire, cover with soil, or blend area with natural cover.
    - Restore drainage features when sites are no longer needed.
    - Fill in and cover latrine sites.
- Walk through adjacent undisturbed areas and take a look at your rehabilitation efforts to determine your success at returning the area to as natural a state as possible.

Wildland Fire Specific Mist Considerations

Line Construction Phase

- Select tactics, tools, and equipment that least impact the environment.
- Give serious consideration to use of natural barriers, roads, trails, water or foam as a fire lining tactic.
- Use alternative mechanized equipment such as motor patrols, disks, rubber-tired skidders, etc., when available and appropriate rather than dozers when constructing mechanical line.
- When constructed fireline is necessary, use the appropriate width and depth to prevent the fire's spread.
- Monitor and patrol firelines to ensure continued effectiveness.

Ground Fuels

- Use cold-trail, wet line, or combination when appropriate. If constructed fireline is necessary, use minimum width and depth to stop fire spread.
- Consider the use of fireline explosives for line construction and snag falling to create more natural appearing firelines and stumps.
- Burn out and use low impact tools like swatters and gunny sacks.
- Minimize bucking to establish fireline: preferably move or roll downed material out of the intended constructed fireline area. If moving or rolling out is not possible, or the downed log/bole is already on fire, build line around it and let the material be consumed.

Aerial Fuels–Brush, Trees, and Snags

- Adjacent to fireline: limb only enough to prevent additional fire spread.
- Inside fireline: remove or limb only those fuels which would have potential to spread fire outside the fireline.
- Cut brush or small trees necessary for fireline construction flush to the ground.
- Trees, burned trees, and snags:
    - Minimize cutting of trees, burned trees, and snags.
    - Do not cut live trees unless it is determined they will cause fire spread across the fireline or seriously endanger workers. Cut stumps flush with the ground.
    - Scrape around tree bases near fireline if hot and likely to cause fire spread.
    - Identify hazard trees with flagging, glow sticks, or a lookout.
- When using indirect attack:
    - Do not fall snags on the intended unburned side of the constructed fireline unless they are an obvious safety hazard to crews.
    - Fall only those snags on the intended burn-out side of the line that would reach the fireline should they burn and fall over.

Retardant Chemical Use: Retardants, Foams, and Gels

- Whenever practical as determined by the fire incident commander, use water or other less toxic wildland fire chemical suppressants for direct attack or less toxic approved fire retardants in areas occupied by threatened, endangered, proposed, candidate or sensitive species, or their designated critical habitats.
- Retardant may be considered for sensitive areas when benefits will exceed the overall impact. This decision must take into account values at risk, agency specific direction, and consequences of expanded fire response and impact on the land.
- Communicate specific fire chemical sensitive and avoidance areas to fire operations, air attack, and pilots.
- Fire managers should weigh use of retardant with the probability of success by unsupported ground force.
- Consult the Wildland Fire Interagency Standards for Fire and Fire Aviation (commonly called the Red Book) chapter on suppression chemicals and delivery systems https://www.nifc.gov/policies/pol_ref_redbook.html for Use of Fire Chemicals and the Interagency Policy for Aerial and Ground Delivery of Wildland Fire Chemicals Near Waterways

AERIALLY APPLIED FIRE RETARDANT

Have incident provide resource advisors if the use of aerially applied fire retardant is expected. Ensure briefings include information and maps for avoidance areas such as waterways (which include 300 feet or larger buffers), critical habitat, and cultural resources. Resource advisors should emphasize that anyone on a fire can make the initial report of a misapplication into waterways or other areas of concern; resource advisors will complete additional assessment and monitoring requirements. Include reporting requirements in the briefing if a misapplication of fire chemical occurs (see https://www.fs.fed.us/fire/retardant/index.html).

