

Specification MT338-2

Do not plan a burn from 24 hours before the expected passage of a cold front to 24 hours after passage. Wind speeds will be increasing, changing directions, and then tapering off.

TABLE 1. SUMMARY OF PREFERRED WEATHER CONDITIONS FOR A PRESCRIBED BURN

FACTOR	PREFERRED RANGE
Wind Speed	5-15 mph
Direction	Steady from one direction
Relative Humidity	40-70%
Temperature	55-80 ^o F
Cloud Cover	Clear-70%

The final decision to conduct a prescribed burn is based on what is happening at the site to be burned. Knowing when not to burn – that is important.

PRESCRIBED BURNING SAFETY

Before, during, and after every burn, SAFETY should be the major consideration.

Follow the prescribed burning safety guidelines outlined in NRCS Montana Agronomy Technical Note MT-71 (SEE EXHIBIT 1).

MONTANA OPEN BURNING REGULATIONS

Prescribed burns need to be planned and operated in accordance to federal, state, tribal, and local laws and regulations, including the state's Best Management Practices (BMP's). The appropriate local city-county health department, environmental health service, sheriff's department, or local fire control authorities need to be contacted to determine what permits are needed and what restrictions apply to your area.

The Montana Department of Environmental Quality (DEQ), Permitting and Compliance Division is responsible for administering the rules and issuing the permits needed to perform "*open burning*" in Montana. A state permit must be obtained before conducting the following types of open burning:

- Landfill burns;
- Christmas tree waste burns;
- Commercial film production;
- Trade waste burns;
- Fire fighter training burns;
- Emergency burns; and,
- Large burns.

A large burn requires a state major open burning permit and occurs when a person plans on burning under the following conditions during a calendar year:

- 100 or more *TOTAL* acres of wildland
- 2,000 or more *TOTAL* acres of agricultural land.

Below are some Montana open burning rules:

- Burning in December, January, and February is generally prohibited.
- General open burning occurs from March 1 to August 31.
- Burning in September, October, and November must be checked by calling the Ventilation Hotline at 1-800-225-6779.
- Permits can be denied during high fire season conditions.

There is some restricted burning (related to PM-10) in the impact zones and airsheds around the following communities:

- 1) Butte
- 2) Kalispell
- 3) Libby
- 4) Missoula
- 5) Thompson Falls.

Contact the appropriate local authorities and the Ventilation Hotline regarding burning in these impact zones and airsheds.

Several counties have their own open burning programs and must be contacted to receive the proper open burning permit prior to the burning.

A state open burning permit is not needed to conduct open burning within an Indian Reservation. Contact the appropriate local authorities to determine what permits are needed and what restrictions apply to the area.

EQUIPMENT

There are two kinds of equipment needed for prescribed burning:

1. Equipment that is required to suppress or control the fire
2. Equipment that is used to ignite the fire.

Suppression Equipment

Equipment used to control or extinguish a fire can range from large, expensive pieces to common hand tools. There are various combinations of vehicles with tanks, pumps, and hoses. The following are some recommended pumping unit minimums:

- Tank 200 gallon
- Pump 6 gpm @ 125 psi
- Hose 3/4" inside diameter
- Hose Length 50 feet
- Nozzle Adjustable--volume/pattern
- Vehicle 3/4 ton.

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Suppression Equipment (CONTINUED)

A number of useful hand tools have been developed. Each has a special use and can play a role in prescribed burning. The fire swatter is the best hand tool to use. It is properly used by placing it gently but firmly on small flames causing the fire to be smothered. If the swatter is slapped down, the air is forced out from under the flap and moves burning material causing the fire to spread. Grain scoops will accomplish the same thing. A garden rake can be used to create a bare soil line for a firebreak in areas where fuel is mainly of a mulch nature. Backpack sprayers can be used to follow vehicles or get into places where vehicles cannot. A water/detergent mixture should always be used in the tank. Liquid dish soap can be used to make water more effective. The detergent breaks down the surface tension of water and allows it to spread and penetrate a surface much better. Detergent at least doubles the effectiveness of water. A 100-gallon tank of water with detergent will perform like a 200-gallon tank. It is an economical way of stretching water. Add about one fluid ounce of the detergent per 100 gallons of water. When using water, use a narrow fan spray rather than a straight stream of water. This also uses less water, is more effective, and can cover larger surface areas.

