

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

Office of Fire and Aviation
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Instruction Memorandum No. OF&A 2000-004
Expires: 09/30/2001

To: All Field Offices

From: Director, Office of Fire and Aviation

Subject: Draft 9214-1 *Prescribed Fire Management Handbook* DD: 2/18/00

Program Area: The program area covered by this IM is prescribed fire.

Purpose: The objective of this IM is to obtain comments on a draft revision of the H-9214-1 *Prescribed Fire Management Handbook*.

Timeframe: Comments are due at the OF&A not later than 2/18/00. Field Offices are to send their comments to their State Offices. State Offices are to consolidate comments and forward them to the OF&A. The final handbook is expected to be completed and distributed by late March.

Budget Impact: The direct budget impact of the document revision is minimal. However, policy and procedure changes directed by the revision could have a significant budget impact on the implementation of prescribed fire projects. Most of the impact would be in the 2823 subactivity.

Background: The existing handbook was issued in November of 1997. Since then significant changes have occurred in the areas of financial guidance, qualifications and training, management roles and responsibilities, and Prescribed Fire Plan development. The new handbook will provide current guidance for prescribed fire operations.

Manual/Handbook Sections Affected: Once the draft document is completed, it will replace the existing 9214-1 Handbook. The 9211, 9214, and 9215 manual sections will also require modifications.

Coordination: Comments from the states' prescribed fire reviews and the National Fuels Workshop were incorporated into this draft document. In addition, the Fire Management staff from each State Office was contacted and asked to comment on an earlier version of the draft handbook.

Contact: If you have questions, please contact Phil Range at (208) 387-5555 or Al Carriere at (208) 387-5168.

Signed by:
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1 - Attachment

1- Draft *Prescribed Fire Management Handbook*, H-9214-1 (100 pp.)

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PRESCRIBED FIRE MANAGEMENT
HANDBOOK

H-9214-1

(Revised 01/07/00)

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

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Chapter 1: Introduction**A. Purpose of the Handbook**

The purpose of this Handbook is to provide information on how to utilize prescribed fires in a safe, controlled, cost-effective manner to achieve resource management objectives as they are defined in land use plans and Fire Management Plans. For a visual overview, see the video [BLM Prescribed Fire](#), distributed by Information Bulletin No. OF&A 98-023, dated March 23, 1998.

Fire is an essential ecological process in many ecosystems. Prescribed fire is used to alter, maintain or restore vegetative communities, achieve desired resource conditions, and to protect life, property, and values that would be degraded by wildland fire. Prescribed fire is only accomplished through management ignition and is supported by Bureau planning documents and appropriate environmental analysis, and in accordance with Bureau Manuals 9214 and 9211.

B. Program Goals, Objectives, and Guiding Principles

Program Goal: The Bureau of Land Management (BLM) will develop and implement a prescribed fire and fuels treatment program that supports the *Federal Wildland Fire Policy* (1995) and promotes the safety of firefighters and the public while meeting land management objectives.

Objectives: To reduce hazardous fuels and to restore fire to its natural role through the application of fuels treatments which may include prescribed fire and mechanical, chemical, and biological treatments. The Bureau will strategically focus activities in:

- Areas where actions will mitigate threats to the safety of the public and our employees.
- Areas to protect, enhance, restore and/or maintain plant communities and habitats that are critical for endangered, threatened, or sensitive plant and animal species.
- Areas that will reduce risks and damage from a wildfire.

Guiding Principles: The following guiding principles are fundamental to the success of the Bureau's Prescribed Fire and Fuels Management Program.

- The role of wildland fire as an essential ecological process and natural change agent will be incorporated into the land management planning process and fire management program.
- Fire managers will work with line officer and resource specialists and cooperators to identify treatment areas, develop plans, and implement all fuels treatments.

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- Only qualified personnel using safe working standards and guides will be applied in the implementation of prescribed fire and fuels treatment projects.
- Recruit and retain a well trained, diverse workforce that meets the highest standards of professional and technical expertise.
- Encourage research and development to advance understanding of fire science.
- Manage the fuels management program in compliance with applicable national, state, and local laws, and regulations, Departmental and BLM manuals, policies and procedures.
- Develop education plans and marketing strategies to increase awareness and the need for prescribed fire/fuels treatments with internal and external publics.
- Promote cooperative landscape scale projects to increase effectiveness and efficiencies.
- Reduce suppression cost and environmental damage.

C. Bureau Priorities

1. **Firefighter and public safety is the first priority in every fire management activity.**
2. Develop qualified personnel and insure that only trained and qualified personnel participate in the implementation portion of the prescribed fire program. (See Chapter 5, Section D.)
3. Prescribed Fire Plans and activities will support land and resource management plans. Compliance with National Environmental Policy Act (NEPA) is required for all prescribed fire projects.
4. Each prescribed fire will have a written Prescribed Fire Plan. That Prescribed Fire Plan will be approved by the appropriate Agency Administrator. (See Chapter 1 Section D.) The prescribed fire project will be conducted in compliance with the approved Prescribed Fire Plan.
5. Prescribed fires will comply with applicable Federal, State, and local laws and regulations for smoke management. (See Chapter 4, Section C.)
6. A prescribed fire that is not meeting management objectives or that exceeds prescription parameters must have immediate action(s) taken to correct the situation, or it will be declared a wildland fire and the “Appropriate Management Response” will be taken.

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7. Establish a clear and consistent message to internal and external audiences about existing resource and ecosystem conditions, management goals and the role of fire, including prescribed fire, in ecosystem management.
8. Insure coordination and cooperation across interagency administrative boundaries in the planning and implementation of prescribed fires. (See Chapter 8.)
9. Planning and implementation funding for prescribed fires will be equitably cost-shared between resources and fire management. (See Chapter 7.)

D. Responsibilities

Existing delegations (910 DM 1.2) from the Secretary of the Interior to the Director of the Bureau of Land Management provide for the operation of the fire management program, including prescribed fire.

1. The Director is responsible for developing policy guidance for the use of prescribed fire.
2. The Director, Office of Fire and Aviation, is responsible for overall policy and guidance for prescribed fire management activities. These responsibilities include:
 - a. Establishing prescribed fire planning and fiscal guidance.
 - b. Establishing prescribed fire operational guidance.
 - c. Establishing prescribed fire personnel qualifications.
 - d. Establishing prescribed fire reporting procedures.
 - e. Establishing prescribed fire review criteria and procedures.
 - f. Establishing prescribed fire monitoring guidelines.
 - g. Providing assistance to the states including smoke management, fire effects, equipment development, planning, and implementation.
 - h. Participating in national level smoke management and air quality programs.
 - i. Reviewing/investigating escaped prescribed fires.

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3. The Associate Director for Renewable Resources and Planning is responsible for establishing resource planning, NEPA compliance, and resource monitoring, and evaluation standards for prescribed fire activities.
4. State Directors (SD) are responsible for developing, implementing, and evaluating prescribed fire operations. Each SD will:
 - a. Develop additional guidelines as needed, for planning, implementation, monitoring, and evaluation of prescribed fire activities.
 - b. Approve Prescribed Fire Plans. Authority may be delegated to the Field Office Managers (not Field Offices) as provided under BLM Manual Section 9211.3 and identified in BLM Manual Section 1203.
 - c. Review/investigate escaped prescribed fires.
 - d. Incorporate prescribed fire into geographic and local area preparedness plans.
 - e. Participate in state level smoke management programs.
 - f. Perform periodic program review to assure compliance with national standards.
 - g. Insure that only trained and qualified personnel participate in the implementation portion of the prescribed fire program.
5. Field Offices Managers (FOM) will:
 - a. Make the decision to use prescribed fire, and incorporate prescribed fire into the BLM's planning framework (RMP's, FMP's, and amendments) and related NEPA documents.
 - b. Insure compliance with National and State Office standards and guidelines for prescribed fire activities. Insure that periodic reviews and inspections of the prescribed fire program are completed.
 - c. Review Prescribed Fire Plans and recommend or approve plans depending upon the delegated authority. When approving a Prescribed Fire Plan, understand the risks associated with it. See Chapter 5 Section D. Ensure the prescribed fire plan has been reviewed and recommended by a person designated as a qualified technical reviewer and who was not involved in the plan preparation.

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d. Insure interdisciplinary team coordination occurs at all planning, monitoring, and evaluation levels.

e. Insure that only trained and qualified personnel participate in the implementation portion of the prescribed fire program. Establish qualification review committees. Insure that prescribed fire training goals and individual development plans are identified for individuals participating in the prescribed fire program.

f. Insure escaped prescribed fires are reviewed.

g. Insure projects are monitored, evaluated, and reported as a part of the fire record.

h. Participate in local smoke management programs.

E. Other Prescribed Fire Responsibilities

1. Fire Management Officer: The Fire Management Officer (FMO) has overall responsibility for planning, implementation and monitoring of the prescribed fire program, in accordance with National and State Office policy and direction.

a. Insures that trained and qualified personnel are available to participate in the prescribed fire program.

b. Coordinates with people requesting prescribed fire projects.

c. Assigns people to participate in Prescribed Fire Plan preparation.

d. Insures that proposed project sites are capable of meeting the proposed objectives.

2. Technical Reviewer:

a. Insures that Prescribed Fire Plans meet BLM standards.

b. Insures that the “Complexity Rating” is appropriate for the project being planned.

c. Insures that the “Management Summary & Risk Assessment” accurately represents the project, so the manager understands the risks that have been identified, and the mitigating measures enacted.

d. Checks the prescription parameters to insure that the project as planned can meet the resource management objectives.

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3. Prescribed Fire Burn Boss:
 - a. Implements the prescribed fire project in compliance with the approved Prescribed Fire Plan.
 - b. Remains in communication with the FMO and FOM.
 - c. Manages the prescribed fire project and supervises personnel.

F. References to Use

The following Bureau Manual Sections may be referenced:

1. 1112 - Safety and Health Management.
2. 1203 - Delegation of Authority.
3. 1386.6 - Tort Claims.
4. 1619 - Activity Plan Coordination.
5. 1625.3 - Supplemental Program Guidance for Support Services.
6. 1740 - Renewable Resource Improvements and Treatments.
7. 1743 - Renewable Resource Investment Analysis.
8. 9210.2 - Fire Management - Financing.
9. 9211.3 - Fire Planning - Prescribed Fire Plan.
10. 9215 - Fire Training and Qualifications.
4. 9217 - Fire Effects
12. 9218.3 - Fire Reporting and Statistics.

Other references.

1. 910 DM Chapter 1 - Wildland Fire Suppression and Management.

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2. *NWCG Prescribed Fire Plan Guide*, NFES 1839/PMS 431-1.
3. *Federal Fire and Aviation Leadership Council, Increasing Programmatic Accomplishments and Reducing Agency Differences in Prescribed Fire Management*. 1/10/96.
4. *NWCG Prescribed Fire Smoke Management Guide*, NFES 1279/PMS 420-2.
5. *User Assessment of Smoke-Dispersion Models for Wildland Biomass*. PNW-GTR-379. 12/96.
6. *Interagency Helicopter Operations Guide*, and the *Aerial Ignition Guide*.
7. *BLM Standards For Fire Operations*.
8. *National Interagency Mobilization Guide*.
9. *NWCG Wildland Fire Qualifications Subsystem Guide* - NFES 1414/PMS 310-1.
10. Fire Effects Information System. Intermountain Research Station General Technical Report INT-GTR-327 describes the system content. This data base is found on the Internet: www.fs.fed.us/database/feis/
11. Index to fire related web sites. Found at www-a.blm.gov/narsc/wildlandfire/index.html/intro.html
12. *NWCG Glossary of Wildland Fire Terminology*, NFES 1832/PMS 205
13. *NWCG Prescribed Fire Complexity Rating Guide* - NFES 2474/PMS 424.
14. *Aids to Determining Fuel Models for Estimating Fire Behavior*, NFES 1574, General Technical Report INT-122.
15. *NWCG Fire Effects Guide* - NFES 2394, PMS 481. This is also found at: fire.r.9.fws.gov/ifcc/monitor/guide
16. The NWCG Publication Management System. This is found at: www.nwgc.gov.

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Chapter 2: Prescribed Fire Definition and Planning**A. Prescribed Fire Definition**

Prescribed Fires are defined as the application of fire, under specified conditions, in a designated area to achieve specific resource management objectives. A written, approved Prescribed Fire Plan must exist, and NEPA requirements must be met, prior to ignition. For further definitions related to prescribed fire, refer to the *NWCG Glossary of Wildland Fire Terminology*, NFES 1832/PMS205.

B. Prescribed Fire Planning

The Bureau's prescribed fire activities function under an interdisciplinary effort supported by Resource and Fire Management. All benefitting activities will coordinate their respective roles for the planning, implementation, monitoring, evaluation, reporting, and funding of prescribed fire projects. Resource Management is responsible for managing vegetation and soils. Fire Management is responsible for identifying hazardous fuel situations and managing ignitions.

All use of prescribed fire will support land and resource management plans. The Resource Management Plans (RMP) or other land use plans (See Chapter 2 Section C.) serve as the document to initiate, analyze and justify prescribed fire activities. The effort and workload for project planning and NEPA compliance for a small project are often the same as that required for a larger project. As appropriate, resource managers and fire managers should consider large scale or even landscape scale projects. Multi-unit and multi-year projects should also be considered.

The Fire Management Plan (FMP) serves as the program strategy document for prescribed fire activities. The FMP captures and quantifies the overall fuels management program needs of the Field Office. The FMP identifies how prescribed fire, along with other fire management strategies, will be used to meet the overall land management goals identified in land use plans. The FMP also identifies the average annual funding and workforce needed to manage, coordinate, plan and implement the fuels management program.

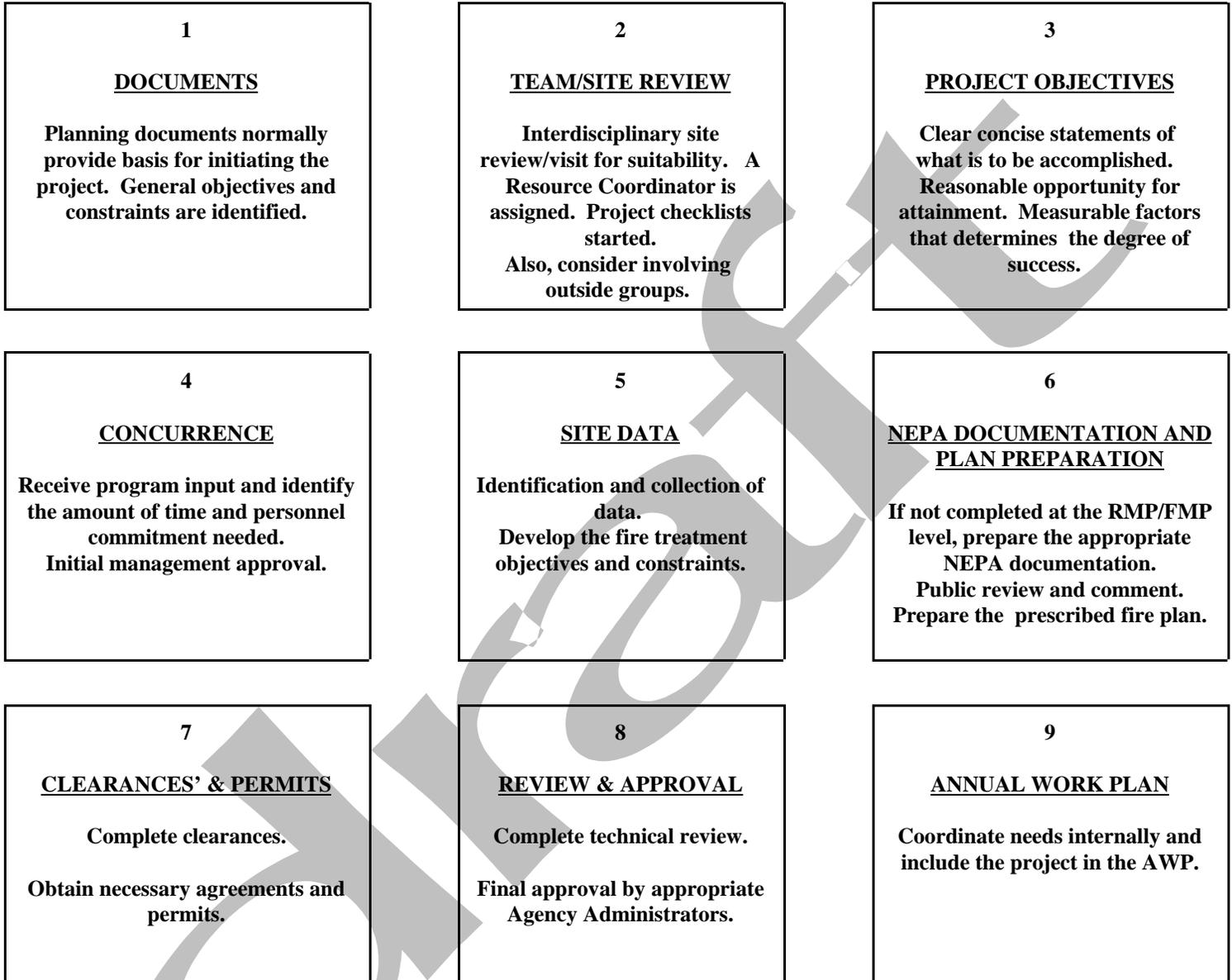
The Prescribed Fire Plan is the project implementation document for an individual prescribed fire project.

C. BLM Prescribed Fire Planning Model

The model below illustrates the general process for planning and implementing a prescribed fire project. The basic process is the same as for planning and implementing any other project. Ideally this process should be initiated in the fiscal year prior to the expected implementation of the prescribed fire project.

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PLANNING STEPS FOR A PRESCRIBED FIRE



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1. **Source Documents:** Land use plans are the primary planning documents through which prescribed fire projects will be identified. These documents will identify the management goals and constraints that project planners and coordinators will need. They will guide the NEPA analysis and Prescribed Fire Plan development. Common planning documents include:

- Management Framework Plan (MFP)
- Resource Management Plan (RMP)
- Allotment Management Plan (AMP)
- Habitat Management Plan (HMP)
- Fire Management Plan (FMP)
- Coordinated Resource Management Plans (CRMP)
- Herd Management Area Plan (HMPA)
- Watershed Management Plan

2. **Preliminary Site Review:** Resource specialists and Fire Management personnel or a Fuels Management Specialist should do an on-site review to determine the potential success of a prescribed fire project. This is also the point in the process at which to include outside groups and individuals as appropriate. Use other sites that have been burned in the same vegetation type, climate conditions, and soil types to assess the general suitability of the project. If the recommendation is to proceed, a Project Coordinator or Interdisciplinary Team Leader should be assigned, and a prescribed fire plan and project checklist started. Appendix 1 is an example of a Site Review and Job Planning Checklist.