Avoid dipping from rivers or lakes with a helicopter bucket containing residual fire chemicals without first cleaning/washing down the bucket. Use only products qualified and approved for intended use by making sure all fire chemicals are on the Qualified Products List: https://www.fs.fed.us/rm/fire/wfcs/index.htm

and Other Avoidance Areas.

Water Bucket Use

- Consider biological and/or chemical contamination effects when transporting water.
- Limited water sources expended during aerial suppression efforts should be replaced.
- Consult Resource Advisors prior to extended water use beyond initial attack.
- Refer to Aquatic Invasive Species decontamination protocols in Appendix K: Invasive Species Management.

Mop-Up Phase

- Consider using "hot-spot" detection devices along perimeter (aerial or handheld).
- Use extensive cold-trailing to detect hot areas.
- Cold-trail charred logs near fireline: do minimal scraping or tool scarring. Restrict spading to hot areas near fireline.
- Minimize bucking of logs to check for hot spots or extinguish fire: preferably roll the logs and extinguish the fire.
- When ground is cool return logs to original position after checking.
- Refrain from piling: burned/partially burned fuels that were moved should be arranged in natural positions as much as possible.
- Consider allowing larger logs near the fireline to burn out instead of bucking into manageable lengths. Use a lever, etc., to move large logs.
- Use gravity socks in stream sources and/or combination of water blivets and fold-a-tanks to minimize effects on streams.
- Personnel should avoid using rehabilitated firelines as travel corridors whenever possible because of potential soil compaction and possible detrimental impacts to rehabilitation work.
- Avoid use of non-native materials for sediment traps in streams.
- Aerial fuels (brush, small trees, and limbs): remove or limb only those fuels which if ignited have potential to spread fire outside the fireline.
- Burning trees and snags.
- Be particularly cautious when working near snags. (Ensure adequate safety measures are communicated.)
    - The first consideration is to allow a burning tree/snag to burn itself out or down.
    - Identify hazard trees with flagging, glow sticks or a lookout.
    - If there is a serious threat of spreading firebrands, extinguish with water or dirt.
    - Consider felling by blasting, if available.

Suppression Damage Repair

- Firelines:
    - After fire spread has stopped and lines are secured, fill in deep and wide firelines and cup trenches and obliterate any berms. The berm material should be spread back into the

fireline or re-contoured to the fireline.

  - Be careful not to reignite or spread hot material hidden in berms across the fireline.
  - Restore drainages by removing fill or dams, reestablish crossings and return to natural configuration.
  - Use water bars only when necessary to prevent erosion or use woody material to act as sediment dams. Water bars should only be used on steep slopes and only when necessary. General guidelines for water bar spacing are listed in the table below. However, it is important to note that improper construction and inappropriate placement of water bars can create excessive erosion.
  - Ensure stumps are cut flush with ground.
  - Camouflage cut stumps by flush-cutting, chopping, covering, or using Fireline Explosives to create more natural appearing stumps.
  - Any trees or large size brush cut during fireline construction should be scattered to appear natural.
  - Discourage the use of newly created firelines and trails by blocking with brush, limbs, poles, and logs in a naturally appearing arrangement.

- Re-contour impacted areas to the existing slope of the hill. Blend berm materials (soils, rocks, brush piles) back onto the dozer line in a natural appearance. Brush or cut trees shall be spread back onto the dozer line, where practical. Be careful not to reignite or spread fire across dozer lines.
- Spread material from dozer piles. Spread this material back onto the dozer line only if there is no chance of fire re-ignition. If there is re-ignition potential, break up and spread cat piles to the outside of the fireline.
- Rubble the dozer lines with rock and debris to disguise the dozer line from road appearance. The entrance to the dozer line shall be blocked from vehicle travel, if possible, by placing slash, boulders, or erosion control devices in such way as to discourage motorized vehicle driving.
- Water bar where necessary on slopes needing water control. Water bars should be constructed so as to drain outside the burn. If possible, the water bar should curve slightly to follow the natural topography.