One other item that needs to be kept around when burning near fences or power poles is a five-gallon plastic bucket with a tight-fitting lid. Put a water/detergent mixture and a supply of burlap bags into the bucket. If a pole or post starts to burn, take one of the burlap bags and wrap it around the object. This cuts off oxygen and begins cooling the wood.

Ignition Equipment

A drip torch is a special device developed for the purpose of setting fires. When lit, the fuel mixture drips across the pad by gravity, ignites, falls into the dry fuel, and starts the fire. The drip torch is very well designed and a safe piece of equipment. The fuel mixture to use is one part gasoline to three parts diesel.

Propane torches have been used as well. The problem with the propane torch is its tendency to spread the heat generated over a large area and thus igniting only the tops of the standing materials.

Always check to make sure the equipment is in working condition before starting a fire.

PLANNING PRESCRIBED BURNS

With good planning, the prescribed burn can be carried out safely and effectively at the appropriate time and under conditions that allow control of the fire. The elements of a good plan are:

- A. Description of burn area.
- B. Objective and timing of burn.
- C. Acceptable conditions for prescribed burns.
- D. Preparation of area for burning.
- E. Adjacent areas—Special precaution areas (roads, structures, etc.).
- F. Equipment/personnel needs/safety requirements.
- G. Special considerations—contingency and mop-up plans.

Montana's Prescribed Burning job sheet further explains the elements needed in a prescribed burn plan.

Inventory the Area

Use an aerial photo or map of the burned area to record or draw all features such as fences, buildings, power lines, water sources, streams, roads, and gates. Locate and mark areas that can be developed for fire guards. Consider natural barriers such as streams, rock out-crops, plowed fields, roads, and trails as potential locations for fire guards.

Permits

A state or county permit may be required to conduct prescribed burns. Check with the local fire district or sheriff's office to determine what requirements you must meet.

Notification

Certain groups should be notified before a burn to prevent unnecessary concern and danger. State regulations require notifying the local fire district and/or sheriff's office before burning unless the county has opted out of the requirement. Notifying neighbors can prevent misunderstandings, unnecessary fire calls, potential public hazards, and poor public relations.

When the prescribed burn is complete, notify the fire department, sheriff's office, and any neighbors. Careful planning and notification will help to maintain good relationships with neighbors and emergency personnel.

Contingency Plans

Even the most carefully planned and conducted prescribed burn can be lost. The major items to consider in planning how to attack a fire that escapes include:

- A quick means of contacting the fire department
- Equipment and manpower limitations that will affect fire control
- Seriousness of the hazard
- Identifying any threatened structures
- Who will control the prescribed burn and who will attack the escape
- Plan the attack to make the best use of manpower and equipment without endangering people.

CONDUCTING PRESCRIBED BURNS

In general, the burning sequence is divided into two parts: establishing firebreaks and lighting the head fire.

Establishing Firebreaks

Firebreaks are made by burning or clearing strips of land. Both types are effective—if properly prepared. Firebreaks should be an equal to or greater than five times the height of adjacent vegetation (minimum five feet). Firebreaks can be broken down into two groups: 1) Primary firebreak; and, 2) Secondary firebreak. The primary firebreak should be established first. It should be established as a minimum on the downwind sides of the area to be burned or more preferably completely around the area to be burned. Start developing the primary firebreak by lighting the upwind sides of the firebreak at a point of the area that is farthest downwind. Work towards the point where the prevailing winds enter the site to be burned. Once a wide enough primary firebreak is established then start the secondary firebreak firing sequence. The secondary firebreak is developed at the point of the area that is farthest downwind in the area to be burned. Ignite a strip of vegetation across the unit to be burned that will connect the sides of the primary firebreak. The area to be burned in this first firing sequence in the secondary firebreaks will be a small triangle or area. Repeat the firing sequence for the secondary firebreak until about one-third of the area is back burned (see FIGURE 1).

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Lighting the Main Fire

Place pumper unit(s) and help at points where people can see under the smoke as the main fire are lit. This is so they can respond to escapes quickly. Once the primary and secondary firebreaks have been developed the main fires can be started. With approximately one-third of the burned area in a secondary firebreak, the remaining two-thirds of the area still left to be burned can be burned. Divide the remaining two-thirds in half and ignite a strip fire perpendicular to the prevailing wind. Once that area has been burned out, ignite the remaining area at the point where the prevailing wind enters the burned unit. A general rule of thumb is the smaller the units burned the greater one has control over the area burned (see FIGURE 1).