3. **Project Objectives:** The desired resource objectives need to be discussed and confirmed. Develop clear concise statements(s) of what is to be accomplished (resource objectives). The statement(s) should state what is to be accomplished from a resource management standpoint. There should be a reasonable opportunity to attain the resource objectives, and there should be measurable factors and time frames that determine the degree of success. Any constraints are also identified at this time. For additional information on developing resource and related fire objectives, refer to Chapter 2 Section D.

Specific prescribed fire treatment objectives are then written which describe the fire treatments needed to meet the resource objectives. State exactly what the prescribed fire should and should not do, e.g., kill 40% to 60% of the sagebrush within the perimeter; do not burn the critical habitat areas identified within the unit.

4. **Concurrences:** Receive other program input and identify the amount of time and personnel commitment needed to develop and implement the project. Obtain management approval for the project.

5. **Data Collection:** Identify and collect any needed field data, such as botanical and archeological information, and fuel inventories.

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5. Data Collection: Identify and collect any needed field data, such as botanical and archeological information, and fuel inventories.

6. National Environmental Policy Act: Compliance with the National Environmental Policy Act (NEPA) is required for all prescribed fire projects. Several of the documents listed under C.1. above have had an Environmental Assessment (EA.) or Environmental Impact Statement (EIS) prepared in conjunction with the plan. The Field Office Manager must determine what level of NEPA analysis is required. The NEPA Coordinator can help determine the level of analysis (if any) needed, and address issues relating to conformity with existing plans and analysis. If an existing EA or EIS addresses the impacts of the prescribed fire, further analysis may not be needed. NEPA compliance could also take the form of a programmatic EA that covers a number of related treatments (mechanical and prescribed fire), in association with the Fire Management Plan. A single analysis could also be appropriate for large scale projects or multiple projects within a defined area up to and including an entire planning area. Where proposed treatments are not compatible with the existing planning documents, a Plan Amendment and associated NEPA documentation may be appropriate.

The Prescribed Fire Plan is the site specific implementation document. The Fire Management staff, Fuels Management Specialist, a fire ecologist, or other person trained in fire behavior and fire effects normally is assigned the responsibility for preparing the Prescribed Fire Plan. It is preferable to assign a Prescribed Fire Burn Boss to the project at this time and require that the individual be responsible for, or at least participate in, the Prescribed Fire Plan development. Fire Managers must maintain close coordination and communication between interdisciplinary team members and other people who may be involved. The team leader or other resource specialist may be assigned to work with the Fire Management staff or Fuels Specialist in the development of the Prescribed Fire Plan. This helps insure that the desired resource management objectives are accomplished. This individual could also serve as the Manager's representative or resource advisor during the actual burn.

7. Clearances and Permits: Complete cultural, T & E species clearances and obtain any needed air quality permits. Obtain land owner releases and cooperative agreements as needed.

8. Review and Approval: Once the Prescribed Fire Plan is complete, it receives a technical review by a qualified individual. The plan is then submitted for approval by the appropriate agency administrators.

9. Annual Work Plan: Insure that the project is included in the Annual Work Plan. The Hazardous Fuel Reduction subactivity (2823) is controlled by AWP target production levels. As part of the AWP process, determine that project funding is available and what portion each subactivity will fund. Insure that other agency and/or cooperator funding identified during the planning is available. Assign a Prescribed Fire Number and if applicable, a Range Improvement Project System (RIPS) number.

D. Resource and Fire Treatment Objectives

The prescribed fire planning process is initiated by guidance established in land use plans and amendments. Land use plan guidance may be in the form of general goals that deal with large areas over long time periods. While prescribed fire may be mentioned in land use plans, resource objectives that define prescribed fire use in specific areas are most often developed in activity plans. During the prescribed fire planning process, the interdisciplinary team refines these objectives into very site specific resource objectives that describe the longer term desired changes in site conditions such as increased plant productivity, altered species composition, or increased off-site water yield. These resource objectives describe second order fire effects that result from the interaction over time of the immediate changes in the environment caused by the prescribed fire with characteristics of the site and environmental factors.

Prescribed fire treatment objectives describe first order fire effects, i.e., fuel consumption, plant mortality, soil heating, smoke production, and burn pattern. These fire treatment objectives describe the effects which the fire must create in order to achieve the site specific resource objectives. Prescribed fires are conducted under selected weather and moisture conditions to create levels of fire behavior and residual fuel burnout that are most likely to produce these direct and immediate effects of the fire.

Both resource and fire treatment objectives need to be specific, measurable, achievable, related to the land use plan goals, and have a definite time frame for achievement, monitoring, and evaluation. The time frame for achievement of resource objectives is usually two or three years. The time frame for treatment objectives is immediate, because they are achieved during the course of the prescribed fire.

The following section provides a series of examples that show derivation of fire treatment objectives from land use plan goals, activity plan objectives, and prescribed fire resource objectives.

1. Forb production.
 - a. Land Use Plan goal. Improve mule deer habitat in Big Creek watershed
 - b. Activity plan resource objective. Improve mule deer spring range in mountain big sagebrush communities in Big Creek watershed.
 - c. Prescribed fire resource objectives. Increase the production of forbs from 100 pounds per acre (air dried weight) to 300 to 400 pounds per acre by the end of the third full growing season after the prescribed fire by removing competition from sagebrush. Leave 40 percent of the area unburned.

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d. Fire treatment objective. Kill 100 percent of mountain big sagebrush, burning with enough fireline intensity to remove fine branch wood less than 1/4 inch diameter. Burn in a mosaic pattern leaving 40 percent of the area unburned in 10 to 25 acre patches.

2. Browse enhancement.

a. Land Use Plan goal. Improve mule deer habitat in Big Creek watershed

b. Activity plan resource objective. Improve mule deer winter range in mountain shrub communities in Big Creek watershed.

c. Prescribed fire resource objectives. Increase production of fine twigs by inducing resprouting in serviceberry, with 90 percent survival after the second growing season. Increase availability by removing old, non-productive branches. Leave 20 percent of area unburned in a mosaic pattern.

d. Treatment objectives. Burn with high enough intensity to remove serviceberry branchwood less than 1/2 inch in diameter on 90 percent of the plants. Sustain no more than 10 percent mortality of mature plants. Burn in a mosaic pattern, leaving 20 percent of the area unburned in 10 to 25 acre patches

3. Watershed restoration.

a. Land Use Plan goal. Restore the watershed of Big Creek.

b. Activity Plan Resource objective. Increase water yield and decrease siltation into Big Creek and its reservoir.

c. Prescribed fire resource objectives. **Increase average July stream flow in Big 20 year average of 100 cfs to a 5 year average of 150 to 200 cfs within ten years by removing sagebrush communities.** Increase canopy cover of grasses and forbs from 10 percent to 30 to 40 percent within 3 growing seasons.

d. Treatment objectives. Generate adequate flame length to kill at least 80 percent of the junipers in the target area that are less than 10 feet tall, and achieve 30 to 40 percent mortality of trees greater than 10 feet tall. Leave 20 percent of the area unburned in a mosaic pattern with unburned patches of 5 to 10 acres. Sustain less than 10 percent mortality of bunchgrasses.

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After reviewing the fire treatment objectives that the Fuels Management Specialist believe are possible on this site given the fuels, the interdisciplinary team may decide that the juniper mortality after one prescribed fire is not adequate to meet resource objectives. It may be determined that manual cutting of taller trees is necessary before the prescribed fire, or that a second prescribed fire treatment is needed after the understory has recovered to a more productive state with greater canopy cover.

4. Hazardous fuels reduction.

a. The intent of a treatment can be a first order fire effect, hazardous fuels reduction, identified in the Fire Management Plan. There may be other fire effects worth including as objectives to ensure that fuels are managed without harming other desirable site properties.

b. Land Use Plan goal. Manage fuels in the wildland-urban interface.

c. Fire Management Plan objective. Manage ponderosa pine stand structure in area of BLM ownership adjacent to Newtown to decrease potential for crown fire, and decrease both intensity and severity of surface fires.

d. Treatment objectives. Kill 90 percent of understory Douglas-fir with stem diameter less than 2 inches. Consume 90 percent of down dead woody fuels in the 0 to 3-inch size class. Remove the top one inch of the 4 inch duff layer. Kill no more than 10 percent of trees larger than 12 inches in diameter.

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Chapter 3: Prescribed Fire Plan Requirements**A. Prescribed Fire Plans**

The Prescribed Fire Plan is a stand alone and legal document that provides the Prescribed Fire Burn Boss all the information needed to implement the project. Prescribed fire projects must be implemented in compliance with the written plan. If a tort action occurs as a result of a prescribed fire, the Prescribed Fire Plan is always considered as evidence. At a minimum address each of the elements discussed below. The size and complexity of the prescribed fire project will determine the level of detail required. Should an element not apply to a specific project, a NA (not applicable) may be utilized.

In some cases prescribed fire plans may be developed on an interagency basis. Interagency Prescribed Fire Plans do not need to follow the BLM format described below. But, prior to development of the plan, a format will be agreed to by all the involved parties. The content of all elements required in a BLM Prescribed Fire Plan must be present somewhere in the interagency plan. Multi-agency plans will be signed by all participating agency administrators.

For any project on BLM land for which a contractor or cooperator writes a prescribed fire plan, that plan must be consistent with and address all elements required in a BLM Prescribed Fire Plan. The BLM will provide the technical review for contractor or cooperator written plans.

For any project on BLM land where the BLM writes the prescribed fire plan and a contractor/cooperator will be implementing the project, the contractor/cooperator will be provided the opportunity to review and comment on the prescribed fire plan prior to approval.

Each Prescribed Fire Plan should be reviewed yearly by the FMO or Fuels Management Specialist to insure that the plan is valid and represents current field conditions. Any prescribed fire plan written prior to 1998 must be reviewed and amended to assure all elements required under current policy are included. Such plans will receive a new technical review and a new approval by the Field Office Manager.

Prescribed Fire Plan Elements Part I -Cover Page

See cover page format in Appendix 2.

1. Prepared by: The signature of the person that prepared the plan. Several people may be involved in the preparation of the plan, but only one person will be designated as the focal point. This person assures the plan meets Bureau standards.

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2. Reviewed by: The signature(s) of other specialists such as NEPA Coordinator, resource specialist, etc., who may review the plan to assure compliance with land management documents, guidance, and objectives. This could also be the signature of the FMO who has reviewed the plan.

3. Technical Review: The signature of the person doing the technical review. The purpose of the technical review is insuring that all the items required in a Prescribed Fire Plan are adequately addressed. A primary responsibility is to assure that:

- a. There is sufficient information for the Prescribed Fire Burn Boss to implement the project.
- b. The “Complexity Rating” (Risk, Potential Consequences, and Technical Difficulty) is appropriate for the project being planned.
- c. The prescription parameters as planned have a reasonable chance to meet the fire treatment and resource objectives.
- d. The Management Summary & Risk Analysis is an accurate portrayal of the project.
- e. This plan meets all National and State standards and that from a technical standpoint, it is appropriate to approve this plan.

4. Complexity Rating: Indicate the level of complexity. The NWCG Prescribed Fire Complexity Rating System Guide provides a rating system for Risk, Potential Consequences, and Technical Difficulty as they related to 14 specific elements. The “Complexity Rating“ becomes the summary of complexity and risk. The “Complexity Elements Work Sheet” and summary rating become an appendix to the Prescribed Fire Plan. As appropriate also bring any necessary items to the Management Summary & Risk Assessment and to the Job Hazard Analysis. For additional information on classification and complexity, see Chapter 4.

5. Estimated Cost: Show the estimated cost per acre to implement the project and list specific funding sources. Also, see item 27.

6. EA & RIPS #'s: Reference the assigned Environmental Analysis (EA) number and/or Range Improvement Project System (RIPS) number if applicable.

7. Plan Approval: Approval of the prescribed fire plan by the appropriate Agency Administrator. This may be at the State, District, or Field Office level depending on the delegation of authority. When approving the plan, it is understood that:

The approved Prescribed Fire Plan constitutes a delegation of authority to burn. No one has the authority to burn without an approved plan or in a manner not in compliance with the approved plan. Actions taken in compliance with the approved Prescribed Fire Plan will be fully supported. Personnel will be held accountable for actions taken which are not in compliance with elements of the approved plan regarding execution in a safe and cost-effective manner.

Prescribed Fire Plan Elements Part II- Management Summary

8. Management Summary & Risk Assessment: The Management Summary is a brief summary of the project. Discuss public and fire fighter safety, the risk of escape and the potential consequences of an escape. Include a summary of the Risk, Potential Consequences, and Technical Difficulty of the project. All elements with a “High” rating and those elements that are higher than the summary rating in the complexity analysis will be discussed and will have potential consequences and mitigating measures identified. Identify the actions taken to reduce the complexity (if any). Specifically identify any unmitigated risks or issues. Note: Keep this section brief; generally do not exceed one page.

Prescribed Fire Plan Elements Part III-Base Data

9. Resource Objectives, Fire Treatment Objectives, and Constraints: Identify the management objectives and constraints from the environmental analysis. Develop clear concise statements(s) of what is to be accomplished (resource objectives). The statement(s) should tell what is to be accomplished from a resource management standpoint. There should be a reasonable opportunity to attain the resource objectives, and there should be measurable factors and time frames that determine the degree of success. (See Chapter 2, Section D.)

Specific prescribed fire treatment objectives are then written which describe the fire treatments needed to meet the resource objectives. State exactly what the prescribed fire should and should not do.

Any constraints are also identified at this time.

10. Physical Description: A description of the burn unit(s) including location, County, size, topography, vegetation, and acreage by ownership. Other items may be added as needed.

11. Maps: Generally, two maps may be necessary to locate a project, a general vicinity map and project area map. The vicinity map should tie the area to the field office or nearest town. The project area map is required and has two specific purposes: 1) identify features (roads, fire lines, water sources, smoke sensitive sites, etc.) related to the project, and 2) identify all items that the Prescribed Fire Burn Boss needs to be concerned with should the fire escape. This should include items such as the project boundaries, roads, water sources, fences, structures, other improvements, and fuel breaks. All maps should include standard mapping elements: title, north arrow, scale, legend, the name of preparer, and date of preparation.

Identify any "Buffer or Allowable Area" boundaries as identified in item 18.

Prescribed Fire Plan Elements Part IV-Environmental Parameters

12. Environmental Parameters and Fire Prescription: **The prescribed fire prescription is a description of the fire behavior needed to obtain the fire treatment and resource objectives. The prescription will also contain parameters for live fuel moisture, duff moisture and soil moisture if those items are significant in terms of meeting the project objectives.** The fire prescription will also identify limitations on acceptable fire behavior for critical holding points outside of the burn area. The environmental parameters such as temperature and wind speed are used only to determine the fire behavior.

Prescriptions for fuels with a significant living component will have a prescription element related to live fuel moisture. Prescriptions for projects in timber (under burns) will have at least one element related to site dryness. This could be 1,000 hour fuel moisture, duff moisture or soil moisture. Until the moisture relationships between these items can be established for specific sites, more than one of the elements may need to be measured.

A separate prescription is needed for "Black Lining Operations," **if** conditions will be significantly different from the primary prescription. It is not adequate to state that black lining will occur at the low end of the prescription.

The fire behavior narrative should describe the fire behavior identified in the prescription and discuss how it will achieve the desired treatment objectives. It will be necessary to discuss fire behavior in terms of firing patterns and techniques. The environmental parameters may be used to guide you to the prescribed fire behavior.

Briefly discuss the scheduling of the project. Indicate the season of the burn and discuss any limitations or restrictions that apply to the project.

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13. Fire Behavior Calculations: Develop the fire behavior calculations based on the “BEHAVE” or other appropriate fire behavior program (FOFEM, REMSOFT, RXWINDOW, Canadian FBP, Etc.) that predicts the fire behavior needed to obtain the fire treatment and resource objectives. At a minimum, calculations for the “Rate of Spread” and “Flame Length” will be developed. If multiple fuel types or different topography exists within the project or adjoining areas, several sets of calculations may be needed. Calculations for critical holding points may be needed. If the prescription for black lining operations is significantly different from the primary prescription, a separate set of fire behavior calculations is needed. Attach the fire behavior calculations to the prescribed fire plan as an appendix.

14. Smoke Management: Describe how the project will comply with Federal, State and county air quality regulations. The Prescribed Fire Plan should identify any Class I air sheds, restricted areas, designated areas, and population centers that could be impacted down wind or from night time inversions. Local features such as highways, airports, and recreation sites should also be identified. If potential negative impacts from smoke could occur, an assessment of potential down wind impacts using an appropriate smoke management model will be completed. Some state regulatory agencies require that modeling be done and non-impact be demonstrated prior to issuing a burn permit. Describe any smoke monitoring requirements.

Restrictions on acceptable wind direction(s) or other environmental parameters can be incorporated into the Prescribed Fire Plan to avoid or help mitigate anticipated adverse impacts from smoke.

15. Monitoring: A monitoring plan is required. It will describe what data will be collected, when it will be collected, where on the prescribed fire site it will be collected, which methods will be used for each data element, list the responsible persons, and provide a budget. Any monitoring equipment needs to be listed and sources and means of obtaining them identified, as well as timing and locations for installation.

The requirements established for prescribed fire monitoring include weather during the fire, observed fire behavior, and whether fire treatment objectives have been met. If slowly changing fuel moisture values, such as live fuel or soil moisture, are included in the prescription, actual values should also be documented. It is recognized that fire treatment effects such as plant mortality may not be evident for some time after the prescribed fire, although they should be evident during the first postfire growing season. Prescribed fire funds (2823) can be used up to one year after the fire for monitoring treatment objectives. If mortality assessment is postponed for too long, it may be due to an interaction of other elements with the fire treatment, such as drought, and effects may be attributed to the fire which are partially due to other factors.

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Monitoring methods and considerations are discussed in Chapter 6.

The monitoring of resource objectives is the responsibility of the resource programs. Resource monitoring will be most successful if it is coordinated with the monitoring of the prescribed fire. Correlations among fire prescriptions, fuel loading, fire behavior and characteristics, fire treatment and resource objectives, and fire effects are much more likely to be observed if all information is collected in the same general area.

Prescribed Fire Plan Elements Part V-Implementation

16. **Notifications:** Provide a list of individuals and organizations to be notified prior to ignition. Show when the notification is to be made (e.g., 24 hours in advance), provide phone numbers and indicate who will make the notification.

17. **Organization and Equipment:** Identify the organization and equipment needed to implement the project. The organization needs to be commensurate with the complexity level of the project. At a minimum a Prescribed Fire Burn Boss will be assigned to every prescribed fire project. The organization and holding forces described in the approved Prescribed Fire Plan will be used to execute the burn.

If aerial firing is specified in the Prescribed Fire Plan, a specific air organization and air operations section will be included. Reference the *Interagency Helicopter Operations Guide*, *Aerial Ignition Guide* and the 9400 manuals. Field Offices doing extensive aerial ignition may wish to develop generic air operations plans and attach pertinent portions to the Prescribed Fire Plans.

