

Specific Instructions for Completing a Prescribed Burn Unit Plan

Burn Unit Name and ID: Record the name of the burn such as Buffalo River. The ID number is specific to each Division.

Location Information:

County Name: Enter the name of the county or counties where the burn will be conducted.

Lat/Long: (Optional) Enter the latitude and longitude of the burn unit. This information can be determined using the Landview software program.

Section/Township/Range/Forty: Enter the legal description for the burn area.

Management Unit Name and Number: Wildlife Management Area, State Park, State Forest, Scientific Natural Area Name and corresponding unit number.

Administrator: List the Division or Unit that has the administrative responsibility for the burn unit.

Burn Unit Description:

Fuel Model: List the primary and secondary fuel model using one of the forty Standard Fire Behavior Fuel Models (Scott, Burgan 2005) or one of the original thirteen fuel models (Anderson, 1992). A description of each fuel model can be found in the appendix. Additional fuel models can be listed as needed. This is a required element for the Minnesota Smoke Management Plan.

Native Plant Community Class: Enter the Minnesota Native Plant Community Classification class if used in your area. A copy of the classifications can be found in the Appendix.

Size of Burn: Record the acres involved in the burn. This can be total acres or it can be broken by fuel model. This is a required element for the Minnesota Smoke Management Plan.

Fuel Loading: Record the fuel loading in tons per acre. Also state whether this came from an estimate or from actual measurement. Fuel loading estimates can be determined using "Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model" or "Aids to Determining Fuel Models for Estimating Fire Behavior" or using the Stereo Photo Series for Quantifying Natural Fuels. These publications are available from the National Interagency Fire Center and the USDA Forest Service Rocky Mountain Research Station. This is a required element for the Minnesota Smoke Management Plan.

Additional Burn Unit Descriptors: Examples of descriptors of the burn unit include land management goals, the overstory and understory on the

burn, adjacent fuel types, occupied structures, soils present on the burn, water resources, roads, power lines, pipelines within or adjacent to the burn area and other ownerships or administrative units within or adjacent to the burn area.

Objectives:

Purpose of the Burn: Describe your measurable treatment objectives (e.g. to reduce fine dead fuels by 90% or top kill 75% of the buckthorn sprouts). Try to achieve these results with the given prescription.

Long Term Resource Objectives: Describe your overall goal for the site (e.g. to maintain fire dependent prairie, reduce exotic competitors or to improve sharp-tailed grouse habitat).

Range of acceptable results: The range of acceptable results ties back to the purpose of the burn. If the purpose of the burn is to reduce fine dead fuels by 90%, then determine what the minimum fine dead fuel reduction would be for the burn to be successful (e.g. the range of acceptable results may be 75-100% fine fuel reduction).

Timing of Treatment in both calendar and phenology terms: Describe the time of the year the burn will be conducted (e.g. spring, summer or fall of the year 2005). Also describe the desirable time period in phenological terms. Phenology is defined as the study of periodic biological phenomena such as flowering, breeding and migration. (For example, the burn may be conducted when sweet clover has sprouted and after green up or the burn may need to be conducted prior to indigenous bird nesting.)

Burn Complexity:

The NWCG “Prescribed Fire Complexity Guide” (PMS 424, NFES 2474 January 2004) is the Minnesota DNR standard for rating prescribed burn complexity. A complexity rating must be completed for each prescribed burn project. Determination of complexity is based on three fire complexity factors: (1) Risk (the probability or likelihood that an adverse event or situation will occur), (2) Potential Consequences (a measure of the cost or result of an adverse event or situation occurring), and (3) Technical Difficulty (the skills needed to implement the project and deal with unexpected or adverse events).

An initial complexity rating must be completed during the project development stage to identify items needing mitigation. These items can then be addressed during the development of the Prescribed Burn Unit Plan. Once the Prescribed Burn Unit Plan is near completion a final complexity rating is made and the summary rating is entered on the first page of the unit plan. The final rating takes into account any mitigation factors identified in the unit plan.

Note: In the case of adjacent fuels, annual land cover needs to be addressed where it may change the complexity rating, e.g. bare soil, agricultural fields, logging operations, agricultural residue, cut hay field etc.