Burn any remaining unburned areas after the final main fire. Begin mop up of the back and main fires.

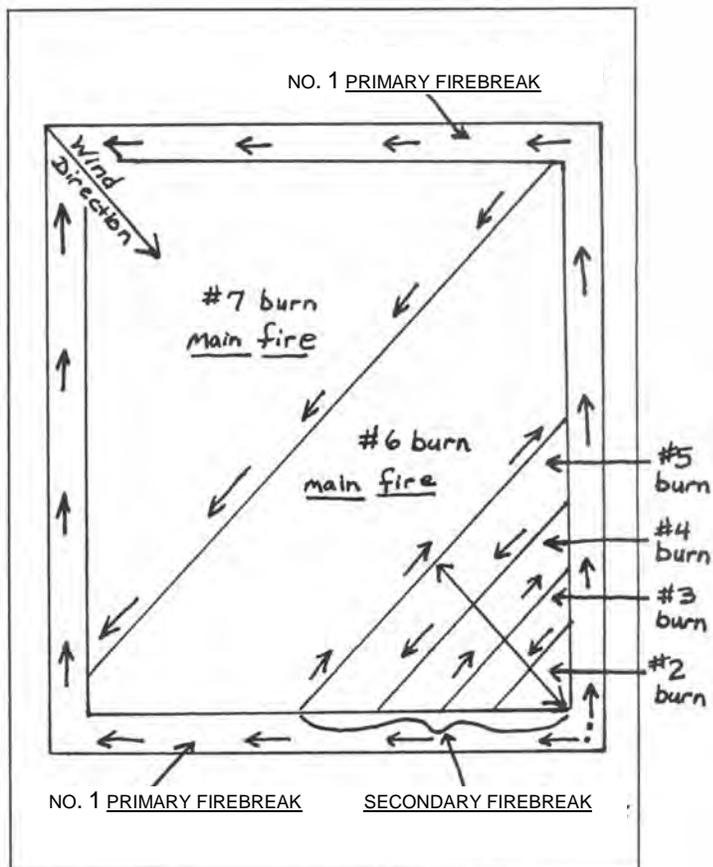


FIGURE 1. Firing sequence for establishing firebreaks and lighting the main fire.

Mop-up

Mop-up is the process of checking the entire perimeter of the burn area to insure that all fires or smoldering material is out or removed to a safe area. Small areas of slow burning grass should be lit again and allowed to burn out rapidly. The perimeter should be checked preferably three times.

POST-BURN EVALUATION

Once the prescribed burn has been completed, a post-burn evaluation is needed to determine any needed changes for planning future burns. The following are some suggested evaluation points:

1. Fire behavior–spotting, difficult to control, fire whirls, convection column;
2. Observed changes in weather conditions during the burn;
3. Burn go as planned–note changes that had to be made;
4. Communications handled well or were there problems;
5. Objective of burn met;
6. Additional treatments needed;
7. Evaluate–at end of growing season–the effects of the prescribed burn on the vegetation–ensures that the management goals are being attained.

PRESCRIBED BURNING SAFETY

Prescribed burning can be an important land management tool in Montana. Poorly managed burns or ignorance of safety measures can lead to property damage and even injury or death. Even in well-managed burns, accidents can occur. Before, during, and after every burn, safety should be the major consideration. Follow basic burning procedures, wear proper clothing, and be prepared for the unexpected.

PERSONAL SAFETY

Prescribed burning, like any management practice, must be accomplished with careful planning, understanding, and care. In addition to planning the burn and providing for adequate fire guards, it is important that everyone on the burn meet specific requirements. This is for the safety and protection of everyone.

Health Considerations. People with known health problems, such as high blood pressure, heart conditions, certain allergies, and respiratory diseases, must not be allowed to participate. Prescribed burning is a strenuous, stressful, and demanding job that requires good physical conditioning. Should a medical emergency occur, some people will have to be pulled away from the fire control to provide emergency assistance. The result could be an uncontrolled burn (wildfire).