18. **Ignition and Holding:** Specific descriptions of ignition and holding procedures are required. For projects with more than one unit, the information should be provided for each unit. This section should provide the general procedures to be used for operations to maintain the fire within prescription and the project area. Specific procedures and instructions may depend on the actual weather and fuel conditions present at the time the project is implemented.

Because the prescribed fire prescription is determined in terms of fire behavior, the ignition patterns and procedures will play a critical role in meeting the fire behavior prescription. A detailed discussion of ignition operations may be needed. Depending on the complexity of the situation, a map showing the location of the holding forces and the ignition pattern may be desirable.

This section will also include a discussion of preburn preparation. Specifically discuss what preburn actions are needed, what standards will be used and who is responsible for completion of each item.

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Specifically discuss the protection of sensitive features within or adjacent to the burn site.

The concept of a “Buffer or Allowable Area” can be incorporated into prescribed fire plans. These are areas outside of the primary burn unit where an “escape” need not be declared until additional conditions as identified in the Prescribed Fire Plan are met. If a prescribed fire leaves the primary burn unit and enters the “Buffer or Allowable Area,” this section will identify the actions the burn boss will take to manage the fire within these areas, it will also identify trigger points at which an escape will be declared.

“Buffer or Allowable Area” will always be identified on the project maps and will have been included in the planning process and covered in the NEPA documentation.

The concept of “Buffer or Allowable Area” may not apply to all prescribed fire projects, or to all parts of a specific project.

19. Mop Up and Patrol: The prescribed fire plan should outline the procedures to be implemented between the time the area is burned and the time it is declared out. A detailed description of the mop up and patrol procedures should be noted in this section. The “Mop Up Shift Plan” may be used to provide instructions and document mop up and patrol instructions.

The Prescribed Fire Burn Boss or other person in charge of mop up and patrol needs to review the general weather forecast and determine if a spot weather forecast is needed.

A significant number of prescribed fires that escape do so during the mop up and patrol phases. Almost all escapes are the result of **high wind events** and many are **preceded by a period of warming and drying**. Another factor contributing to many escaped prescribed fires is **heavier than normal fuel loadings**. Above average fuel loadings should be recognized as a potential problem and changes should be made to all operational activities as appropriate.

20. Escaped Fire Plan: Identify the actions to be taken if the fire escapes perimeter lines and cannot be contained with the resources identified in the plan. Specifically, identify who will make the decision that the prescribed fire has escaped. If appropriate, identify key trigger points or events that will lead to the declaration of an escape. Identify how the transition to the Incident Command System will be made, who will be the Incident Commander, and what specific actions will be taken. An escaped fire plan should also list containment opportunities outside of the planned perimeter and list the location and type of suppression resources that would normally be available to assist with suppression actions should an escape occur. List the notification to be made if an escape occurs. See Chapter 9 for additional information on escaped prescribed fires.

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21. Job Hazard Analysis: Develop a Job Hazard Analysis to identify hazards to employees. The analysis will identify hazards, corrective actions and the required safety equipment to ensure employee safety. If aerial ignition devices will be used, include an aerial operation hazard analysis to determine procedures and safety requirements.

Appendix 4 in this handbook is an example and can be used as a starting point for building a JHA for a specific prescribed fire project. Using the example as a starting point, delete items which do not apply and add new items as needed.

22. Public Safety: Describe the provisions made for public safety. List specific items such as road or trail closures and signing.

23. Medical Plan: Develop a Medical Plan with specific information, locations and contacts. Check to insure that contacts and phone numbers are correct.

24. Communications Plan: Develop a project specific communications plan. If aerial ignition is to be used, a separate frequency for communications between the aircraft and Ignition Specialist and/or Prescribed Fire Burn Boss will be established. Also, provide a list of needed phone numbers.

25. Go/No Go Checklist: This checklist will be completed by the Prescribed Fire Burn Boss prior to ignition, on the day of the burn, and retained as part of the project documentation. At a minimum the following items will be used in the checklist:

- a. **ARE ALL FIRE PRESCRIPTION SPECIFICATIONS MET?**
- b. **ARE ALL SMOKE MANAGEMENT PRESCRIPTION SPECIFICATIONS MET AND/OR HAS SMOKE MANAGEMENT CLEARANCE BEEN GIVEN FOR THE PROJECT?**
- c. **HAS A SPOT FIRE WEATHER FORECAST BEEN OBTAINED? IS IT FAVORABLE?**
- d. **ARE ALL REQUIRED PERSONNEL IN THE PRESCRIBED FIRE PLAN ON SITE?**
- e. **IS ALL REQUIRED EQUIPMENT IN THE PRESCRIBED FIRE PLAN IN PLACE AND FUNCTIONAL?**

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- f. **HAVE ALL PERSONNEL BEEN BRIEFED ON THE PROJECT OBJECTIVES AND THEIR ASSIGNMENTS?**
- g. **HAVE ALL PERSONNEL BEEN BRIEFED ON THE SAFETY HAZARDS, ESCAPE ROUTES AND SAFETY ZONES?**
- h. **HAVE ALL THE REQUIRED NOTIFICATIONS BEEN MADE?**
- i. **ARE THE ON SITE RESOURCES ADEQUATE FOR CONTAINMENT UNDER THE EXPECTED CONDITIONS?**
- j. **IN YOUR OPINION, CAN THE BURN BE CARRIED OUT ACCORDING TO PLAN AND WILL IT MEET THE PLANNED OBJECTIVES?**

Additional items can be added to the standard checklist as needed.

26. **Prescribed Fire Briefing:** Develop a Prescribed Fire Briefing Checklist. Appendix 2 provides a sample outline, however a project specific checklist needs to be developed. Insure that any significant items identified in the Job Hazard Analysis (JHA) and mitigating measures are included in the checklist and briefing. Also, see Chapter 5, section A.

27. **Test Fire:** A test fire will be used to verify that the fire behavior will achieve the fire treatment and resource objectives. The test fire will be done in a location that can be easily controlled or extinguished. The location should also be representative of the general fuel type in the burn unit. Documentation of the test fire conditions and results is required.

28. **Cost:** Develop a detailed cost summary with estimated costs and the source(s) of funding.

Prescribed Fire Plan Elements Part VI-Reports

29. **Prescribed Fire Report:** A post burn evaluation and summary that documents burn day weather and fuel conditions, observed fire behavior, problems, concerns, and results is required. Where possible, the prescribed fire results should be compared to the fire treatment objectives and resource objectives that were identified for the project.

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Appendix 2 is an example of a Prescribed Fire Plan that addresses all of the above elements and meets the minimum Bureau standards. Local units may add additional items to meet their needs.

B. Implementation**OBTAINING A SPOT WEATHER FORECAST, ON EACH DAY OF THE BURN, PRIOR TO IGNITION, IS MANDATORY.**

Note: An exception can be made for piled slash and other burns where no rate of spread outside of the burn area is expected.

If the Prescribed Fire Burn Boss assigned to the project was **NOT** involved in planning the project and/or writing the Prescribed Fire Plan, that individual will be afforded the opportunity to review the Prescribed Fire Plan and inspect the project site prior to implementing the project.

There needs to be a clear understanding between Agency Administrators, fire management and the prescribed fire burn boss as to which parts of the prescribed fire plan (if any) may be changed on the site prior to implementing the project. This information may be included in the plan or it may be established as local policy. On-site changes to the prescribed fire plan **will not** include changes to the objectives or the fire behavior prescription. Examples of changes that might be permitted are minor boundary adjustments, or minor changes in the amount or type of holding or ignition resources required, or changes in ignition patterns(s), techniques, or sequence. Any changes to the prescribed fire plan by the Prescribed Fire Burn Boss will be noted on the original copy of the Prescribed Fire Plan and dated and initialed by the Prescribed Fire Burn Boss.

Prescribed Fire Plans that are “amended” or where major changes occur must identify the affected sections, the reason for the change(s) and have the changes clearly identified. New signatures for the agency administrator are required. Note: This refers to significant changes, not minor on-site changes as discussed above.

The dispatch office responsible for the area in which the prescribed fire will occur will be provided a complete copy of the prescribed fire plan prior to ignition.

C. Implementation Restrictions

Implementation of Prescribed Fires at National Preparedness Levels IV and V is restricted. (See the National Mobilization Guide.)

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At National Preparedness Level IV, concurrence by the State Fire Management Officer (SFMO) must be obtained before implementing the local Agency Administrator's recommendation for a prescribed fire. An evaluation of significant risk is made by the SFMO or representative in a presentation of the prescribed fire implementation proposal to the geographic multi-agency coordinating (MAC) group prior to prescribed fire approval. A coordination/tracking function will be established to track prescribed fires and resource commitments at Geographic Area and National coordination levels.

At National Preparedness Level V, a National level representative must concur with the SFMO's recommendation. The national level representative will present an evaluation of significant risk in a proposal to the national MAC group prior to prescribed fire approval.

D. Project Files

There will be only one official project file. All other related files or documents will be referenced in the project file. BLM Records Schedule 4, Items 26a and 27a and Schedule 17, item 21b, discuss the storage of project files.

The project file will as a minimum contain:

1. The prescribed fire plan and all attachments.
- 2: A copy of the NEPA documents.
- 3: Maps and Photos (Pre- and Post Burn).
4. Names and locations of pertinent GIS files.
- 5: Agreements (to include outside funding agreements) and Contracts.
6. The Burn Boss Report, General and Spot Weather Forecast, Weather and Fire Behavior Observations, Fuel Moisture Data, Unit Logs, Fire Report (DI-1202).
- 7: Monitoring and evaluation information.
- 8: Projected and actual cost information.

The original project file will be kept with the Field Office files. The Fire Management Staff and/or the Fuels Specialist should keep copies for reference.

Chapter 4: Prescribed Fire Complexity.

A. Determination of Complexity

The NWCG *Prescribed Fire Complexity Rating System Guide*, NFES 2474, May 1995, is the Bureau standard for rating prescribed fire complexity. A complexity rating will be completed for each prescribed fire project. The determination of the prescribed fire complexity will be based on an assessment of **risk** (the probability or likelihood of an unexpected event or situation occurring), **potential consequences** (some measure of the cost or result of an undesirable event or situation occurring), and **technical difficulty** (the level of skills needed to complete the project and deal with expected events).

Classify prescribed fire projects by complexity elements using the definitions outlined in the NWCG guide. It is important to note that each of the 14 elements have distinct definitions for high, moderate, or low. These definitions must be used when preparing the rating. All of the individual elements must be rated. If a specific element does not apply to a given project, indicate it as n/a. Additional elements may be added if needed.

An initial complexity rating should be completed during the project development stage to identify items needing mitigation. These items can then be addressed during the development of the Prescribed Fire Plan. Once the Prescribed Fire Plan is near completion the final complexity rating is made and the summary rating is entered on the cover page of the Prescribed Fire Plan. The final rating should take into account any mitigation included in the plan. The mitigating measures identified in the plan should be noted in the Management Summary and Risk Assessment portion of the plan.

Based on the NWCG classification system three prescribed fire complexities are possible. Any prescribed fire meeting one of the items below will be classified at the level indicated regardless of the overall rating.

1. High - **Prescribed fires (other than pile burning) in the wildland/urban interface.**
2. Moderate - All aerial ignitions must be classified as at least moderate complexity.
3. Moderate - Simultaneous ignitions, using a mix of firing equipment (hand firing and mechanical firing, e.g., terra torch or propane), must be classified as at least moderate complexity.

B. Complexity and Qualifications

The Prescribed Fire Complexity System does not tie directly to the Prescribed Fire Qualifications System. The following guidance will apply.

All prescribed fire projects rated as “High Complexity” will require a Prescribed Fire Burn Boss rated as RXB1 and an Ignition Specialist rated as RXI1.

The use of RXB3 is restricted to “Pile Burning.”

Pile burning is the burning of wildland fuels which have been machine or hand piled and where there is no fire spread outside of the pile(s) expected. A Prescribed Fire Plan is required. This type of burning occurs outside of a declared fire season, if a declared fire season program is established.

C. Smoke Management

As per public law 95-95 compliance with Federal, state, and local air quality regulations is mandatory and will require coordination with state and local air quality authorities. Smoke management can also be a significant part of determining the complexity of a prescribed fire project.

The National Wildfire Coordinating Group (NWCG) publication *Prescribed Fire Smoke Management Guide*, NFES 1279/PMS 420-2, provides an understanding of smoke management concepts. Several computer models including Simple Approach Smoke Estimation Model (SASEM), NSF puff, VSSMOKE, and the Ventilated Valley Box Model (VALBOX) are available to help with determining potential smoke impacts on a given area might be. *User Assessment of Smoke-Dispersion Models for Wildland Biomass Burning*, PNW-GTR-379, 12/96, is a guide to the available smoke models.

Personnel developing Prescribed Fire Plans must be aware of state and local regulations and the impacts that a specific project may have on critical areas. Potential smoke impacts on critical areas such as Class I air sheds, restricted areas, and designated areas (often called non-attainment areas) must be considered. Equally important are local features that could be impacted such as highways, airports, recreation sites and smaller population centers. Prescribed Fire Plans need to identify sensitive areas and provide operational guidance to minimize the impacts from smoke. If potential negative impacts from smoke could occur, an assessment of potential down wind impacts using an appropriate smoke management model will be completed. Some states require that some type of smoke dispersion modeling be done before they will issue a permit for the prescribed fire project.

Chapter 5: Safety and Qualifications

A. Safety Awareness

The safety of fire fighters and the public is the number one priority when planning and implementing a prescribed fire project. Every person involved in a prescribed fire project is responsible for identifying safety issues and concerns. It is the responsibility of each individual participating in prescribed fire activities to let management know if they do not understand their assignment or have safety concerns related to the assignment.

A personnel briefing will be conducted prior to any prescribed fire activity to insure that all people involved understand how the project will be implemented and what their assignments are. Briefings must cover safety considerations for both known site specific hazards and potential hazards. A briefing checklist must be developed and attached to the Prescribed Fire Plan. All personnel involved in the project must be present for the briefing. Personnel not present at the initial briefing must be briefed by the Prescribed Fire Burn Boss or other supervisor prior to being assigned to the project. A briefing will be given for each operational period of multi-period projects.

A Job Hazard Analysis (JHA) will be completed for each prescribed fire project and attached to each Prescribed Fire Plan (JHA BLM Form 112-3, Manual Section 1112). Appendix 4 is an example of a generic JHA for a prescribed fire and is set up in a checklist type format. Prescribed fire managers need to develop a site specific JHA for each prescribed fire project. The checklist can be used as a starting point with additional, site specific items added as needed. All items identified will be mitigated. Significant items will also be identified in the “Management Summary & Risk Assessment” and discussed at the project briefing(s).

B. Safety Equipment

All personnel on a prescribed fire project will be equipped with required Personal Protective Equipment (PPE) appropriate to their position or identified in a Job Hazard Analysis. For holding and ignition personnel, the minimum PPE (unless otherwise identified in the JHA) is the same as that required for wildland fire assignments. (Reference the *Standards For Fire Operations* Chapter 4).

C. Smoke Exposure

Exposure to smoke during prescribed fire operations can be a significant safety concern. Research has shown that smoke exposure on prescribed fires, especially in the holding and ignition positions, often exceeds that on wildfires. There are many things that prescribed fire planners and Prescribed Fire Burn Bosses can do to reduce the personnel exposure to smoke.

1. Planning: Smoke exposure needs to be considered when planning prescribed fires. Simple things such as altering line locations can have a significant impact on smoke exposure. Placing fire lines in areas of lighter fuels or moving lines to roads or other barriers that will require less holding, patrol and mop up will significantly reduce the smoke exposure to personnel. The identification of “Buffer or Allowable Areas” where fire outside the main control line may not need to be aggressively attacked is also a good method to reduce smoke exposure.

2. Implementation: There are many techniques that can help reduce the exposure of personnel to heavy smoke. Rotating people out of the heaviest smoke area may be the single most effective method of limiting smoke exposure. Changing firing patterns and pre-burning (black lining) during less severe conditions can greatly reduce exposure to smoke. The use of retardant, foam or sprinklers can also significantly reduce the workload and exposure time for holding crews.

D. Risk and Safety Mitigation

While prescribed fire operations in a office may occupy a small segment of time, Field Office Managers must consider the magnitude of prescribed fire implementation errors and resulting system failures (which may occur in very short time periods) in comparison to implementation errors and system failures in other disciplines.

For prescribed fire escape risk and safety mitigation to be effective as part of a land management program, Field Office Managers must understand prescribed fire is a high reliability section of their domain. Simply defined, a high reliability organization is one which operates in a hazardous environment, with serious potential consequences, yet has a very low rate of accidents and incidents.

1. Risk Management: Use a systematic process to identify and manage risk in order to reduce the chances of a prescribed fire escape.

- Make sure your plan includes an accurate risk assessment and identifies the consequences should the fire escape the planned perimeter.
- Make sure the plan has considered threats to life or property, smoke management concerns, potential impacts on key resources, public land users, cooperators, and communities.
- Make it clear to your FMO, FMS, and Prescribed Fire Burn Boss that prescribed fire risks must be acknowledged and minimized. The Go/No Go Checklist and Job Hazard Analysis are required in every burn plan. Stress that project must be implemented in compliance with the written plan.
- Make sure resources (time, budget, staffing, equipment) are adequate to implement the prescribed fire project.

- Insure that the FMO, FMS, and Prescribed Fire Burn Boss monitor area activity. What's going on around you? Have adjacent units been experiencing escaped prescribed fires?
 - Insure that the FMO, FMS, and Prescribed Fire Burn Boss review "long range" Weather/National Fire Danger Rating System indexes, live fuel moistures, and fuel loadings.
 - Don't compromise safety or allow deviation from the burn plan to accomplish the project.
2. Quality: Insist on high quality standards.
- Set high quality prescribed fire standards as a unit goal.
 - Insist that prescribed fire projects are monitored and correct any deviations from established National BLM standards.
 - Know what the Bureau's prescribed fire plan requirements are and reference them when approving your burn plans.
3. Supervision and Control: Do the policies and procedures that are established to safely conduct prescribed fire operations -
- Openly demonstrate a commitment to prescribed fire safety.
 - Consider Safety as an integral part of your prescribed fire accomplishments.
 - Uniformly support the Bureau's prescribed fire standard operating procedures.
 - Make frequent trips to prescribed fire projects in your unit and interact with the Prescribed Fire Burn Boss and crew members.
 - Insure good communication (briefings are conducted) is taking place up and down the chain of command in prescribed fire operations.
 - Insist on redundancy, multiple coverage or adequate safety back-ups for high-risk prescribed fire operations.
 - Ask the FMO, FMS, and Prescribed Fire Burn Boss questions if you don't understand something or don't feel "good" about something.
 - A post burn report is required for every project. This report is completed by the Prescribed Fire Burn Boss and the resource specialist(s) involved. It is a concise report of the project including summaries of things that went right and things that need to be improved for the next project. Request a copy for your review.