Based on the complexity guide which rates 14 variables, three prescribed fire complexities are possible and are described briefly as:

Low: Few personnel are required, low threat of escape, minimal risk to the people involved in the operation.

Moderate: May require staffing of a majority of the prescribed fire positions, potential for spot fires that will spread moderately but can be taken care of by prompt holding action, safety issues have been identified that may require mitigation or use of special briefings to raise awareness.

High: Requires staffing of all primary prescribed fire positions with a potential for multiple levels of supervision to maintain span of control, use of several different ignition devices (ground and aerial), possibility of multiple spot fires and slop-overs that may exceed the holding forces, complex safety and public impact issues exist.

A majority of the burns executed by DNR personnel will fall in the low and moderate complexity classification.

The prescribed burn complexity system does not tie directly to the qualifications system. However, all burns rated, as high complexity will require a Minnesota Burn Boss Type 1 and a Minnesota Ignition Specialist Type 1.

The NWCG Prescribed Fire Complexity Rating System Guide (NFES 2474) can be found on the Internet at <http://www.nwcg.gov/pms/RxFire/rxfire.htm> an example of a completed Complexity Rating can be found in the Appendix.

Burn Prescription Window:

The burn prescription is a range of fuel, weather, and site variables that produce the type of fire behavior necessary to meet the burn objectives. The outline below gives a brief description of the process of developing burn prescriptions. Several courses are available that provide greater detail on this subject (RX-341 Prescribed Fire Burn Plan Preparation, Behave Fire Prediction Software, RX-301 Prescribed Fire Implementation).

Steps in developing a burn prescription:

- 1) Identify the resource objectives, constraints, and other considerations for the burn unit. Constraints may include smoke management parameters, holding or contingency concerns, adjacent fuels types, land ownership, etc.

- 2) Define desired fire behavior necessary to accomplish the resource objectives and address any of the identified constraints. Things to ask yourself include: What flame lengths or scorch heights are necessary to achieve resource objectives or are they going to cause undesired effects? Will backing fire or flanking fire produce the desired effects or is a head fire needed? Are resources adequate to handle the desired fire behavior or do you have to modify ignition patterns to address safety or holding concerns?

- 3) Use one of many available tools to determine the guidance parameters that will result in the desired fire behavior. Computer based models like Behave Plus or Rx Window can be used to determine the range of guidance variables that will result in the desired fire behavior. The tables in the Fireline Handbook or nomograms will accomplish the same thing.

The burn prescription window is split into a maximum prescription and minimum prescription portion. The maximum prescription is the maximum fire behavior output required to achieve burn objectives while accounting for any constraints that were identified. The minimum prescription describes the lowest fire behavior output required to achieve burn objectives.

It is important to focus on the ‘output prescription parameters.’ The outputs are what actually determine if burn conditions are within prescription. For example, high winds when fuel moistures are high may be within the determined output parameters; however, high winds when fuel moistures are low may not be within predetermined output parameters. Burn planners must match current or expected weather variables with fuel conditions to verify that fire behavior will be within the ‘output prescription parameters.’ It is common for burn plan writers to list a range of variables (Max & Min) within which they might conduct a burn on that particular site. It will be rare, however, for a burn to be conducted when all parameters are at their maximums (i.e., highest wind speed and temperatures, and lowest humidity) ***unless*** one describes how they will mitigate those extremes.

For example, a burn plan reviewer may be hesitant to approve an 80 acre tall-grass prairie burn plan next to a woodland with dry fine fuels with all parameters at their maximum value.

Plan writers need to describe in the plan (unit description, firing plan, additional considerations, etc.) how to mitigate those extremes such as:

- using a backing fire adjacent to plowed break instead of head fire to allow direct attack with hand tools, or
- using increased manpower, or
- reduce fuel height inside the fire breaks

Essentially, a wide range of guidance prescription variables may be used to achieve the desired fire behavior and fire effects. However, the extremes of each guidance variable cannot exceed the maximum output prescription parameters that were determined necessary to achieve burn objectives and burn safely within all constraints.

Wind direction should specify acceptable wind directions (degrees or cardinal directions) to address smoke management, ignition patterns, and other issues.

1000-hour fuel moisture or drought codes should be used where appropriate to address concerns with long-term dryness, mop-up, holdover fire, etc.