Clothing. Clothing must be of natural fiber (cotton, wool, etc.) that covers the body, arms, and legs. A cap or hat of natural material is needed to cover the hair. Gloves (preferably leather) and high-top boots are mandatory (steel-toed boots are prone to accumulating heat). Wear pant legs outside the boots—not inside. In areas where burning includes timber, brush, or trees, a hard hat should be used.

Clothing made of most synthetic fibers, such as polyester and nylon, is a hazard to personal safety near fires. Some synthetic fibers can melt at temperatures which are common in prescribed burning, causing severe burns. While such incidents are rare, the risk of wearing synthetic materials should be avoided.

The one exception to the use of synthetic fibers is “NOMEX” (a registered trademark of Du Pont) or any other materials designed for fire fighting. These are special fire retardant fibers and are used by fire fighters, military pilots, and race car drivers. Shirts, pants, and coveralls made of NOMEX are the best available alternative.

PUBLIC SAFETY

From the public's viewpoint, fire is dangerous and should be avoided. Always maintain good public relations and avoid situations which might endanger the public. Dangerous situations can create legal liability.

Notification. For both safety and legal reasons, certain groups should be notified before a burn to prevent unnecessary concern and danger. Check with local authorities.

Neighbors, the fire department, and law enforcement officials should be notified. This can prevent misunderstandings, unnecessary fire calls, and poor public relations.

Neighbors. Notifying neighbors can help in determining their attitudes toward burning and possibly help in finding assistance. Notifying neighbors of a burn can lead to cooperation in conducting the burn. With good relations, neighbors may be willing to share labor and equipment.

Fire Department. Follow any state and local regulations such as obtaining a burn permit. Working with the fire department is crucial. Contact the fire chief to determine state and local regulations and to develop specific plans for requesting emergency help.

Law Enforcement. If a potential traffic hazard exists, notify local law enforcement personnel. Discuss the location of the burn with officials to determine what actions may be needed to prevent traffic problems.

Exhibit 1

Smoke Management. From a public safety standpoint, smoke may present the greatest safety hazard. Airports and public roads are the major concerns. The following situations merit special considerations:

- Public Roads—smoke moving over public roads may create a visibility problem and should be avoided. Three alternatives are available when burning next to public roads: (1) burn with the wind blowing away from public roads; (2) use burning procedures that limit the amount of smoke and/or cause the smoke to lift over the road; and, (3) arrange for traffic control during the time of the burn.
- Airports—burning near an airport is a major concern. Smoke over airports can cause poor visibility created by smoke. Turbulence and updrafts within the smoke column can create control problems for light aircraft. When planning burns near airports, select a time when wind directions will carry the smoke away from the airport. Also, notify airport authorities and discuss your plans with them.

Weather. Weather conditions must remain within acceptable limits to safely manage a prescribed burn. The main factors that need to be monitored are wind speed, wind direction, cloud cover, relative humidity, and temperature. These factors affect fire behavior and control. Acceptable ranges and limits for prescribed burns are summarized on the burn plan itself. Burning when conditions are outside these ranges should rarely be done and only by experienced personnel.

Wind. Speed and direction are crucial to fire behavior. Wind speeds of 5-15 mph, steady from a desirable direction, are preferred. Listen to the weather forecasts closely. Changes in wind direction, variable wind speed, or gusty winds, are unacceptable conditions. Wind speed is modified by relative humidity, temperature, and frontal movements. As relative humidity decreases and temperature increases, the effect of the wind is increased. Frontal movements can cause changes in wind direction and speed. Burning should not be completed if frontal movements are forecast within 24 hours.

Cloud cover plays a significant role in prescribed burning. As a rule, as cloud cover increases, it becomes more difficult to ignite and maintain a burn. Cloud covers of more than 70 percent and low cloud ceilings are conditions to avoid. When cloud ceilings are low, smoke will stay near the ground and can cause visibility problems.

Relative humidity controls the rate at which fuels dry. Most grassy fuels change moisture content quickly as relative humidity changes. During late morning and early afternoon hours, relative humidity can drop quickly, causing fire size and intensity to increase rapidly.

Temperature and relative humidity are related in that as temperature increases, relative humidity decreases. When temperatures exceed 80° F, people perform at lower efficiency, tire quickly, and require higher levels of fluids to maintain stamina.

Weather forecasts. The two best sources of weather information are weather radio or the National Weather Bureau located in Great Falls. Weather information is updated regularly at the National Weather Bureau and should be contacted for the most current weather information.