4. Process Auditing: Auditing refers to a system of ongoing checks by members of the organization to identify the development of any hazardous conditions, and to take corrective action.

- Make sure periodic reviews and inspections of your prescribed fire program are completed. Does the program follow national standards? Are safety practices and operating standards followed?
- Have set prescribed fire training goals and individual development plans for your interested staff. Use subject matter expert boards/interagency review committees to determine prescribed fire qualifications.
- Make sure a knowledgeable person prepared the burn plan.
- Insist on an independent qualified technical review of all your burn plans.

5. Reward System: The expected rewards or disciplinary actions for safe or unsafe behavior.

- Recognize prescribed fire/safety achievements in your unit through social praise and formal awards and incentives.
- Safe prescribed fire operations should be reinforced as a cultural norm (by field office manager emphasis and peer pressure)
- Encourage everyone to report safety discrepancies or plan deviations without fear of negative repercussions.
- Take timely action(s) to appropriately discipline unsafe behavior/attitudes.

E. Positions Qualifications and Duties

1. General Qualification Requirements: It is a responsibility of both the State Director and the Field Office Manager to establish qualification committees to review experience, training, currency, and fitness levels. This committee is also to assure the proper completion of Task Books and make recommendations regarding prescribed fire qualifications for the Agency Administrator.

There are several key organizational positions to consider when implementing any Prescribed Fire Plan. Not every project will require that each position be filled, while other projects may require additional positions. Each Field Office planning a prescribed fire project will identify the required positions and build an organization necessary to execute the burn. At a minimum Prescribed Fire Burn Boss will be assigned to every prescribed fire.

2 The National Wildland Fire Coordinating Group has issued the *Wildland and Prescribed Fire Qualification System Guide* (PMS 310-1). This guide provides a complete review of the qualification system. There is a second publication, the *Task Book Administrators Guide*, (PMS 330-1) that explains the task book process for documenting performance and certifying personnel. The BLM has additional requirements for some positions. The qualifications for each position are shown in the chart below. All BLM personnel assigned to prescribed fire operations will meet the minimum qualifications outlined in this section. This will include personnel assigned to assist other agencies even though the other agency may have established its own (lower) qualifications.

3. Prescribed Fire Positions: The BLM has defined key positions as shown below. Chapter 4 discusses the issue of complexity as it relates to prescribed fire operations. The Prescribed Fire Manager, Prescribed Fire Burn Boss, and Ignition Specialist each have two skill levels. The assignment of skill levels to a given project is dependant on the complexity of the project. The BLM has established a standard for “High” complexity projects and has restricted the use of the RXB3 position. See Chapter 5 Section D.

a. Fire Management Officer: The FMO is responsible for overall program management.

- Act as liaison/coordinator between the Prescribed Fire Burn Bosses, other offices, agencies, air quality authorities, news media, transportation agencies, and safety officials.
- Insures the technical review is completed.
- Assigns the Prescribed Fire Burn Boss.
- Insures that prescribed fire monitoring is completed.
- Insures coordination with program specialists that originated the project.

b. Technical Reviewer:

- Insures that the “Complexity Rating” is appropriate to the project being planned.
- Insures that the “Management Summary” represents the project so the manager understands the risks that have been identified and the mitigating measures enacted.
- Checks the prescription parameters and insures that the project as planned can meet the resource objectives.

c. Prescribed Fire Manager (RXM1/RXM2): A Prescribed Fire Manager is responsible for the implementation and coordination of assigned prescribed fire activities. A Prescribed Fire Manager may be assigned during periods when multiple simultaneous prescribed fires are being conducted, multiple prescribed fires will be conducted within a short time frame, or

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there is a complex interagency involvement. The following are the key duties and responsibilities:

- Obtains briefings from ordering official and/or prior Prescribed Fire Manager.
- Reviews prescribed fire plans prior to implementation and assess the situation.
- Acts as liaison/coordinator between the Prescribed Fire Burn Bosses, other offices, agencies, air quality authorities, news media, transportation agencies, and safety officials.
- Obtains and interprets long term weather information.
- Conducts strategy meetings and/or briefings as needed.
- Sets priorities for allocation of resources.
- Briefs Prescribed Fire Burn Bosses and direct operational assignments according to the agency specific policies and standards identified in prescribed fire plans.
- Monitors prescribed fire operations.
- Ensures all operations are conducted in a safe manner and in accordance with the prescribed fire plans.
- Ensures the completion of all required documentation including the evaluation and documentation of accomplishments, immediate fire behavior and fire effects, operational procedures and costs summaries.

d. Prescribed Fire Burn Boss (RXB1/RXB2): A Prescribed Fire Burn Boss is responsible to the agency administrator or Prescribed Fire Manager for implementing a prescribed fire plan. The following are the key duties and responsibilities:

- Reviews prescribed fire plans prior to implementation and insures plan requirements are met.
- Acts as liaison/coordinator between interdisciplinary managers and specialists.
- Recons the site.
- Obtains weather forecast, updates, and advisories from a meteorologist.
- Makes the go/no go decision.
- Conducts the personnel/safety briefing to ensure a safe operation.
- Conducts the test burn.
- Supervises assigned personnel.
- Directs the ignition, holding, and monitoring operation.
- Insures that a log is kept which records all activities taking place during each operational period.
- Declares the prescribed fire out.

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- Determines when the prescribed fire exceeds prescription parameters or burn objectives.
- Evaluates and documents objective accomplishment, operational procedure, assigned personnel, and costs.
- Assures reports are completed.

Note: the BLM has established an additional level of Prescribed Fire Burn Boss known as RXB3. The intent of the position is to qualify a person to supervise prescribed fire operations that are limited to pile burning. These types of operations typically would have only a limited number of personnel assigned, they would have a very low threat of escape, and they would present a minimal risk to the people involved in the operation.

e. Ignition Specialist (RXI1/RXI2): An Ignition Specialist is responsible for supervising and direction ground and/or aerial ignition operations according to established standards in the prescribed fire plan. The following are the key duties and responsibilities:

- Reviews the burn plan and the burn unit prior to implementation.
- Conducts preburn readiness assessment and briefing.
- Instructs crews on ignition operations.
- Conducts ignition operations in a safe manner.
- Completes test fire according to the ignition plan.
- Ignites project area according to the ignition plan.
- Identifies impacts of ignition on control and desired fire effects.

f. Fire Effects Monitor (FEMO): The Fire Effects Monitor is responsible for collecting the on-site weather, fire behavior, and fire effects information needed to assess whether the fire is achieving established resource management objectives. The following are the key duties and responsibilities:

- Reviews the monitoring plan prior to implementation.
- Monitors, obtains, and records weather data.
- Monitors and records fire behavior data throughout the fire management operation.
- Recons the burn unit/area assigned.
- Plots the burn area and perimeter on a map.
- Monitors and records smoke management information.
- Monitors first order fire effects.
- Collects and records environmental data.
- Provides a monitoring summary of the fire.

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4. Prescribed Fire Qualifications Summary:

Bold print represents BLM additional requirements and positions.

Position	Qualified As	Required Training	Suggested Training	Physical Fitness	Position Task Book
RXM1	RXB1	NONE		NONE	REQUIRED
RXM2	NONE	NONE		NONE	REQUIRED
RXB1	RXB2 + ICT3 or DIVS	S-490 RX-450	RX-540 RX-481 ECOSYS* FPM*	LIGHT	REQUIRED
RXB2	FIRB(2) + ICT4 or TFLD	S-390 RX-300 RX-340 BEHAVE	RX-450 S-381 FPM* I-300	MODERATE	REQUIRED
RXB3	ICT5	S-290	S-201	ARDUOUS	NONE
RXI1	RXI2 + STL(Any) or TFLD	RX-340		ARDUOUS	REQUIRED
RXI2	SRB(Any)	S-234	IGNITION DEVICES	ARDUOUS	REQUIRED
FEMO	FFT2	S-290 RX-340	S-244	ARDUOUS	REQUIRED

* ECOSYS = Fire and Ecosystem Management

* FPM = Fire Program Management

a. The NWCG qualification standards require qualification at the ICT4 level for RXB2, and at the ICT3 level for RXB1. The BLM has added an additional way to become qualified at the Burn Boss level. Qualification at the RXB2 level may be met with qualification at the ICT4 **OR** the TFLD level. Qualification at the RXB1 level may be met with qualification at the ICT3 **OR** the DIVS level. If the Prescribed Fire Burn Boss is not qualified as an IC, a qualified IC will be identified in the Escaped Fire Plan. Additionally the transition from the Prescribed Fire Burn Boss to the IC needs to be explained.

b. Prescribed Fire Burn Boss 3 (RXB3): As a supplement to the qualifications system the BLM has identified an additional position. This position would be identified as a

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“Prescribed Fire Burn Boss 3” (RXB3). The individual would need to be qualified as an Incident Commander Type 5 (ICT5). Required training would be S-290, Intermediate Fire Behavior. Suggested training would be S-201, Fire Supervision. The intent of the position is to qualify a person to supervise prescribed fire operations that are identified as pile burning defined in Chapter 4, Section B. These types of operations typically would have only a few personnel assigned, they would have a very low threat of escape, and they would present a minimal risk to the people involved in the operation. (These types of operations still require a signed prescribed fire plan.) This position is not a prerequisite for the RXB2 position.

c. Prescribed Fire Holding Specialist: The qualification for the Holding Boss position is the appropriate ICS Operations position. The Holding Boss will be qualified at the Single Resource Boss, Strike Team Leader, Task Force Leader, Division Supervisor, Operations Section Chief 2, or Operations Section Chief 1 as required by the number and mix of the resources assigned to the holding operation.

For some projects there may be no holding requirements or the holding duties are assumed by the Burn Boss.

d. Burn Plan Writer: No minimum standards are established at the national level. State Offices may establish minimum standards.

e. Prescribed Fire Plan Technical Reviewer: For prescribed fire projects rated as “Complex,” e.g., those projects requiring an RXB1, the technical reviewer must be qualified as, or have been previously qualified, at the RXB1 level. For those Prescribed Fire Plans rated as “Moderate or Low” the technical reviewer must be qualified as, or have been previously qualified, at the RXB2 level. If a Field Office cannot complete their own technical review, the State Office will insure that a technical review is completed by a qualified person. A primary reviewer will be designated, however it is acceptable for other specialists to review specific portions of the Prescribed Fire Plan. For example a Fire Behavior Analyst may review the fire behavior calculations or the Aviation Officer may review the Air Operations Plan.

f. Field Office Manager: Mandatory training is “Fire Management Leadership.” Additionally, a detailed briefing from the State Fire Management Officer regarding the roles and responsibilities relating to the prescribed fire program with emphasis on the Prescribed Fire Plan approval process is required. At a minimum the manager will receive a copy of the *Prescribed Fire Handbook* H-9214-1 and will review the appropriate sections with the State Fire Management Officer.

4. The "Grand Fathering" of prescribed fire qualifications for current BLM employees is no longer permitted. Some Field Offices will need to determine the proper qualification level for new or transfer personnel who will be involved in prescribed fire operations. Agency Administrators and Fire Management Officers need to review all the wildland fire training, wildland fire experience, prescribed fire training, and prescribed fire experience and

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determine at what level each individual should be qualified. The qualifications system is a performance-based system, as such the individual's ability to do the job should be the primary consideration. Performance is demonstrated through the completion of position task books. The formal training is an important but secondary consideration. There are a couple of key points to consider when reviewing the training side of the qualifications issue. The **required** training courses are: Basic Firefighter Training, S-130, the Fire Behavior Skills Courses, S-190, S-290, S-390, S-490, and RX-300, RX-340, and RX-540. All of the other training is defined as "**Knowledge and Skills Needed.**" One method of evaluating individuals is to compare that individual's skills and abilities against the tasks listed in the task book for a given position. If there is sufficient evidence that the individual has performed all of the tasks in a given task book and has all of the **required** training that individual can be qualified at that level.

Once the level of qualification for an individual has been determined, a letter or memo stating the level of qualifications should be drafted, signed by the Agency Administrator, and placed in the personnel file. The appropriate entries then need to be made into the Incident Qualification and Certification System. It may be necessary to do some management overrides within the system to obtain the proper qualifications for an individual.

At this point, advancement in the system requires that all **required** training be completed and that the appropriate Task Book(s) be completed.

5. The prescribed fire qualifications system does not establish currency requirements to maintain prescribed fire qualifications. The currency requirement is set at five years, the same as for suppression qualifications. As with the suppression qualifications an assignment at one level will maintain prescribed fire qualifications at the next higher level.

Note: Should we use wildfire assignments to maintain prescribed fire qualifications, e.g., should an assignment as an ICT3 or DIVS maintain the qualification as a RXB1?

6. Recording and Tracking Prescribed Fire Qualifications: The Incident Qualification and Certification System is the system the Bureau uses to track prescribed fire qualifications, training and experience. The BLM Manual Section 9215, Fire Training and Qualifications, establishes the State Office and Field Office responsibility for maintaining qualification, training and experience records.

All records of prescribed fire qualifications, training, and experience will be entered into the Qualification and Certification System. Prescribed fire qualifications will appear on individual "Red Cards" along with wildfire qualifications. Red cards for prescribed fire will be approved by the appropriate Agency Administrator (State Director or Field Office Manager).

The Qualification and Certification System does not separate prescribed fire qualifications by fuel type. The local units are responsible for insuring that Prescribed Fire Burn Boss and Ignition Specialist have qualifications and training are appropriate for the fuel type(s) in which they will be

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working. “Management has the ultimate responsibility and is accountable for failures resulting from inappropriate use of personnel in unfamiliar fuel types, regardless of their Red Card rating.”

Agency Administrators may sign “Red Cards” for other agency employees only by a written agreement with the other agency.

7. Physical fitness levels are not established by the NWCG. The Bureau has established physical fitness levels as shown in the chart in Section 4.

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Chapter 6: Monitoring**A. Introduction**

This chapter will discuss methods for monitoring the conditions and characteristics of the prescribed fire treatment and the treatment objectives. The purpose for this monitoring is to document the weather and moisture conditions associated with the fire; determine whether the fire is remaining within the range of prescribed fire behavior; assess whether prescribed fire project objectives are met; and measure the effectiveness of the fire prescription in obtaining the desired fire treatment. Evaluation of monitoring data can lead to modifications in fire prescriptions, ignition, and treatment objectives. Methods for monitoring resource objectives, the indirect and longer term effects of fire, will not be discussed in this chapter.

Monitoring is the collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting management objectives. Prescribed fire monitoring can be defined as a systematic process for collecting and recording information to provide a basis for evaluating and adjusting resource and fire treatment objectives, prescriptions, and implementation practices. In prescribed fire monitoring, we also gather information to document the treatment itself.

Inventory is a point-in-time measurement of the resource to determine location or condition. It can be a prerequisite for monitoring, such as determining the amount and distribution of fuels on a prescribed fire site, or locating and mapping sensitive features. Specific treatment objectives and constraints may be identified from the inventory information.

Information in this chapter will be presented in three parts. The “Prefire” section describes inventory and monitoring elements and activities that occur before the prescribed fire. The “During the fire” section discusses monitoring of burning conditions and the fire itself. Postfire data collection is discussed in the “Postfire” section. More specific details about the monitoring techniques discussed here can be found in Miller (1994)¹.

1. Sample size: Sampling is the process of collecting samples from which an estimate is made of the characteristics of the entire population. For example, to determine what percentage of individual plants of a target species survived in a prescribed fire area, estimates of survival are made on individual plots. The number of samples collected determines how accurately the sample represents the actual plant survival. Managers decide how much error they can accept in the sample estimate, and how certain they would like to be that the estimate is correct. Using this information, and an estimate of the variability in the population, the number of samples to collect can be determined. It is important to sample correctly, because incorrect

1. Miller, Melanie. 1994. Fire Effects Guide. PMS 481. National Wildfire Coordinating Group. National Interagency Fire Center. Boise, ID. (Publications Management System, NFES 2394).

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conclusions may be drawn from inadequate data. A manager may not be able to detect a change that occurred after a prescribed fire, or may think that a prescribed fire did not achieve the desired effect when it actually did occur. With inadequate sampling, a manager may burn when a key element such as live fuel or duff moisture is not within the prescribed limits and have undesired fire behavior or unacceptable fire effects. An excellent discussion of the basic principles of sampling can be found in Elzinga and others (1998)². A simple procedure for determining sample size can be found in Norum and Miller (1982)³.

2. Required elements: Monitoring requirements are discussed in Chapter 3, Item 15, this Handbook.

B. Prefire

1. Fuels information: The type and amount of fuels inventory depends on how much information is required for developing the prescription and for evaluating the fire treatment. Fuels data are gathered to obtain information that can be used for prescription development. Information can range from a fairly cursory assessment needed to determine which fire behavior fuel model applies, to much more detailed information required to monitor specific fuels reduction objectives. The amount and type of fuels information required to set and evaluate a fuels reduction objective is set by the parameters detailed in the objective, and the accuracy and precision required.

a. Fuel loading. Specific techniques have been developed for inventorying or estimating living and dead biomass in forest and rangeland vegetative types. Sampling during the specific time of year when a prescribed fire is planned to occur is critical if grasses or forbs are an important part of the fuel complex. Timing is not as critical if only dead fuels will influence fire behavior. The following are some commonly used methods for determining fuel loading.

1) Fuel model assessment. A fuel model can be selected from the standard guide (Anderson 1982)⁴.

2) Photo-series. Series of photographs show different levels of fuel in

2. Elzinga, Caryl L., Daniel W. Salzman, and John W. Willoughby. 1998. Measuring and monitoring plant populations. BLM Technical Reference 1730-1. Printed Materials Distribution Center. National Business Center. Denver, CO. 476 p.

3. Norum, Rodney, and Melanie Miller. 1984. Measuring fuel moisture content in Alaska: Standard methods and procedures. USDA For. Serv. Gen. Tech. Rep. PNW-171. Pacif. Northw. For. and Range Exp. Sta., Portland, OR. 34 p. (Publications Management System, NFES 2127.)

4. Anderson, Hal A. 1982. Aids to determining fuel models for estimating fire behavior. USDA For. Serv. Gen. Tech. Rep. INT-122. Intermt. For. and Range Exp. Sta. Ogden, UT. 19 p. (Publications Management System, NFES 1574.)

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stands of selected vegetation types, and include fuel inventory data. Seven different photo series are available for natural and activity fuels, including two new stereo photo series for Pacific Northwest mixed-conifer, western juniper, sagebrush and grassland types (Ottmar and others 1998)⁵; and for black and white spruce types of Alaska (Ottmar and Vihnanek 1998)⁶.

3) Clipping and weighing. Live herbaceous fuels are commonly measured by clipping and weighing (Hutchings and Schmautz 1969; Chambers and Brown 1983). These techniques are commonly practiced by range staff, and will not be discussed here.