Slope and aspect can be significant factors in developing burn prescriptions and should be described in the 'Burn Unit Description' section. Slope is an important input in the models used to determine guidance parameters.

Additional Considerations:

These are considerations that, if present, may require the burn boss to mitigate prior to implementation of the plan.

Cultural sites - If a cultural site is present at the burn location, list what it is. Indicate how you would mitigate the risk to the site (e.g. avoid the use of heavy equipment or the use of digging tools)

Natural Heritage Elements – If Natural Heritage Elements are present at the burn location, list what they are. Indicate how you would mitigate the risk to the element (e.g. avoid burning all nesting habitat at the same time).

Adjacent land concerns – If adjacent landowners are present, list who they are and their proximity to the burn. If necessary indicate how you would mitigate the risk to the adjacent landowner (e.g. contact owner of turkey farm prior to the burn so that ventilation can be adjusted to the barns)

Peat soils or wet soils – Indicate if peat soils or wet soils are present and to what extent and their location in the burn unit. If necessary, indicate how to mitigate rutting or ignition of peat during the burning operation.

Other – Indicate any other considerations that need to be accounted for on the burn (e.g. park users, hunters, railroad etc).

Emergency Telephone Numbers:

List telephone numbers of those who would need to be contacted in the event of an emergency. Include numbers for contacts necessary in a medical emergency. Also include numbers of agencies that may be listed as part of your contingency plan.

Burn Activity Contacts:

List telephone numbers of people who need to be contacted on the day of the burn to inform them that the burn will be conducted. This could include numbers for adjacent landowners, fire department or sheriff's offices, DNR forestry office (to activate burning permit) and other cooperators.

Personnel Needs:

Enter the level of burn boss needed to complete the burn. The choices available are Minnesota Burn Boss Type 3 (MRXB3), Minnesota Burn Boss Type 2 (MRXB2), Minnesota Burn Boss Type 1 (MRXB1), NWCG Prescribed Fire Burn Boss Type 2 (RXB2), and NWCG Prescribed Fire Burn Boss Type (RXB1). Personnel qualification requirements are covered later in this document.

Indicate how many of what positions are needed to accomplish the burn. (For example, you may need 5 firefighters, 1 ignition specialist and 1 burn boss.)

Equipment Needs:

Indicate the type, quantity and source of equipment needed to accomplish the burn.

Operations Plans:

Pre-Burn Site Preparation Plan – Outline any site preparation that needs to take place in advance of the burn day. This may include plans for fire line preparation, pre-treatment around signs or trail markers, and preparation of helispots.

Ignition/Firing Plan - Outline the ignition or firing plan that will be executed the day of the burn. The ignition plan should indicate the firing pattern that will be used, what type of firing device will be employed, the preferred wind direction and any hazards or special considerations that need to be taken into account. On the day of the burn, monitor initial ignition (test burn) to determine fire behavior on the site. This can be used to determine if the burn should be delayed or cancelled.

Holding Plan - Indicate where resources will be staged and what resources and positions will be used for holding the fireline.

Patrol/Mop-up Plan – Outline mop up plans, instructions for patrols, indicate safety concerns, post fire weather monitoring and site rehabilitation plans. Describe how lingering/carry over fire will be addressed.

Contingency Plans:

Contingency plans should be developed to accommodate the potential for an escaped prescribed burn or equipment failure.

For equipment failure, list sources of contingency resources you may draw from.

For an escape, indicate the secondary control lines for the burn, trigger points for termination of ignition procedures and summoning contingency resources. Also outline what the anticipated contingency resources are for the burn, where they may be located and their approximate response times. This list will need to be referred to when executing the Go/No Go Checklist.

Smoke Management Plan

Specific information on smoke management is contained in the Minnesota Smoke Management Plan. The Minnesota DNR is one of the signatory agencies to this document and must follow the recommendations found within the plan. Copies of the Minnesota Smoke Management Plan can be found on the DNR Prescribed Burn web site . <http://www.dnr.state.mn.us/rxfire/index.html>

Smoke Dispersion Category – To ensure dispersion of smoke emissions during prescribed fires, the atmospheric mixing layer must be deep enough and have sufficient transport wind speed. The Dispersion Index multiplies mixing height and transport wind speed to produce an index that describes the ability of the atmosphere to disperse emissions. The National Weather Service morning fire weather forecast includes a smoke dispersion index forecast for the afternoon at 1300 hours. If the burn will occur in the morning, burn bosses should contact their nearest National Weather Service office to determine the anticipated dispersion index at the time of ignition.