SAFETY DURING THE BURN

Communications. Two types of communication during a burn are desirable: Contact with a location that can relay a request for emergency assistance; and, between crews working on the burn. Communications can be by CB, business band or similar radios, or cellular phones. Cellular phones are the best alternative for requesting emergency assistance in most areas. It can be vital to have fast response by emergency help in case the fire gets out of control or an injury occurs.

Emergency Situations. Several dangerous situations can occur during a prescribed burn. Potential dangers can be minimized with good advance planning. Have escape routes planned, wear proper clothing, use well-maintained equipment, plan for good communications, and have a good overall plan for conducting the burn.

Probably the most frightening situation is to be in front of a head fire. This can occur as a result of unexpected wind shifts or from becoming disoriented. Unless the fire front is low and it is possible to determine that the depth of the fire is small, never attempt to run or drive through the fire. High temperatures, smoke, and lack of oxygen make it virtually impossible for a person on foot to walk or run through larger fire fronts. If matches or a lighter are available, a small fire can be started. Stay behind it until the main fire passes. If a person is in a vehicle in running condition, a similar approach can be used. If the vehicle is inoperable, wet down an area around the vehicle and remain inside it. Try not to get in front of a head fire.

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Exhibit 1

Crew Preparation. Every person working on a burn should be briefed on the burning plan. This briefing should include designating who is in charge, the responsibility of each person during the burn, and the responsibility of each person in case the fire escapes. In addition, each person should be briefed on communication procedures for notifying emergency personnel if needed. This item is extremely important.

Each person on the burn must be familiar with basic prescribed burning and fire techniques. Persons who are not familiar with these basics pose a potential hazard to the entire operation and to themselves. Every effort should be made to train or familiarize each person on the techniques needed during the prescribed burn and what to do in case the fire escapes.

Equipment Operation. Safe operation of all equipment should be first and foremost. Tractors and other vehicles should be operated by trained and experienced persons. Equipment operators should remain in communication with other personnel. Power take-offs, belts, and other dangerous parts should be shielded and marked.

Night Burning. Burning at night should be avoided. Darkness prevents the drivers of vehicles or personnel on foot from being able to find their way, see obstacles and landmarks, judge distances, and assess the overall fire situation. Night fires also appear more severe than they are and many times result in false alarms.

SPECIAL CONCERNS

Electrical power lines and oil and gas production and transmission equipment can pose special hazards for prescribed burns. Special consideration during the planning and conducting of a prescribed burn can eliminate or greatly reduce injury and damage from these factors.

Power Lines. When burning under or near electrical power lines or high voltage transmission lines, exercise extreme care. The following situations can lead to injury or deaths.

Smoke Buildup. Smoke consists of carbon particles, which can conduct electricity. If the concentration of carbon is high enough, an electrical discharge from the line to the ground, similar to lightning, can occur. The discharge hazard increases as line voltage increases, distance to the ground decreases, and the amount of smoke increases. Such discharges have killed fire fighters.

To reduce the potential for discharges, the fire front should not be allowed to cross under the lines in large areas. By properly coordinating the location of the burn with the wind direction or by lighting the fire parallel to the line, no major smoke build-up can occur.

Water and Power Lines. When working below power lines with water hoses, extreme care must be taken to keep water streams out of overhead lines. Water will conduct electricity and the water stream will act as a conductor causing electrocution.

Downed Power Lines. Power lines can be downed during a prescribed burn by vehicles colliding with poles or poles being burned, etc. If power lines are downed, there are two hazards: the lines themselves and the combination of lines on wire fences.

When lines are downed, they become hard to see and people or vehicles can run into them. Electrocution or serious shock injury can occur. Also, wildfires can be started by the downed lines arcing.

If lines fall on fences, a new hazard is created. Electricity can be conducted by the fence wires for long distances. The distance will be determined by the type of posts (steel posts may reduce the hazard) and the contact between the wires at corner and pull posts. As long as the wires contact each other, there is the potential for shock.

Oil and Gas Production. Burning near oil or natural gas production sites or around pipelines, pump stations, and storage facilities can be potentially hazardous. Explosions and/or fire at these sites can result. In all cases, during the planning of the prescribed burn, contact the company representative to determine what might be needed to prevent damage. Leaks, open vents, and plastic lines are potential hazards.

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