4) Forest fuel inventory. Forest vegetation and fuels have been divided into the following categories: standing trees, shrubs, herbaceous vegetation (grasses and forbs), forest floor litter, forest floor duff and downed woody material. Standard techniques for their inventory are outlined in Brown (1982)⁷.

b. Fuel distribution. An assessment of fuel distribution is valuable for both prediction of both fire behavior and effects. Significant variation in the amount and distribution of carrier fuels will affect fire behavior and may require adjustment in ignition. The presence of localized, large concentrations of fuel should be noted and considered when establishing the fire prescription, as these are a potential source of extreme amounts of heat, potentially damaging to vegetation and to soil. If fuel conditions are markedly different inside and outside of the prescribed fire area, such as on a slash unit, it may be desirable to obtain fuels information in the adjacent area for purposes of assessing fire potential and expected fire behavior.

c. Fuel moisture. Fuel moisture is defined as the ratio of the weight of water contained in particular sample of fuel to its oven dry weight, expressed as a percentage. Baseline information on general patterns of seasonal moisture in live and dead fuels may be required to determine the timing and prescription for a prescribed fire. Sampling moisture contents of slowly drying fuels may be necessary to establish whether the prescribed conditions are being approached. Fuel moisture both inside and outside of the burn unit should be monitored if the fuel complexes are significantly different. Materials such as large diameter dead woody fuel, duff, soil, and live fuels need only be sampled every two weeks, unless a significant rainfall event occurs. The number of samples required to accurately estimate fuel moisture is determined by

5. Ottmar, Roger D., Robert E. Vihnanek, and Clinton S. Wright. 1998. Stereo photo series for quantifying natural fuels. Volume I: Mixed-conifer with mortality, western juniper, sagebrush, and grassland types in the interior Pacific Northwest. PMS 830. National Wildfire Coordinating Group, National Interagency Fire Center. Boise, ID. (Publications Management System, NFES 2580.)

6. Ottmar, Roger D. and Robert E. Vihnanek. 1998. Stereo photo series for quantifying natural fuels. Volume II: Black spruce and white spruce types in Alaska. PMS 831. National Wildfire Coordinating Group. National Interagency Fire Center. Boise, ID. (Publication Management System, NFES 2581).

7. Brown, James K., Rick D. Oberheu, and Cameron M. Johnston. 1982. Handbook for inventorying surface fuels and biomass in the interior West. USDA For. Serv. Gen. Tech. Rep. INT-129. Intermt. For. and Range Exp. Sta., Ogden, UT. 48 p. (Publication Management System, NFES 2125).

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the accuracy and confidence that the user desires. One sample is never adequate. (See Norum and Miller (1982) for a detailed example and data sheets for determining the number of fuel moisture samples to collect.)

Various methods exist for measuring fuel moisture. By far the best method is to collect samples, and weigh them before and after oven drying. Fuel sticks that estimate 10 hour moisture are commonly available. They are not a good analog for 1/4 to one inch fuels, and are intended for use only in fire danger assessment. Moisture meters work only for dead fuels, and must be calibrated against true values obtained from the oven drying method. Fuel moisture theory and sampling procedures for dead and live fuels are discussed in the NWCG Fire Effects Guide, Chapter II, and in greater detail in Norum and Miller (1982) (see reference on a previous page), and in Countryman and Dean (1979)⁸.

2. Weather: If seasonal and diurnal weather is not known for a prescribed fire site, it may be valuable to obtain this information by monitoring at least one year ahead of the planned prescribed fire(s). Monitoring of weather conditions such as maximum temperature and minimum relative humidity, time of evening when the air temperature drops and humidity increases, and the amount and direction of terrain influenced winds will establish the time of day when weather parameters are met. A nearby RAWS station may be adequate to obtain this information.

Depending on the amount and type of weather data needed, weather collection equipment may be installed in the previous year to the prescribed fire, or in the months or weeks before the fire is scheduled to occur. If you choose to develop a short term climatology for a burn site, establish a weather station 4 to 6 weeks prior to the fire with a minimum of 5-10 days prior to ignition. Type 3 RAWS stations (portable) are ideal for this purpose. These may be radio or telephone activated and/or satellite linked. RAWS stations are available through the resource ordering system. Detailed information on both establishment and operation of manual and automatic weather stations can be found in the "Weather station handbook: An interagency guide for wildland managers."⁹

3. Photograph: Photographic documentation should be a routine part of all monitoring projects. A specific schedule for taking photos should be established, such as during the growing season before the fire, immediately before the fire, at the end of the first postfire growing season, and at designated yearly intervals. 35 mm slide film generally records more detail than print film, and prints can be made if necessary. Digital cameras are becoming increasingly common. While their resolution is currently significantly less than 35 mm slide film,

8. Countryman, Clive M. and William M. Dean. 1979. Measuring moisture content in living chaparral: A field user's manual. USDA For. Serv. Gen. Tech. Rep. PSW-36. Pacif. Southw. For. and Range Exp. Sta., Berkeley, CA. 27 p. (Publications Management System, NFES 2142).

9. Finklin, A. I. and W. C. Fisher, 1990. Weather station handbook: An interagency guide for wildland managers. PMS 426-1. National Wildfire Coordinating Group. National Interagency Fire Center. Boise, ID. 237 pp. (Publications Management System, NFES 1140 - with binder; NFES 2140 - paperback).

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technology is improving their image quality. An excellent discussion of the use of photo points and photo plots can be found in Elzinga and others (1998).

a. Photo points. Photo points record landscapes and plant community features. Photo points provide a visual record of the impact that a fire has upon a site, and allow comparison among years. They are the minimum monitoring level for treatment objectives that should be done. The point of origin, compass direction and angle of each photo point view must be recorded so it can be accurately replicated.

b. Photo plots. Photo plots are photographs of a defined small measurement area, often the vegetation measurement plot. They are the size of the photographic frame or slightly smaller, taken from above at a specified height. Each plot number should be recorded in the image.

4. Measures of plant mortality or injury:

a. Density. Density is a vegetation monitoring techniques that can be used assess plant mortality relative to a fire treatment objective. The objectives of a prescribed burn could be to burn at least 80 percent of the area of a mountain big sage community and have no more than 10 percent mortality of bunchgrass plants. Mortality of sprouting species can be most easily assessed at the beginning of the next growing season.

b. Staked plants. Much valuable information on plant mortality and vegetative response can be obtained from permanently staked plants. The intent of staking plants is to provide a record of the individual fuel situation in which a plant exists, the amount of damage inflicted upon that plant by the fire, and the type of recovery which the plant does or does not make. Plants can be marked with a metal stake placed far enough away to not have an influence on the heat that the plant receives from the fire. Wide-mouth canning jar lids, held in place with a bridge spike and numbered with high temperature paint also provide useful markers. Plants ought to be located, marked, and mapped in the days or weeks ahead of the fire. GPS coordinates can make it much easier to relocate marked plants.

5. Monitoring equipment:

a. Fire behavior and characteristics. Before the fire, equipment needs to be installed for monitoring rates of fire spread and flame length, such as reference stakes, and for estimating depth of burn (duff consumption), such as duff duff spikes or surveyors pins. Soil temperatures are most easily monitored using tile or mica chips covered with heat sensitive paints that are placed at the duff or soil surface and at various depths¹⁰. Duff spikes and soil temperature markers are best installed along a grid, or in association with tagged trees or plants. Locations of these devices should be recorded before the fire, because ash layers can make them difficult to

10. Heat sensitive paints are described on the web at <http://www.telatemp.com/Thermo.htm>

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relocate. Techniques for using this equipment are described in the NWCG Fire Effects Guide, Chapters II.D. and V.D.

b. Air quality. Local and State air quality officials ought to be consulted during the prescribed fire planning process to determine their monitoring requirements, and to obtain assistance in locating and installing any equipment required for air quality monitoring, such as nephelometers and filter samplers. (See NWCG Fire Effects Guide, Chapter IV.2.)

6. Sensitive features: Features such as wildlife trees, archaeological sites, cabins, populations of sensitive plants, nesting habitat, or other special features are identified before the fire, so their protection can be integrated into the burn plan. Actions taken can include flagging so that disturbance from suppression actions can be avoided; taking special measures to prevent them from burning, or applying fire in a highly controlled way at specified sites. Some of these actions may occur days or weeks before the fire, such as building handline, or removing adjacent fuel concentrations; or just before ignition, such as applying fire suppressant foam.

C. During The Fire

Fire behavior and location of the fire front are monitored during ignition. Fire weather should be monitored not only during the ignition phase, but for the entire length of time during which fire remains in the unit. Throughout the prescribed fire, comparisons must be made of predicted and observed fire behavior. Any deviation from the fire behavior limits established in the prescription must be reported to the Burn Boss.

1. Weather:
 - a. Spot weather forecast. A spot weather forecast shall be obtained each day until the fire is out.
 - b. Smoke dispersal forecast. In areas where prescribed fire smoke is a sensitive issue, a smoke dispersal forecast can help determine whether ignition is appropriate.
 - c. Weather observations. A fire behavior and weather observations data sheet (Appendix 3) must be completed for each prescribed fire. A standard set of weather observations should be taken every 30 minutes during the ignition phase and hourly during the operational period. Observations shall include: temperature, relative humidity, windspeed and direction, cloud cover, indicators of atmospheric instability, and the presence of thunderstorms.
2. Fire behavior and characteristics: Methods for the following elements are discussed in the NWCG Fire Effects Guide, Chapter II.D.
 - a. Rate of spread .

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- 1) Referenced observations.
 - 2) Metal tags.
 - 3) Grid marking system.
 - 4) Sketch map.
 - 5) Photography.
- b. Flame length.
- 1) Referenced observations.
 - 2) Photography.
- c. Flaming residence time.
- d. Fuel burnout time. The length of time during which large diameter woody fuels and duff burn, especially in the smoldering and glowing phases of combustion, has an important relationship to soil heating and mortality of buried plant parts, as well as duration of smoke production.
- e. Burn pattern. If the prescribed fire objectives include a requirement for a specific burn pattern or mosaic, the pattern of burn that is being obtained should be noted and communicated throughout the ignition phase.
- f. Potential control problems. The occurrence of any of the following should be noted, and the Burn Boss notified.
- 1) Spotting.
 - 2) Torching or crowning.
 - 3) Fire whirls.
 - 4) Fire behavior exceeding prescribed limits.
3. Smoke: Smoke can be monitored by using visual estimation. Air craft can be used to track plume height and direction. Smoke monitoring is discussed in more detail in the NWCG Fire Effects Guide, Chapter IV.D.
- a. Plume height and direction.
 - b. Dispersion.
 - c. Impacts on identified sensitive receptors.
 - d. Personnel exposure.
 - e. Presence of residual smoke after the ignition phase.
 - f. Presence of smoke on highways.

D. Postfire

Postfire monitoring activities include both observations and measurement. The major effort will be that required to determine whether fire treatment objectives have been met. Postfire data will

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be most accurate if collected at the same locations where data was obtained before the fire. An assessment must be conducted to determine whether sensitive features have been protected and other constraints met. Data collection specifically involves measurement of prefire plots or data points, estimation of mortality, and estimation and measurement of the severity of the fire.

1. Photo points and photo plots: While photo points may not be documenting a specific treatment objective, it is important to retake the photos soon after the fire so the impact of the fire upon the landscape, and upon specific plants, is documented. Photos must be again with the same camera orientation as for photos taken before the fire.
2. Smoke: Filter samples and any smoke data recorded by instruments during the fire must be collected. Some estimation of smoke production must be made. The most accurate estimates are based on fuel and duff consumption data.
3. Woody fuel consumption: If a quantitative fuel reduction objective was set, and fuel inventory was performed before the fire, that same inventory must be conducted again.
4. Litter/duff consumption: Measurements of litter and duff depth taken before the fire should be repeated at the same locations as for the prefire inventory. Each depth of burn pin or bridge spike is measured to determine the amount of organic matter consumed at that site.
5. Soil heating: Any probes, electronic devices, or temperature sensitive markers should be relocated, and read in the field. If temperature sensitive paint templates or chips are to be collected and read elsewhere, each temperature sensing device must be marked with its location during the sampling period.
6. Measures of plant mortality and injury:
 - a. Tagged plants. All tagged plants must be remeasured.
 - b. Plant density. Any plot data required to assess postfire plant survival or mortality, such as density measurements, must be collected again.
7. Indirect measures of plant mortality and injury: Relationships can be developed between fire behavior and consumption of shrubs and bunchgrasses. However, there are no clear relationships between these fire characteristics and postfire sprouting. Postfire regeneration of these plants can be related to the amount of damage sustained by the aboveground part of the plant, because there is a relationship between heating and consumption of aboveground plant parts and mortality of buried regenerating buds. If this damage is monitored and related to their postfire sprouting, information is then available that can be used to develop a link from the fire prescription to plant damage to postfire sprouting. Our ability to predict recovery of key species under different prescribed conditions will be significantly enhanced if these data are collected and used in the evaluation process.

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a. Shrubs. The amount of damage sustained by the above ground portion of sprouting shrubs and small deciduous trees is related to the amount of sustained heating of roots, root crown, and other subsurface reproductive structures, and thus relates to postfire sprouting. Sprouting can vary among species sustaining the same amount of damage because the location of regenerating buds varies by species. Blaisdell (1953) used the following classes for estimating damage to shrubs:

- 1) Unburned.
- 2) Leaves scorched or consumed.
- 3) Smaller branches and twigs consumed.
- 4) Most or all of trunk or shrub main stem consumed.

This information may be particularly useful when obtained from tagged shrubs, and later compared to their survival. These classes may also be estimated for data collection plots.

b. Bunchgrasses. Bunchgrasses survive a fire if some of the dormant buds and/or meristems from which shoot growth occurs are not lethally heated. These growing points are located at different depths above, at or below the surface, depending on the species. Conrad and Poulton (1966) related bunchgrass survival to specific damage classes:

- 1) Unburned.
- 2) Plants partially burned, but not within two inches of the root crown.
- 3) Plants severely burned, but with some unburned stubble less than two inches.
- 4) Plants extremely burned, all unburned stubble less than two inches and mostly confined to an outer ring.
- 5) Plants completely burned, no unburned material above the root crown.
- 6) Plants burned both above and below the surface, belowground portions of the root crown are consumed.

Damage classes related to the amount of fuel consumption can be noted for marked plants, and subsequent survival, growth, and production related to them. These classes may also be estimated for data collection plots. The relationships between these classes and mortality will vary among species.

c. Trees. Severity of burning of conifers has been related to postfire survival, with different species able to survive different amounts of damage. Crown scorch height and stem char height can be related to flame length, and correlated with the fire prescription.

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1) Crown scorch height. A tree crown is scorched if foliage is heated to a temperature that is lethal, but not high enough to cause its consumption. Average scorch height should be estimated for the stand or for individual tagged trees. Scorched foliage may not be apparent for several weeks after the fire.

2) Percent of crown scorched. The percent of crown volume with scorched foliage is a better indicator of tree mortality than crown scorch height because it considers the amount of live crown remaining to sustain the tree. Postfire mortality will be closely related to percent of crown scorched for most short needled conifers because scorched foliage generally indicates that buds and twigs are also dead. The average percent of crown scorch should be estimated and recorded for different size classes of trees within the stand or on tagged trees.

3) Percent of crown consumed. For some long needled pines, particularly ponderosa pine, and for western larch, crown scorch does not indicate crown death because buds are fairly well protected from fire heat. Death of buds and twigs is generally only indicated by the complete consumption of foliage. An estimate of crown consumption may later be correlated with actual mortality. Estimate and record the average percent of crown consumption on different size classes of trees within the stand or on tagged trees.

4) Stem char. For thin barked species such as aspen, cambium layers are usually dead beneath charred bark. For trees with thick or moderately thick bark, stem char does not necessarily indicate cambium death. Note the height of stem char, and percent of the base of trees that are charred within the stand or on tagged trees.

5) Root damage. Root damage can kill trees, even though there is no apparent damage to the tree crown. The severity of burn beneath tagged trees may be correlated with tree mortality, and the fire prescription. (See IV.H.2 below.)

8. Burn pattern: The attainment of a specific pattern of burn, a mosaic of areas where the fire did or did not burn, is an objective of many prescribed fires. Burn pattern occurs at different scales, ranging from a coarse scale in tree crowns, to a very fine scale in the litter/organic layer. Pattern can be monitored by visual estimation, along transects, with photography, or by remote sensing. Digital images can be classified and become part of a Geographic Information System or other database.

a. Canopy. Pattern within the tree or shrub canopy can be shown by areas where plant crowns are unburned, scorched, or consumed. An oblique image taken from a high vantage point, a hill or a tree, can be measured to determine percent of area in each pattern class. A low elevation aerial image will provide the best piece of data from which to extract this information for small burned units. For large fires, remotely sensed data may provide a source for burn pattern information. As images are analyzed, it should be noted that areas with unburned canopy may have been underburned.

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b. Surface. Burn severity is a qualitative term that can be used to describe the pattern of burning in the surface and subsurface fuel layer. Burn severity classes relate to different degrees of consumption of litter, duff, and soil organic layers, which closely relate to survival of plant roots and other buried reproductive structures. This downward heat pulse is not predicted by the fire behavior system and has no consistent relationship to fireline intensity. Burn severity relates closely to both fire effects on vegetation and soils, and the moisture content of large diameter woody fuels, duff, and other soil organic layers. When conducting postfire monitoring, noting burn severity and associated effects provides information that can be used to link fire prescriptions to fire effects. An example of descriptive classes of severity follows.

- 1) Unburned.
- 2) Scorched. Foliage is yellow, litter and surface vegetation are barely burned or singed.
- 3) Low severity. Small diameter woody debris is consumed; some small twigs may remain. Leaf litter may be charred or consumed, and the surface of the duff may be charred. Original forms of surface materials, such as needle litter or lichens may remain; essentially no soil heating occurs.
- 4) Moderate severity. Foliage, twigs, and the litter layer are consumed. The duff layer, rotten wood, and larger diameter woody debris are partially consumed; logs may be deeply charred; shallow ash layer and burned roots and rhizomes are present. Some heating of mineral soil may occur if organic layer was thin.
- 5) High severity. Deep ash layer is present, all or most organic matter is removed; essentially all plant parts gone. Consumption of a large proportion or essentially all coarse woody debris and soil organic layers occurs. Soil heating may be significant where large diameter fuels or duff layers have been consumed. The top layer of mineral soil may be changed in color; layer below may be blackened from charring of organic matter in the soil.

This severity classification can be modified or a new one developed for a site specific situation. Consistency of use among sites and years is the important factor. Pictures and descriptions of each class should be placed in a project file for reference by individuals who were not involved in the original monitoring of the prescribed fire site.

9. Global Positioning System: According to policy, fire perimeters must be recorded using a Global Positioning System (GPS). Large unburned areas within the fire perimeter can also be digitized to obtain a better estimate of actual acres burned.