The Dispersion Index relates to the dispersion category. Each burn should have a dispersion category of fair or better to burn.

Dispersion Index	Dispersion Category
Less than 13,000	Poor
13,000-29,999	Fair
30,000-59,999	Good
60,000 or greater	Excellent

Distance and Direction from Smoke Sensitive Areas – A smoke sensitive area is a location where someone or something is located that could be at risk due to smoke impacts. In most cases a 2 to 3 mile radius from the burn should cover your smoke sensitive area, but burn size, smoke production, smoke dispersion and wind direction all need to be considered. List developments such as livestock barns, airports, residences and towns along with their distance from the burn unit and the cardinal direction from the burn unit.

Smoke Management Plan – Describe how you intend to mitigate the effects of smoke on roads, firefighters, neighbors, and other sensitive receptors. The Minnesota Smoke Management Plan outlines two methods for utilizing the dispersion index for mitigating smoke impacts during burn plan formulation. Consult the plan for specific instructions.

Safety Plan

The safety of firefighters and the public is the number one priority when planning and implementing a prescribed burn project. The prescribed burn unit plan should identify safety zones and escape routes for the burn. A communications plan should also be included outlining radio frequencies or cellular phone numbers that ensure adequate communications with burn staff and emergency resources. If burning adjacent to roads consider developing a traffic control plan or consulting with local road authorities to help with traffic control. *Consult section VIII of this handbook for more in depth safety considerations.*

Medical Plan

A medical plan is required in the event of a medical emergency on the burn. In addition to notification of the 9-1-1 dispatcher, identify the nearest ground and air ambulance, location of the nearest hospital, also list what first aid supplies are available at the burn site, what person or equipment they are assigned to and how they can be contacted.

List of Attachments

Required:

- Project map
- DNR form NA-1973 Grant of Permission to Burn Lands Not Administered by the Department of Natural Resources, If the burn is to be executed on non-DNR lands by DNR staff and equipment.

Optional:

- Behave Plus runs used to develop the prescription, including shaded tables
- Traffic control plan
- Organizational chart

Distribution to Area Forestry Office

As per Operational Order 47, all burn plans must be sent to the appropriate Area Forestry Office (or its designee) with the current Prescribed Burn Unit Plan prior to obtaining a burning permit. Use this section of the burn plan to document that completed plans have been sent to the Division of Forestry. Each time an existing burn plan is modified, it should be resent to the Division of Forestry.

Signatures

Prepared by: The person who prepared the prescribed burn unit plan needs to sign the document signifying it is complete and accurate.

Reviewed by: As per Operational Order 47, all burn plans must be reviewed and signed by a Burn Boss 1 or 2 that is qualified for the complexity and fuel type indicated in the plan. Reviewers need to include their prescribed burn qualification title with their signature.

Reviewed by: Plans may receive additional review and approval as required by individual Division policy.

Approved by: Approval authority varies between DNR Divisions. Consult with your Division's Regional Manager for direction.

Go/No Go Checklist

The Go/No Go checklist must be completed on the day of the burn prior to execution of the burn. All elements must be answered in the affirmative prior to ignition.

Specific Instructions for Completing the Prescribed Burn Unit Report

The Prescribed Burn Unit Report is completed the day of the burn and also after the burn is completed. The report provides record of forecasted and observed fire weather, observed fire behavior and final burn acreage accomplishments.

Weather: Record forecasted fire weather, spot weather forecast and observed fire weather. Include the time of the forecast or observation along with the wind speed and direction, temperature and relative humidity.

Observed Fire Behavior: Record actual fire behavior observations such as: spread rate, flame length and scorch height. If multiple observations are made, record the time they were made.

Acres Burned by Fuel Model and ECS Type/SubType: Once the burn is complete record the actual acres burned by fuel model and record acres burned by ECS Type or SubType whichever is applicable. This should mirror the ECS level listed in the burn unit description section of the burn plan.