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Chapter 7: Project Financing**A. Project Funding for Prescribed Fire**

Prescribed fire projects will be funded by equitable cost-sharing. Funding for the implementation of prescribed fire projects must be identified and agreed to at the Field Office level. It is the responsibility of each program area to cover their own regular (base-eight) salaries and fixed costs. This applies to items such as preliminary site assessments, writing environmental assessments, developing Prescribed Fire Plans, obtaining clearances, training, and monitoring. Regular salaries for fire management staff involved in prescribed fire activities are programmed in Preparedness (2810), identified in the FMP, and considered part of the Most Efficient Level (MEL).

Fund Code Guidance for the Hazardous Fuel Reduction Operations Subactivity (2823)

This subactivity is commonly referred to as the Fuels Management Program. The Congressional intent of this funding source is to focus on implementation. The Fuels Management subactivity requires the use of a project number with all expenditures. Project number YY99 is used with costs associated with general fuels program activities not tied to a specific project. This includes things such as training, non-implementation travel, major equipment purchases and program management. The term "Program Support" is commonly used to identify activities and costs associated with the use of the YY99 project number.

Complete funding guidance can be found in IM No. OF&A 99-008.

Uses of Funds:

Includes the costs of implementing prescribed fire, mechanical, and chemical treatments to reduce hazardous fuels and to restore fire to its natural role in ecosystems.

Includes mechanical and chemical treatments necessary to alter fuels as a precursor to the introduction of fire in its natural role.

Includes the costs of construction and maintenance of fuel breaks that are part of a scientifically planned, NEPA compliant network of strategically located linear connected areas where fuel characteristics are modified to break up continuity of hazardous fuels. To develop a network of connected areas, cooperative agreements with partners may be necessary.

Includes funding of prescribed fire, mechanical and chemical treatments to remove undesirable vegetation as the first step in ecosystem restoration, but excludes subsequent mechanical and chemical treatments, planting, and seeding to establish the desired vegetation.

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Excludes treatment of fuels generated in conjunction with commodity production activities, such as timber stand improvement and slash.

Excludes type conversions where the principal purpose is for commodity production.

Excludes annual maintenance of landscaping, transportation corridors, and right-of-ways.

Labor Costs:

Includes regular planned salaries for all fuels management permanent full time personnel who are dedicated for the full year to non commodity production fuels management activities. Includes shared positions with other agencies. Permanent full time fuels or forest management personnel that also have responsibility for treatment of fuels associated with commodity production must pro-rate their salary.

Includes salaries for career seasonal and seasonal personnel hired specifically for fuels management project implementation.

Includes salary for hours worked by qualified non fuels management personnel with responsibility for developing a project burn plan(s). Does not include salary for non fuels management personnel performing (fire or non fire) program-wide planning activities which address general fuels management activities. For example, the office's Range Specialist has been integrally involved in the prescribed fire program, is qualified, and has shared or been the lead in developing burn plans and will continue to do so regardless of whether they benefit the range management program. The employee's salary for the hours worked can be charged to the project.

Includes salaries for the hours actually worked on implementation for all non fuels management personnel (fire or non fire) that are a formal part of the unit's prescribed burn implementation team. For example, the office's Wildlife Biologist is a qualified ignition specialist and is used on all prescribed burns on and off the district land regardless of wildlife program benefits. The employee's salary for the hours worked implementing the project can be charged to the project.

Includes costs of project development and clearances for permanent full time support personnel (such as archeologist, environmental compliance specialist, and T&E Biologist) that do not have regular planned base salaries and are funded on a project-by-project basis. Funding is only for the hours worked on a project when their discipline is not a benefitting activity. Also includes the costs for these same activities if they are performed by qualified temporary hires and contracted specialists. For example, the office's archeologist, if funded on a project-by-project basis, or a contract archeologist, can charge salary for the time worked on the project. Funding should only be for the level of work needed to perform the basic task(s) meeting compliance requirements commensurate with the anticipated disturbance.

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Includes overtime and premium pay for all personnel, fire and non fire, permanent, career seasonal or seasonal, while actually involved in project implementation.

Excludes regular planned salaries for all fire and non fire permanent full time personnel, other than permanent full time fuels management personnel and forest management personnel that also have responsibility for treatment of non commodity fuels, or as previously described have lead roles in burn plan development or are formal members of the prescribed fire team. Fuels management funds (2823) for non fuels personnel performing covered roles as previously described are not spread to the respective disciplines to be used as base funding. These employees only charge to the specific project as the work is performed. Career seasonal and seasonal personnel hired under another fire subactivity or a non fire appropriation, may not charge their base salary to the hazardous fuel reduction operations subactivity. However, career seasonal and seasonal employees' appointments may be extended under the hazardous fuel reduction operations authority when dedicated to fuels project development and implementation, regardless of the original purpose of hire. Seasonals cannot be extended beyond the annual 1039 hour limitation.

Excludes all costs associated with general land management planning such as ecosystem plans, land management plans (RMP's), and program management plans (e.g., AMP's, HMP's, and FMP's). Program support fuels management personnel assigned to general land management planning activities would continue to code labor costs to their base-8 (2823) subactivity. For example, a fire manager working on an RMP or FMP would code all of their regular planned salary (base-8) to the 2810 subactivity, even if the work addresses fuels management, such as prescribed fire. A forester working on an RMP or an activity management plan would code to their regular planned subactivity for all labor costs, even if they address fire and fuels, which they should be doing to consider ecological disturbances.

Excludes all costs of managerial oversight which is normally funded through general administrative or non fire program management funds. Fire program managers, such as State, District, and Field Office Fire Management Officers (FMO's), should code to the Preparedness activity which covers general fire program management and readiness.

Travel and Per Diem Costs:

Includes travel and per diem for all personnel involved with project implementation activities. These costs would be part of project implementation and coded to the specific project number.

Includes travel and per diem for all approved personnel associated with developing, managing, and attending fuels management training and workshops as well as National Wildfire Coordinating Group's (NWCG) certified prescribed fire curriculum. These costs would be part of the office's fuels management program support and would use the YY99 project number.

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Administrative Support Costs:

Includes administrative support cost, but can only be assessed at the organization level directly responsible for implementing fuels management activities. This fee cannot exceed five (5) percent of the Field Office's target allocation. Subactivity 0777 (a general purpose, non program specific support costs) cannot be assessed to the fuels management program.

Aircraft Costs:

Includes flight time associated with hours actually worked on a project. Usually Call-When-Needed aircraft are more economical for fuels management activities than extending Preparedness (2810) contract aircraft and paying for both the availability and flight time. There may be exceptions, so an analysis should be performed to determine the most economical method before extending the length of an aircraft contract.

Public Awareness Costs:

Includes the cost of public awareness activities for specific projects.

Excludes cost associated with general fire education/awareness activities and general information about the use of fire or other generic fuels management activities.

Monitoring and Analysis Costs:

Includes costs for establishing plots for monitoring fire behavior, fuel moisture, and direct effects of the fire treatment, and immediate post-treatment monitoring of these plots. Long-term effects monitoring and analysis should be funded by the activities with responsibility for management of the vegetation.

Contracting:

Includes all costs associated with contracting. Contracts can be used for all, or portions of, project development and implementation.

Equipment Purchases:

Includes purchase of capitalized equipment needed for the average annual workload that cannot be economically contracted, leased, or rented. Capitalized equipment is identified as acquisition costs equal to or greater than \$10,000. Before the standard procurement process is initiated, the proposed purchase must be supported by an analysis of cost alternatives and submitted with a request to authorize the purchase to the State FMO. Purchases should always consider cost sharing with other activities and/or statewide sharing. These types of purchases would normally be considered as program support costs and coded to the YY99 project number. Heavy equipment, including vehicles, tractors and other mechanized equipment, should not be purchased. The purchase price of this category of items can be misleading as it only represents a portion of the total long term indirect costs, such as maintenance, operations, training, storage, and liability.

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Includes the cost of replacing equipment destroyed while being used on a fuels management project and will require a Board of Survey action. These types of purchases would be coded to the specific project number.

Miscellaneous Costs:

Includes costs of moving fuels management personnel (PCS moves). Costs associated with PCS are program support costs and use the YY99 project number.

Includes costs of procuring supplies and office equipment for permanent fuels management. These are program support costs and use the YY99 project number personnel.

Includes costs of all supplies directly related with project development and implementation.

Interagency Fuels Management Activities:

See Chapter 8 for financial details relating to Cooperation and Assistance.

B. Hazard Pay

Current policy is that hazard pay will not be paid for any prescribed fire. [Note: An interagency proposal covering hazard pay on prescribed fires has been developed and submitted to the Office of Personnel Management. This proposal would permit the payment of hazard pay on prescribed fires under some conditions. If and when this proposal is approved, an Instruction Memorandum will be issued.]

Should a prescribed fire become a wildfire, suppression policies will govern the conduct and use of hazard pay.

C. Escaped Fires

When any prescribed fire is declared a wildland fire, it is suppressed using the concept of the "Appropriate Management Response." All costs associated with the suppression actions will be charged to the 2821 subactivity. A "Fire Number" must be assigned for this purpose. (See Chapter 9 for Escaped Fires and Chapter 10 for Fire Reports.)

D. Contracting for Services

The Bureau can contract to conduct all or part of the prescribed fire operations and/or all or part of mechanical treatments for "Hazard Fuel Reduction" projects. Standard contracting procedures will be followed. Extra care must be taken when developing specifications for prescribed fire contracts. The exact service or end product must be carefully described to insure the desired outcome.

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Contractor personnel conducting prescribed fire operations must meet the same qualification, experience, and fitness requirements as BLM personnel would if they were conducting the operation. See Chapter 5 for qualification information.

By definition a contractor is not supervised by BLM personnel. The contractor is fulfilling the terms of the contract and is responsible only to the contracting officer or designated representative. This concept is valid whether the contractor is executing a full service prescribed fire contract, or assisting the BLM in the execution of a project, e.g., providing holding and/or mop up services. If a contractor is actively involved in igniting, holding or mopping up a BLM prescribed fire, a Contracting Officers Authorized Representative (COAR) or Project Inspector (PI) will be on the site (exceptions can be made for late stage mop up and patrol) to insure that the burn objectives are being met and that the terms of the contract are adhered to.

The BLM representative (COAR or PI) must have prescribed fire and/or wildfire qualifications equal to what the BLM would require if a BLM Prescribed Fire Burn Boss were conducting the actual operations. This requires coordination with the Contracting Officer to insure that qualified personnel are designated as COAR and PI's.

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Chapter 8: Cooperation and Assistance**A. Cooperation**

Offices are encouraged to enter into agreements for the use of prescribed fire resources. Joint ecosystem based prescribed fire management programs are encouraged to accomplish resource or landscape management objectives when consistent with land use plans. These partnerships are encouraged at both the programmatic and project levels to implement prescribed fire projects.

B. Other BLM Units and Other Federal Agencies

Assistance to other BLM units may be provided without formal agreement. If the assistance is related to the implementation of prescribed fire projects, the assisting unit may use the prescribed fire number assigned by the host unit.

Coordination with other Federal agencies will occur in the planning phase for joint prescribed fire projects. The BLM may provide assistance for prescribed fire that will be conducted on land administered by other Federal Agencies. The "Interagency Agreement for Fire Management," dated 2/20/97, provided for interagency assistance without additional agreements. Assistance is initiated by the issuance of "Task Orders" that provide the project specifics. Fuels management, "including prescribed fire" is specifically covered in the agreement. The agreement states that "Agencies may choose to bill by mutual agreement."

Instruction memorandum No. OF&A 99-008 provides the following guidance:

The process the Bureau follows for interagency fuels management activities is similar to the process BLM follows for assistance on Wildland fires. The Bureau fully endorses the concept of interagency support and recognizes that well planned and managed interagency activities should benefit all parties. Unlike emergency suppression activities, no office is obligated to provide fuels management assistance if it conflicts with BLM workload priorities and jeopardizes achieving BLM's performance measures.

1. All BLM interagency fuels management activities (prescribed fire, mechanical, chemical) involving 2823 funding must have the following:

- **An assigned fuels management project number that is unique to that project**, not one number for all interagency activities or one number for each agency. Use a project number from the list of numbers assigned to each Bureau Field Office. The project number enables financial tracking and the documentation of the project in the Fire Reporting System.
- **Documentation of each project in the Bureau's Fire Reporting System.** The local BLM office that assigns the fuels project number is responsible

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for filing the Fire Report for the project as long as that assistance number is used by any BLM office. The assistance Fire Report is easy to complete and requires no specific knowledge of the project or BLM's costs.

2. The 1999 Amendment to the master 'Interagency Agreement for Fire Management,' which covers the BLM, BIA, FWS, NPS and the USFS, addresses several items among which is reimbursement for fuels management activities. Section V, G, item 7, states as follows:

The Interior agencies have agreed to not reimburse for services rendered to one another under the Hazardous Fuel Reduction Operations program. Potential deficiencies in individual agency's Operations accounts due to assistance rendered will be covered by funding transfers following normal Department protocols. The Interior bureaus and the Forest Service also agree to not reimburse each other for Hazardous Fuel Reduction Operations assistance except for extraordinary situations in which there is no opportunity for reciprocal services to achieve performance targets. Reimbursement is acceptable only when the amount to be reimbursed represents a significant portion (greater than ten percent) of the office's allocation.

The phrase "ten percent of the office's allocation" only applies to the U.S. Forest Service since the Interior agencies, through the "Master Interagency Agreement" amendment and previous documents, have already agreed to not reimburse for any services regardless of cost. The reimbursement phrase refers to that portion of work beyond what has been off-set through reciprocal services. It should also be noted that national caches run by the Forest Service have no allocated fuels funds. Therefore, they may choose to bill for all fuels management orders as they currently can for non-suppression activities. In keeping with the intent of minimizing administrative costs, BLM offices should work with their Geographic Area's national cache. If managed by the Forest Service, see if an arrangement can be made, such as picking up the order as opposed to having it shipped, to eliminate billing. In general, the most efficient method of obtaining supplies for fuels activities is to work directly with our local interagency neighbors.

3. When another Federal agency requests BLM's assistance on a fuels management project, the request should go to the local BLM Field Office. The local BLM office assigns a fuels management project number and that will be the only BLM number issued for that project regardless of where the BLM assistance is obtained. If the local BLM office provides all of the requested assistance, all activities are handled strictly between the two interagency neighbors. If only some, or no, local BLM assistance can be provided, it is the responsibility of the requesting agency to decide if they want to continue to seek assistance from more distant sources. If BLM assistance is obtained from other sources, usually through the normal Resource Ordering process (similar to wildland fires), the original BLM project number assigned is the only one used. The Bureau's fuels project number is only used to cover BLM costs. Each BLM office responding uses their own office designation code (such as OR-010) with the 2823 subactivity code, the program element of "00," and the assigned project number given by the local BLM office. All costs of interagency assistance will not be considered part of any office's fuels management allocation. By having a unique project number and the Fire Report, these costs can be tracked at

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the national level. Budget adjustments among the agencies can be made if necessary. For example, a Field Office has been allocated \$100,000 fuels funds (2823) to meet their program support and project implementation costs to accomplish that year's planned fuels management workload. If the office uses all of this allocation on their projects, plus an additional \$8,000 for documented interagency assistance, they will not be considered over expended for the additional \$8,000. Because of the complexity that interagency assistance introduces into fund management, every office must promptly and accurately document their expenditures and activities.

For those infrequent situations when an interagency partner does not request BLM for local services and only wants to get radios from the national cache (which BLM manages) or supplies from the Great Basin national cache (which BLM manages), a unique fuels management number for each agency has been established at the National Interagency Coordination Center (NICC). This number will only be used by NICC for national cache items when no BLM Field Office number has been assigned.

4. Interagency assistance activities should not be used to expand BLM's workforce numbers or extend the length of BLM's workforce season more than one full pay period. The Bureau is still accountable to the 1,039 hour length-of-season limitation on seasonal employees. Assistance workloads must not be part of any consideration to convert seasonals to career seasonal (WAE's) or career seasonals to permanent full time. Interagency assistance will also not be considered when assessing the local workload for the purpose of establishing a permanent full time fuels management position.

C. Private Individuals and Organizations

Agency administrators should enter into agreements with private parties on intermingled lands when resource objectives can best be met through this approach. The agreements will specify the exact lands involved, the overall objectives, what actions will be taken by each party, and how costs will be shared. The BLM has only very limited authority to expend public funds to provide benefits on private lands. Any expenditure on private land must have a clear benefit to biological resources on public land administered by BLM. In most cases the private land owner must fund a proportional share of the project cost. However, this does not need to be a monetary exchange. The private land owner(s) may provide services (e.g., line construction), equipment (e.g., engines, water tenders or dozers), supplies (e.g., fuel), or personnel to fulfill their part of the obligation.

There may be occasions where a private land owner would allow the BLM to burn private land to facilitate a BLM project. For example moving a perimeter to a road or natural barrier on private land would allow the BLM to avoid constructing a significant amount of fire line. In such cases there is a clear benefit to the BLM and asking the private land owner to pay a share of the cost would not be appropriate.

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D. Prescribed Fire Management Teams and Support Modules

There are six Interagency Fire Use Teams available to provide assistance in planning, developing, and implementing the prescribed fire program. These teams consist of seven personnel and include the following positions: Team Leader (Incident Commander), Operations Section Chief, Planning Section Chief, Logistics Section Chief, Prescribed Fire Behavior Analyst, and two trainees. These teams are capable of providing technical assistance in the planning, implementation, and evaluation of complex prescribed fire projects as requested by the ordering unit. For additional information refer to the National Interagency Prescribed Fire Management Teams Operational Guide.

These teams can be ordered through the normal dispatch system. Local dispatch offices should forward orders to the appropriate Geographical Area Coordinating Center.

The National Park Service maintains Prescribed Fire Support Modules. These modules are seven people each and are trained to do ignition, holding and monitoring of prescribed fires. The modules are available for interagency use. At this time the use of the modules outside of the National Park Service needs to be coordinated through the program coordinator. The program coordinator can be contacted at: 208-387-5200,

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Chapter 9: Escaped Fires**A. Definition of Escaped Prescribed Fire**

A Prescribed Fire becomes a wildland fire when the Prescribed Fire Burn Boss determines that an escape has, or is likely to occur. Fire outside of the planned perimeter, or outside any planned "Buffer or Allowable Areas," that cannot be contained with the holding forces identified in the Prescribed Fire Plan is an escape and will be declared a wildland fire. This is not fire that crosses the fire line which can be contained by resources on-site (no suppression charges will be used). If fire suppression funds (2821) are used to contain a prescribed fire, it must be declared an escaped fire.

Some Prescribed Fire Plans identify "Buffer or Allowable Areas" where a fire outside the planned perimeter will not be declared a wildland fire until it exceeds specified criteria, exceeds a stated target size or threatens the boundary of the "Buffer or Allowable Area." In such cases an escape does not need to be declared until the criteria as stated in the Prescribed Fire Plan have been exceeded.

Once a prescribed fire becomes a wildland fire it cannot be returned to prescribed fire status. For additional information, see Chapter 10 for fire reporting requirements and Chapter 7 for financial information.

B. Escaped Prescribed Fire Actions

When a prescribed fire is declared a wildland fire, managers still have the full range of suppression options available under the concept of the "Appropriate Management Response." If a prescribed fire is declared a wildfire a "Fire Number" will be assigned and all suppression costs will be charged to the 2821 subactivity.

The following actions will be taken on all Bureau prescribed fires that escape and are declared wildland fires:

1. Take prompt and reasonable action to control and suppress the fire. This should include the development of a "Wildland Fire Situation Analysis" to determine the appropriate suppression action.
2. Notify the BLM Agency Administrator responsible for the area.
3. Notify the other Agency Administrator(s), and/or other land owners that may be affected, of the escaped fire. Coordinate suppression actions with the other affected parties.

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4. Document the time and environmental conditions that existed when the escape occurred.

5. Document the incident, including all actions prior to and after the escape. Set up a file that includes all pertinent information, i.e., the prescribed fire plan, a chronology of events including the prescribed fire report and unit logs or individual statements, the fire investigation report, weather forecasts including any spot forecasts, Remote Automated Weather Station (RAWS) data and National Fire Danger Rating System (NFDRS) data for the day of the escape for the nearest weather stations, photos, and any appraisal of damages.

Since all prescribed fires are planned management actions, an escape onto non-Federal land may lead to a Tort Claim and liability issues. The instructions contained in Manual 1386 should be followed. Special attention to documentation is critical.

C. Escaped Prescribed Fire Administrative Review

A prescribed fire that escapes and requires an expenditure of suppression funds or results in property damage, injuries or fatalities will be investigated. Bureau Manual 1112 - Safety, Paragraph .22, outlines accident investigation procedures. The following guidelines apply to escaped prescribed fire reviews.

1. The objectives of the prescribed fire review are:
 - a. To prevent future escapes from occurring and to establish accountability.
 - b. To determine if the Prescribed Fire Plan was adequate for the project.
 - c. To determine if the prescription, actions, and procedures set forth on the Prescribed Fire Plan were followed.
 - d. To determine if overall policy, guidance, and procedures relating to prescribed fire operations are adequate.
 - e. To determine the level of awareness and the understanding of the personnel involved, in regard to procedures and guidance.
 - f. To determine the extent of prescribed fire training and experience levels of personnel involved.
2. Responsibilities for the review are as follows:

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a. **Fire Management Officer.** The Fire Management Officer is required to make an investigation of all escaped prescribed fires either personally or through an appropriate designated investigator.

b. **Field Office Manager.** The Field Office Manager has the responsibility for ensuring adequate and proper investigation of all escaped prescribed fires that result in personal injuries, burn onto private or other agency land, or requiring expenditures of up to \$50,000 for suppression and/or damage to property. The Field Office Manager may appoint an investigation team or request that one be appointed consistent with Manual Section 1112 - Safety, paragraph .22D, Accident Investigations.

The Field Office Manager will notify the State Director of escaped prescribed fires meeting the criteria in Chapter 8.C.2.b. within 24 hours. Copies of the completed review report will be sent to the State Director, SFMO, and the Director OF&A.

c. **State Director.** State Directors have the responsibility for ensuring adequate, proper investigation of all prescribed fire escapes resulting in serious or multiple personal injuries, significant burned area on private or other agency lands, or has an estimated expenditure of from \$50,000 to \$100,000 for suppression and/or property damage.

The State Director will notify the Director, Office of Fire and Aviation, of escaped prescribed fires meeting the criteria in Chapter 8C.2.c. within 24 hours. Copies of the completed review report will be sent to the Director OF&A.

d. **BLM Director (FA-100).** The Director is responsible for ensuring adequate and proper investigation of all prescribed fire escapes resulting in fatalities(s), injuries to people not involved in the prescribed fire operation, fire shelter deployment(s), a major transportation route closure, smoke significantly impacting a major population center or caused a public health concern, or where suppression expenditures and/or property damage will exceed \$100,000.

3. The documentation required for a review are those listed below. A review team will be provided with all of the **original** documents related to the incident.

a. Those items listed in Chapter 8. B.

b. Documents pertaining to the qualifications and experience of the Prescribed Fire Burn Boss, Ignition Specialist, Holding Specialist, and other key overhead. This would include red cards, training and experience records, and task books.

c. Dispatch logs, radio logs, and any aviation records or logs.

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Chapter 10: Reports**A. Individual Prescribed Fire Report**

All prescribed fires will be assigned a “Prescribed Fire Number” and will be reported on the BLM Fire Reporting System. A block of numbers has been issued by the National Office of Fire and Aviation for each reporting office.

Instructions for reporting prescribed fires are found on the Internet at www.nifc.blm.gov/nsdu/fire_reporting/index.html.

Some unique entries will be required to allow the Bureau to capture the required data.

1. The acreage for the project requires two entries in the “Statistical Data section” of the report: The first is the actual burned area or **Black Acres**, or the actual acres treated for mechanical treatments; the second entry is for the total project size or “**Project Acres**.”
2. An entry for the Fire Behavior Prediction System (FBPS) fuel model will be required.
3. An estimation of preburn fuel loading is required. Fuel loadings should have been determined by using a combination of experience, photo series, and inventory prior to the development of the Prescribed Fire Plan. As an alternative standard fuel loadings of light, average, or heavy may be selected.
4. A post burn estimation of the percentage of fuel consumed by the prescribed fire is also required. A combination of experience and inventory will provide an adequate level of information. As an alternative a standard light, average, or heavy fuel consumption may be selected. This will make it possible to estimate the emissions produced by each prescribed fire project, and allow for the accumulation of baseline data.
5. An entry must be made to identify the objective of the prescribed fire project. This entry should identify the overall objective of the project.
6. An additional entry must be made to identify the benefitting program(s). Up to seven entries can be made. However, the total acreage shown cannot exceed the total Black Acres for the entire project. The above information will allow the Bureau to track accomplishments and costs and facilitate end-of-year reporting.

B. Escaped Prescribed Fire Reports

If a prescribed fire escapes and is declared a wildfire, two fire reports are required. The acreage burned while the fire was considered a prescribed fire would be reported as prescribed fire acreage

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using the “Prescribed Fire Number.” Acreage burned after the fire was declared a wildfire would be reported as wildfire acreage using the local “Fire Number.”

Instructions for both reports can be found at: www.nifc.blm.gov/nsdu/fire_reporting/index.html.

C. Other Agency Assist Reports

The purpose of using assist numbers is to track funds spent to assist other agencies with Prescribed Fire or other Fuels Management projects. While “offset services” or billing is not required when providing assistance, using an assist number provides the basis for such actions and allows the Office of Fire & Aviation to track the total costs of assists to other agencies.

Assist Prescribed Fire numbers should only be used with the 2823 subactivity.

Assign one number per project where the cost must be tracked. Local offices may choose to assign one number per agency where there are numerous assists to a single local agency. Use the next available Prescribed Fire Number from the block assigned to your office. Refer to Chapter 8 Section B.

Do not use an assist number for assists to other BLM offices; use the prescribed fire number assigned by the host unit.

EXAMPLE OF A
PRELIMINARY BURN SITE REVIEW

Review Group

Field Office _____
Location (w/map) _____
Project Name _____
Project Number _____

A. Management Consideration

Land/Resource Planning Documents: _____
Present Management Constraints: _____
BLM Relationship W/Operator: _____
Potential Conflicts with Other Uses: _____
Smoke Management Issues: _____
(Consider location of communities, prevalent winds, smoke sensitive air sheds, etc.)

Resource Objectives: 1. _____
2. _____
3. _____
4. _____

B. Site Analysis

General Site Description: _____
Plant Species and Densities: Bare Ground % _____ Litter Depth: _____
Overstory: _____, _____
Understory: _____, _____
Topographic Features: % Slope _____ Elevation: _____
Aspect: _____ Fuel Description: Height: _____
Continuity: _____ Loading in tons/AC: _____
By Size Class: _____
Fuel Profile Adjacent to the Planning Unit: _____

Site Considerations

Water Quality **Water Shed** **Water Source** **Recreation**

Wildlife/T&E **Wildlife/Other** **Wilderness** **Mining**

Archaeology **Other** _____

Land Status/Use Conflicts: _____

Type of Ignition: _____

Season to Burn: _____

Barriers to Fire: _____

Special Equipment Needed: _____

Preburn Actions Needed to Meet Fire Behavior Objectives: _____

Fire Organization (Specify number of people needed): **Burn Manager** _____, **Burn**

Boss _____ **Firing Crew** _____, **Holding Crew** _____, **Other** _____

Type and Amount of Equipment Needed: _____

Duration of Activity: Site Preparation _____

Implementation _____

Post-Burn Activities _____

E. Logistics of Project

Travel Time to the Site _____

Preparation _____

Camp/Motel Arrangements _____

F. Recommendations

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

JOB PLANNING CHECKLIST

Field Office _____ Project Name _____
 Project Number _____ Subactivity _____

SECTION I - ACTION REQUIRED TWO YEARS PRIOR TO AWP.	DATE	INITIAL
1. Prescribed Fire Project Proposed to local Agency Administrator.		
2. Local Manager approves or denies further action and assigns the project to appropriate area staff person.		
3. Site inspection. Map and initial flag project. Preliminary objective determined and discussed. Environmental concern identified and agreement that objectives can be met.		
<p>4. Check and document the following:</p> <ul style="list-style-type: none"> a. Planning Documents b. Land Claims c. Mining Claims d. Wilderness Status e. Water Rights Status f. Possible threatened and endangered species conflict g. Possible conflicts with wildlife concerns h. Possible problems with soil, water quality, or air quality i. Possible problems with livestock, wild horses or burros j. Possible conflicts with other authorized uses k. Possible conflict with other Federal, state, or local government agencies and public. <p>*Note: Indicate either Conflict (C), Possible Conflict (PC), No Conflict (NC), or Not Applicable (NA). If a conflict or possible problem does exist, explain on a separate sheet or memo and attach.</p>		
5. Local Manager reviews and resolves or initiates resolution of conflicts or terminates the proposal.		
6. Prepare a prescribed fire project file. Include this checklist, full documentation of all items, and best available map of the project area.		
7. Initiate possible Co-op agreement and contributions. Prepare rough draft of co-op agreement(s).		

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

<u>SECTION II - ACTION REQUIRED ONE YEAR PRIOR TO AWP</u>		
8.	Visual contrast Rating completed (form #8400-4) and mitigated if required.	
9.	Cultural Resources/Antiquities inventory completed and mitigated if required.	
10.	Environmental Analysis report prepared, reviewed and signed	
11.	Local Manager reviews the mitigation identified in Environmental Assessment, Cultural Resource Report, Visual Resource Management, draft co-op agreements, and resolves or mitigates conflicts.	
13.	Prescribed Fire Plan prepared and approved.	
14.	Resource Advisory Council review.	
15.	Permission by private land owners for access, if needed.	
16.	Co-op agreements finalized and signed.	
17.	Office staff review and approval.	
18.	Public review and/or involvement of interest groups, tribal entities, user groups, or individuals.	
19.	Final project lay out.	
20.	Project submitted to Agency Administrator.	
21.	Final approval.	
<u>SECTION III - AWP & JOB COMPLETION</u>		
22.	Contracting Draft prepared if this option selection: a. Contract Draft reviewed. b. Contract advertised. c. Bids reviewed. d. Contract awarded. e. Contract administration COAR and PI assigned. (These are the only people authorized to perform administration of the contract.)	
23.	Implementation of Prescribed Fire Plan.	
24.	Conduct long term monitoring of resource objectives	

Additional comments or information:

PRESCRIBED FIRE PLAN TABLE OF CONTENTS

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Preparers Signature	<u>1</u>
Reviewed By	<u>1</u>
Technical Review Certification	<u>1</u>
Complexity Rating	<u>1</u>
Cost Estimate	<u>1</u>
Prescribed Fire Plan Approval	<u>1</u>
EA & RIPS Numbers	<u>1</u>
Technical Review Checklist	<u>2</u>
Part II-Management Summary & Risk Analysis	
Management Summary & Risk Analysis	<u>4</u>
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Resource Objectives, Fire Treatment Objectives & Constraints	<u>5</u>
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Ignition and Holding Procedures	<u>13</u>
Mop Up and Patrol Plan	<u>14</u>
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Job Hazard Analysis	<u>A</u>
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A= Attached AN= As Needed

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

**EXAMPLE OF A
PRESCRIBED FIRE PLAN**

PROJECT NAME

FIELD OFFICE

Prepared By: _____ **Date:** _____

Reviewed: By: _____ **Date:** _____

Reviewed By: _____ **Date:** _____

Technical Review By: _____ **Date:** _____

The approved Prescribed Fire Plan constitutes a delegation of authority to burn. No one has the authority to burn without an approved plan or in a manner not in compliance with the approved plan. Actions taken in compliance with the approved Prescribed Fire Plan will be fully supported. Personnel will be held accountable for actions taken which are not in compliance with elements of the approved plan regarding execution in a safe and cost-effective manner. The complexity of this project is rates as:

HIGH _____ **MODERATE** _____ **LOW** _____

Estimated Cost Per Acre: _____

Funding Source(s): _____

EA Number: _____

RIPS Number: _____

Approved By: _____ **Date:** _____

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

PRESCRIBED FIRE PLAN REVIEW

Field Office:	EA Name:
Project Name:	EA Number:

	FO Review	Technical Review
Supporting Analysis Document (NEPA) (OPTIONAL)		
Decision Document (ROD) (OPTIONAL)		
Prescribed Fire Plan Elements:		
Complexity Rating		
Cost Estimate		
Management Summary & Risk Analysis		
Resource Objectives, Fire Treatment Objectives, & Constraints		
Physical Description		
Map(s)		
Environmental Parameters & Prescribed Fire Prescription		
Fire Behavior, including calculations and narrative		
Smoke Management Information		
Monitoring Information		
Notifications		
Organization & Equipment List		
Air Operations Organization/Plan		
Ignition and Holding Plan		
Mop Up and Patrol Plan		
Escaped Fire Plan		
Job Hazard Analysis		
Public Safety Provisions		
Medical Plan		
Communication Plan		
Go/No GO Checklist		
Prescribed Fire Briefing Checklist		
Test Fire Provisions		

Cost Summary		

Comments: _____

DRAFT

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

MANAGEMENT SUMMARY & RISK ANALYSIS

Draft

PROJECT OBJECTIVES

RESOURCE OBJECTIVES

FIRE TREATMENT OBJECTIVES

TOLERABLE DEVIATION OF OBJECTIVES

CONSTRAINTS

PHYSICAL DESCRIPTION

Legal Description:

Lat./Long.

Size:

County:

Elevation: Top:

Bottom:

Aspect:

Slope %:

Drainage:

General description of the site:

DESCRIPTION OF FUELS

FUELS DESCRIPTION NATURAL:

ACTIVITY:

Photo series and Code(s): GTR:

Code:

Fuel Model(s): NFDRS

FBPS

SIZE CLASS TONS ACRE Total Dead:

Duff Depth:

Continuity:

0-."1

Shrubs:

Surface Fuel Depth:

1"-3

Herbaceous:

3"-9"

Total Fuel Loading (Live & Dead):

9"-20"

20" +

General description of the fuels adjacent to the project area:

ENVIRONMENTAL PARAMETERS

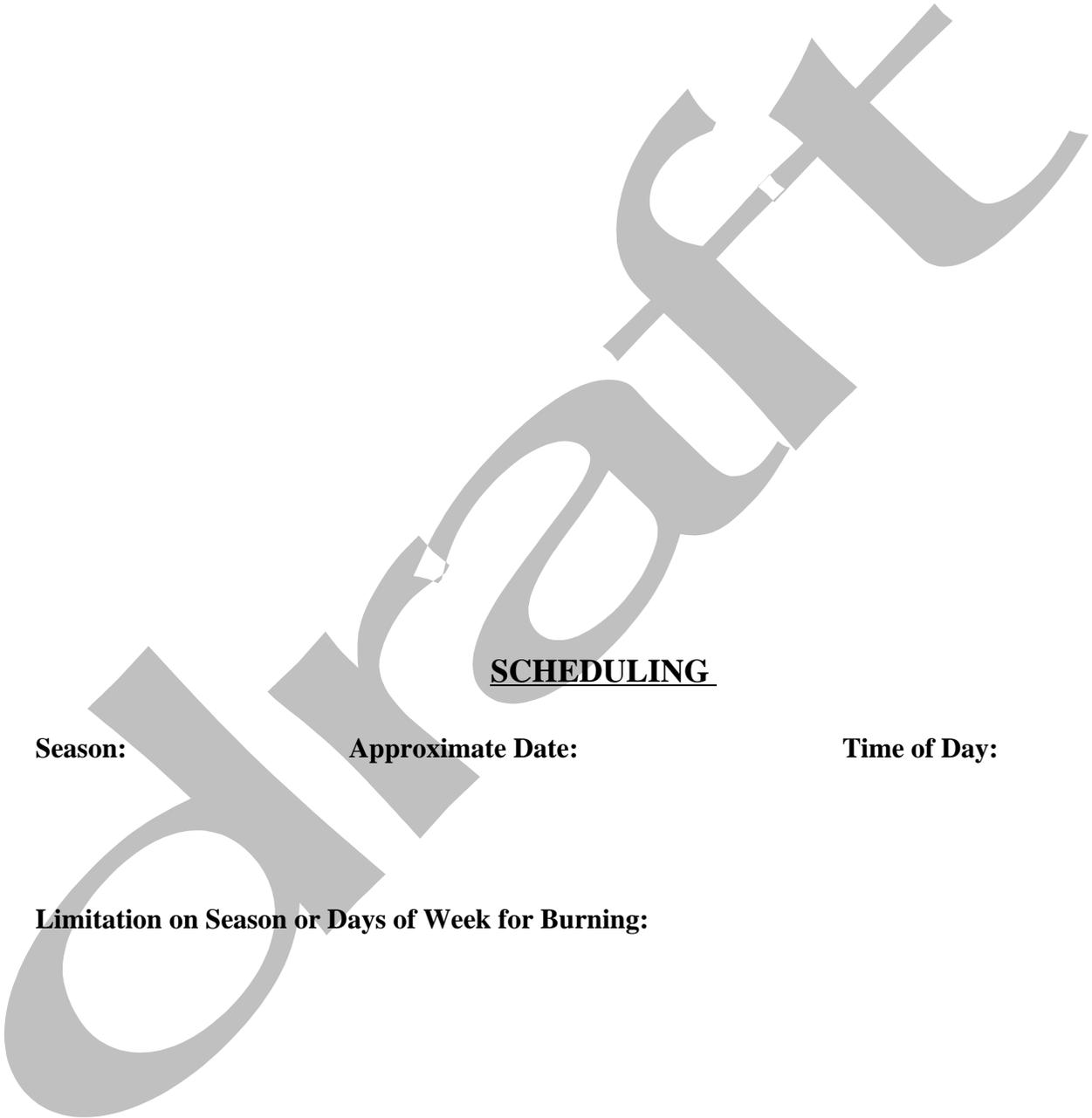
	ACCEPTABLE RANGE			
	(Low)	(High)	(Desired)	
Temperature				OUTSIDE AREA AT CRITICAL HOLDING POINT
Relative Humidity				
Wild Speed (Mid Frame)				
Slope				
Wind Direction				
1 hr. Fuel Moisture				
10 hr. Fuel Moisture				
1000 hr. Fuel Moisture *				

PRESCRIBED FIRE PRESCRIPTION

	ACCEPTABLE RANGE			
	(Low)	(High)	(Desired)	
				OUTSIDE AREA AT CRITICAL HOLDING POINT
Fuel Model(s)				
Rate of Spread - Ch./hr.				
Flame Length - Feet				
Live Fuel Moisture - % *				
Duff Moisture - % *				
Soil Moisture - % *				
Scorch Height - Feet *				
Probability of Ignition - %				
Spotting Distance - Miles				

* If Applicable

FIRE BEHAVIOR NARRATIVE



SCHEDULING

Season:

Approximate Date:

Time of Day:

Limitation on Season or Days of Week for Burning:

Length of Ignition Phase:

Length of Burnout Phase:

SMOKE MANAGEMENT

Smoke Management No.(If Required):
Distance and Direction From
Smoke Sensitive Area(s):

Necessary Transport Wind Direction:
Visibility Hazard(s) (i.e., roads, airports, etc.):

Actions to Reduce Visibility Hazard(s):

Can Residual Smoke Be a Problem?