Post Burn Observations: Post burn observations should include the extent to which you met your objectives. For example, if one of your objectives of the burn was to reduce fine dead fuels, you might say “dry conditions were present at the time of the burn so duff was completely consumed”. You may also want to include any notes on control, which might be helpful on future burns.

Recommendations: List any information that may help in future burns at this location or others like it. For example, you might say “additional resources needed on east side of burn due to poor access and slow progress” or “this unit should only be burned when drought conditions are not present (1000 hr fuels greater than 23%) to avoid mop up and holdover in 1000 hour fuels”.

Items to Consider when Calling the Prescribed Burn Out

State Law 88.17, Subd. 1b states that “The permittee shall remain with the fire at all times and before leaving the site shall completely extinguish the fire”.

However, State Law 88.171 states: Fires must not be allowed to smolder with no flame present, *except* when conducted for the purpose of managing forests, prairies, or wildlife habitats.

There may be instances when the burn boss feels the controlled burn is contained and controlled to his/her satisfaction to leave the site in the evening when *all threats are mitigated* and return early morning to continue monitoring or mop up the fire. These circumstances might include having a number of smoldering snags or brush piles well inside the interior with no threat of escape, smoldering green material away from control line or others.

Burn bosses should use **additional care** should they leave a prescribed fire before it is formally called “out”. They should also determine if there are any local municipal ordinances that preclude leaving the prescribed fire before it is called out.

In these instances, the burn boss shall consider and note on the burn plan or the Prescribed Burn Unit Report his/her intentions such as:

- 1) Contacting affected parties with a phone number at which you can be reached overnight.
 - a. Local fire department
 - b. Local DNR Forestry Office
 - c. Law Enforcement Center
 - d. Neighbors

- 2) Determining if the fire is controlled.
 - a. Is there a secure control line around the fire?
 - b. Are any unburned fuel islands secure from additional fire threats?
 - c. Have potential snags near the control line that might still burn been dropped or extinguished ?
 - d. Have any hot spots that are an immediate threat been cooled down?

- 3) Analyze overnight weather forecast.
 - a. Will fire hold in containment until early morning monitoring visit?
 - b. Are relative humidity, temperature and wind expected to be favorable?

- 4) Determining the probability of ignition to surrounding fuels.

- 5) Determining if signs should be posted for Controlled Burn or Smoke on Road.
 - a. Can lingering fire be seen from the road?
 - b. Will smoke create a public safety hazard?

Prescribed Burning on Lands not Administered by the DNR

The question of liability is often raised when the DNR burns private lands. This should be looked at in the same light as State land burning. Take the same precautions and preparations. Fill out the same MN DNR Prescribed Burn Unit Plan form. If the fire escapes and does damage to adjoining property, the State may be subject to the same liability risk as if the fire were on State lands and escaped.

DNR employees are allowed to burn lands not administered by the DNR when the objectives achieved fall within the goals of the local DNR unit. Some examples of past private lands burning include burning a key tract of wildlife habitat, burning a private parcel that lies within or adjacent to state land, burning in road right of ways and burning a tract of native prairie. Another example would be the DNR conducting a burn on land owned by a county or private conservation organization such as The Nature Conservancy.

In some instances, the DNR provides all the resources and conducts the entire burn, or one or more DNR staff may lead or participate in the burn. In instances where DNR personnel lead the burn, the form (NA-1973) entitled "Grant of Permission to Burn Lands not Administered by the Department of Natural Resources" must be completed and retained by the Burn Boss. A completed burn plan must be submitted as is done for burning on State lands. When burning in MNDOT right of ways a MNDOT permit may be required. Consult with your local MNDOT road authority to guidance on permit requirements. The following website provides the contact information for MNDOT district offices www.dot.state.mn.us/information/districts.html .

There are other times where DNR involvement may amount to the loaning of some equipment such as bladder bags, drip torches, or assisting as firefighters for another agency or organization to complete a prescribed burn. It would not be necessary to fill out a burn plan or permission form in these cases.

Burning permit regulations only allow permits to be issued for vegetative materials. The landowner or the burn boss must assure that only vegetative materials are planned to burn and that no building or other personal property exist within the burn area. If they do exist, the burn plan must have specific measures identified to address them and protect them from burning.