Special Constraint(s)/Consideration(s):

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

MONITORING

DRAFT

PUBLIC INFORMATION

Public Information: (What, When, By Whom):

NOTIFICATIONS

Pre-burn & Burn Contacts: (When, By Whom):

Who To Notify	Phone #'s	When to Notify	Who Will Make The Notification

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

ORGANIZATION & EQUIPMENT LIST

Prescribed Fire Burn Boss:
Ignition Specialist:

Resource Advisor:
Holding Specialist:

		AMOUNT SUPPLIED BY	
PERSONNEL	TOTAL AMOUNT	BLM	OTHER
EQUIPMENT			
Ignition Equipment			
Engines			
Water Tenders/Other			
Fittings/Hose/Etc.			
Pumps and Accessories			
Other (Radios, Belt Wx Kits, etc.)			

If aerial firing is planned, develop a Air Operation Organization and Plan and attach to the prescribed Fire Plan.

Appendix 3, page 14

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

IGNITION & HOLDING

Preburn Work:

Ignition Plan:

Potential Holding Problems:

Location of Holding Forces and Instructions:

Water Sources:

Action Plan for Slopovers:

Other:

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

MOP UP & PATROL PLAN

Draft

DAILY MOP UP SHIFT PLAN

Burn Date:

Shift Plan Date:

PREDICTED WEATHER NEXT 24 HOURS		
	MINIMUM	MAXIMUM
Temperature		
Relative Humidity		
Wind Speed (20 ft.)		
Wind Direction		

Weather Trend Narrative:

Shift Plan Objective:

Special Considerations and Hazards:

Mop Up IC:

Patrol Coordinator:

		AMOUNT SUPPLIED BY:		
PERSONNEL	TOTAL AMOUNT	BLM	PURCHASER	OTHER
EQUIPMENT				
ENGINES				
HOSE				
PUMPS				
OTHER				
Add extra pages as needed				

Attach weather forecast.

ESCAPED FIRE PLAN

This page describes the action to be taken should an escape occur:

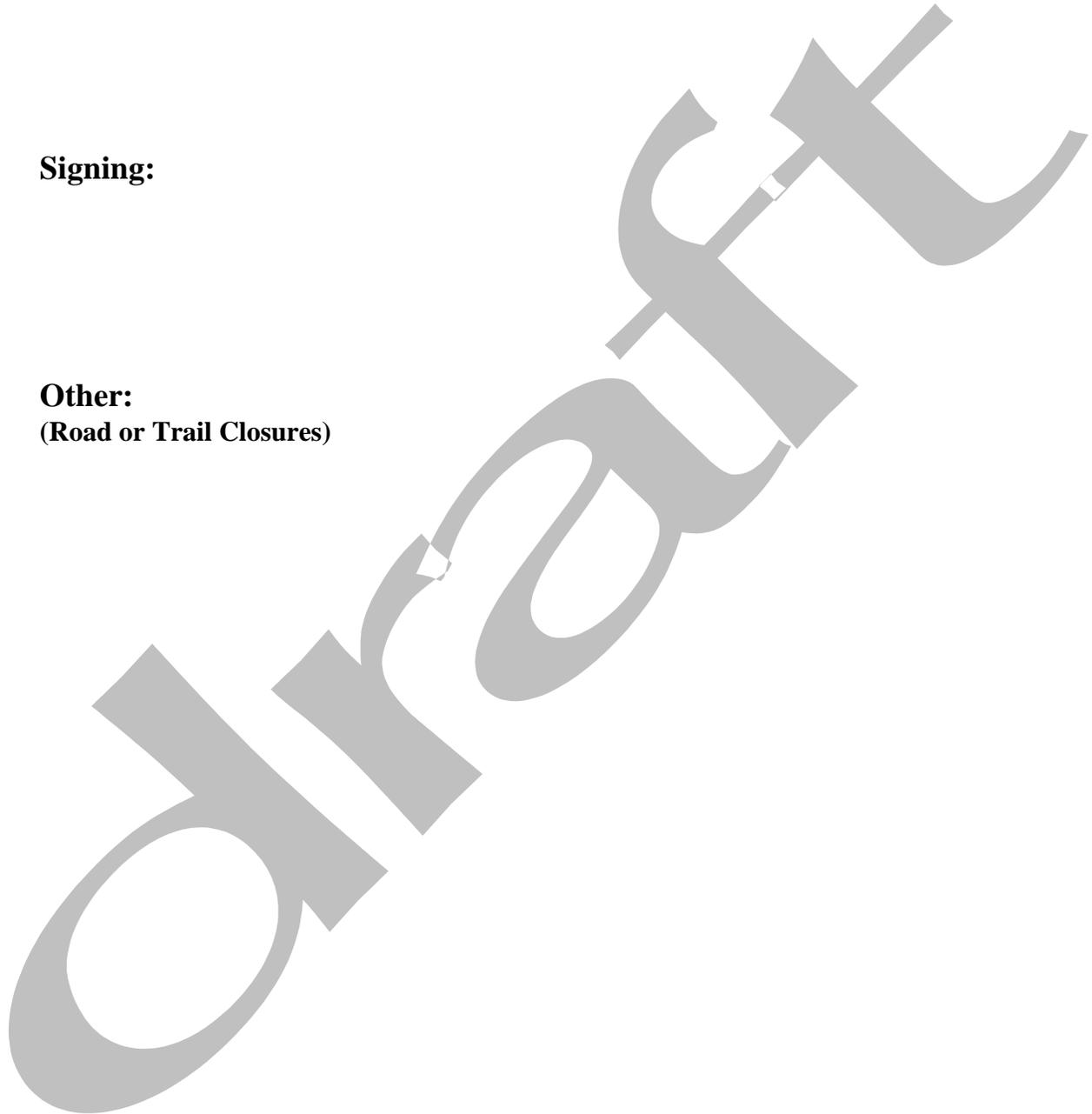
- 1. Organization: Identify who will be the IC.**
- 2. Notifications: Identify the notifications to be made and who will make them.**
- 3. Containment Strategy: Describe the containment strategy.**
- 4. Containment Opportunities: Identify any known containment opportunities.**
- 5. Resource Ordering: Identify the dispatch center responsible for resource ordering.**

PUBLIC SAFETY PROVISIONS

Notifications:

Signing:

Other:
(Road or Trail Closures)



H-9214-1 - PRESCRIBED FIRE MANAGEMENT

MEDICAL PLAN

EMT's	LOCATION	EQUIPMENT	
		YES	NO

* Identify any on site EMT's, and First Responders.

TRANSPORTATION

(Identify Ambulance Services and "Life Flights")

NAME	TELEPHONE	ADDRESS	PARAMEDICS	
			YES	NO

HOSPITALS

NAME	ADDRESS	TRAVEL TIME		PHONE	HELIPAD		BURN CENTER	
		AIR	GRND		YES	NO	YES	NO

* Identify the Latitude and Longitude for hospitals with helipads. Also list hospital radio frequencies.

MEDICAL EMERGENCY PROCEDURES

Notify Prescribed Fire Burn Boss of serious accidents or injuries. The Prescribed Fire Burn Boss will initiate on site response and coordinate additional needs through _____. The first option is to transport to _____ if using an ambulance for transport, send someone to meet the ambulance at a known location. IE. Highway Junction or known landmark.

PRESCRIBED FIRE COMMUNICATIONS PLAN

RADIO INFORMATION

SYSTEM/CACHE	CHANNEL	FUNCTION	FREQUENCY	ASSIGNMENT	REMARKS
					H = Hand held M = Mobile

* If aerial ignition is used consider assigning a specific radio frequency for use between the aircraft and Prescribed Fire Burn Boss and/or Ignition Specialist.

PHONE INFORMATION

NAME	NUMBER

GO/NO-GO CHECKLIST**(A "NO" RESPONSE TO ANY ITEM MEANS STOP!)**

1. ARE **ALL** FIRE PRESCRIPTION SPECIFICATIONS MET?
2. ARE **ALL** SMOKE MANAGEMENT PRESCRIPTION SPECIFICATIONS MET, AND/OR HAS SMOKE MANAGEMENT CLEARANCE BEEN GIVEN FOR THE PROJECT?
3. HAS AN AREA SPOT WEATHER FORECAST BEEN OBTAINED ? IS IT FAVORABLE?
4. ARE **ALL** REQUIRED PERSONNEL IN THE PRESCRIBED FIRE PLAN ON-SITE?
5. IS **ALL** REQUIRED EQUIPMENT IN THE PRESCRIBED FIRE PLAN IN PLACE AND FUNCTIONAL?
6. HAVE **ALL** PERSONNEL BEEN BRIEFED ON THE PROJECT OBJECTIVES AND THEIR ASSIGNMENTS?
7. HAVE **ALL** PERSONNEL BEEN BRIEFED ON THE SAFETY HAZARDS, ESCAPE ROUTES AND SAFETY ZONES.
8. HAVE **ALL** THE REQUIRED NOTIFICATIONS BEEN MADE?
9. ARE THE ON SITE ADEQUATE FOR CONTAINMENT UNDER THE EXPECTED CONDITIONS?
10. IN YOUR OPINION, CAN THE BURN BE CARRIED OUT ACCORDING TO PLAN AND WILL IT MEET THE PLANNED OBJECTIVES?

IF ALL QUESTIONS WERE ANSWERED "YES" PROCEED WITH A TEST FIRE. DOCUMENT THE CONDITIONS, LOCATION AND RESULTS.

Signed: _____
Prescribed Fire Burn Boss

Date: _____

PRESCRIBED FIRE BRIEFING CHECKLIST

UNIT NAME/NO.: _____

CHAIN OF COMMAND:

OBJECTIVES:

COMMUNICATIONS:

FIRING/HOLDING

ASSIGNMENTS:

ESCAPED FIRE PLAN:

WEATHER

FORECAST:

SAFETY:

PUBLIC SAFETY:

- JHA**
- Known Hazards**
- LCES**
- Medical Plan**
- Other**

OTHER CONSIDERATIONS AND NOTES ON THE BRIEFING:

Signed: _____

(Prescribed Fire Burn Boss)

Date: _____

TEST FIRE

LOCATION:

DATE & TIME:

FUELS:

WX CONDITIONS:

RESULTS:
(Note the flame length and rate of spread)

The test fire meets the prescription parameters: YES:_____ NO:_____

PROPOSED TOTAL COST

Planning:

**E.A.
Clearances
Plan Preparation**

Site Preparation:

Ignition + Holding:

Mop & Patrol:

Supplies:

Other:

Specify the funding sources and amounts.

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

PRESCRIBED FIRE REPORT

Burning Unit:

Date(s):

Date of Burn(s)

Time of Burn(s):

Temp.

R.H.

Wind Speed

Direction:

Fuels Present after Burning:

Estimated:

Measured:

ACHIEVEMENT OF FIRE TREATMENT OBJECTIVES

Short Term Results:

Prescribed Fire Boss Comments (i.e., fire behavior, personnel & equipment performance, etc.)

Prescribed Fire Burn Boss

H-9214-1 - PRESCRIBED FIRE MANAGEMENT
WEATHER + FIRE BEHAVIOR OBSERVATION SHEET

Observer's Name _____
 Date _____
 Fire Identification _____
 Section of line identification _____

Weather + Fuels

Time						
Slope (%)						
Aspect						
Elevation (Ft.)						
Fuel Model (1-13)						
Shade Percent (Est.)						
Dry Bulb Temp.						
Wet Bulb Temp.						
Relative Humidity (%)						
Eye Level Windspeed						
Wind Direction						
1 Hr. Fuel Moist. Open (%)						
1 Hr. Fuel Moist. Shade (%)						

FIRE OBSERVATIONS

Average Flame Length (Ft.)						
Maximum Flame Length (Ft.)						
Overstory Torching/Crowning (Y/N)						
Fire whirls (Y/N)						
Spotting Occurrence (Y/N)						
Spotting Distance (Ft.)						
Rate Of Spread (Ch/Hr. or Ft./Min.)						

Other Information: 1,000 Hr. Fuel Moisture: _____ Duff Moisture: _____ Soil Moisture: _____
 Live Fuel Moisture: _____ .

H-9214-1 - PRESCRIBED FIRE MANAGEMENT

EXAMPLE OF A
JOB HAZARD ANALYSIS FOR PRESCRIBED FIRE OPERATIONS

X = This Project	ACTIVITY	HAZARDS	ACTION TO ELIMINATE HAZARD
	1. Driving to work site	A. General operations and public traffic.	A. Defensive driving techniques.
		B. Steep, narrow roads.	B. Drive cautiously so that you can stop in less than ½ of your usual distance. Lights on.
		C. Unsecured loads.	C. Check loads for secureness before departing - use tie downs.
		D. Hauling flammable substances.	D. Use appropriate containers for hauling slash fuel or gasoline.
		E. Transporting sharp tools.	E. Use guards, cages, boxes, or tool mounts.
		F. Loading vehicles.	F. Use proper lifting techniques.
		G.	G.
		H.	H.
	2. Driving at or near work site	A. Backing or turning around in small areas.	A. Use spotters. Face the hazard while turning around. Avoid tight turn around if possible.
		B. Heavy truck traffic between units and water source.	B. Maintain radio communications and alert other drivers in the area. Lights on.
		C. Smoke, poor visibility.	C. Place a guide on foot ahead of the vehicle. Wait until smoke is less dense. Lights on. Use light bars and/or warning lights.
		D. Parking near a prescribed burn.	D. Use parking brake. Leave keys in ignition, avoid leaving exposed flammable in bed of vehicle. All windows closed.
		E. ATV's.	E. Operated by trained and licensed drivers only. Lights on. Avoid steep slopes.
		F. Public Safety.	F. Post signs an/or use road blocks if needed.
	3. Handling flammable material	A. Exposure to sparks.	A. Use proper containers, move away from hot areas, no smoking.
		B. Eye or skin contamination from fuel.	B. Gloves, goggles, leather lace-up boots.
		C. Leaking containers or torches.	C. Empty and tag in field, have repairs made before next use.

X = This Project	ACTIVITY	HAZARDS	ACTION TO ELIMINATE HAZARD
		D. Improper gas/diesel ratios for slash fuel.	D. Use labels on containers, field test small amounts before use.
		E. Slippery surfaces from spilled fuel.	E. Make every effort to avoid spilling fuel, where feasible. Install non-slip material on fuel truck beds. Clean up spills as soon as possible.
	4. Equipment set-up	A. Muscle or back strain lifting heavy objects.	A. Use of proper lifting techniques. Get help if too heavy.
		B. Operating pumps and mechanized equipment exhaust burns, loose clothing.	B. Tuck in shirt tails, remove scarfs and jewelry. Proper clothing, gloves and boots.
		C. Application of slippery retardant, poor footing.	C. Eight-inch lug sole, lace-up boots. Avoid slick areas if possible.
		D. Crew people working uphill from each other (rolling debris).	D. Post lookout. Shout warnings.
		E. Operating high pressure nozzles.	E. Maintain visual contact with pump operator and other crew members. Use backup person behind nozzle man. Use goggles.
		F. Traversing rocky terrain.	F. Eight-inch lug boots, slow cautious movement.
		G. Noise from pumps and saws.	G. Use hearing protection (ear plugs or muffs).
	5. Firing (hand ignition)	A. Rolling debris.	A. Use hand held radios, close supervision, lookouts. Consider aerial ignition.
		B. Close proximity to intense heat and erratic fire behavior.	B. Same action as in A. Use PPE.
		C. Smoke, sparks, and cinders.	C. Avoid very dense smoke. Wear PPE, Alter firing patterns. Rotate personnel out of worst areas.
		D. Poor footing, steep slopes, heavy fuels.	D. Constant awareness, learn to identify hazard area. Slow down.
		E. Noise of fire, obscures verbal warnings.	E. Hand held radios for all lighting personnel.
		F. Burning fuel dripping from torches. Burns from drip torches.	F. Lighters stay alert to where torch head is. Close air vent when not actually lighting. Proper PPE.

X = This Project	ACTIVITY	HAZARDS	ACTION TO ELIMINATE HAZARD
		G. Misguided lighter lighting wrong area.	G. Know location of others. Radios for all lighting personnel. Close supervision.
		H.	H.
		I.	I.
	5.1 IGNITION DEVICES		
	5.1.1 Flares	A. Risks associated with firing projectiles or flares.	A. Basic firearm safety rules followed, separation of ammo by type and size, access to launchers limited to trained personnel or those undergoing training.
		B. Inadvertent firing over/under shot resulting in activity outside project boundaries.	B. Post lookouts. Notify ignition spec. and holding spec. Holding crews extinguish spot, subsequent to further ignition.
	5.1.2 Mechanical (ATV)	A. Vehicle Maintenance.	A. Thorough inspection of vehicles and ignition equipment.
		B. Close proximity to fire, intense heat, erratic behavior.	B. Same as in 5. B, Know escape routes.
		C. Rough terrain, heavy ground fuels, side hills and slopes.	C. Scout and locate accessible routes, make dry run, experienced operator or supervised trainee. Fire by hand if needed.
		D. Noise of ATV and fire obscures verbal warnings.	D. Hand held radios required of all ignition personnel. Hard hats instead of helmets to facilitate communications.
		E. Inadvertent ignitions.	E. Preplan ignition on/off points, check wand apparatus on regular basis. Notify holding crew.
		F.	F.
	5.1.3 Mounted (Terra torch)	A. Intrinsic danger of using terra torch (vehicle mounted).	A. Terra torch is to be operated under supervision of the ignition spec. Use only with trained operator's ie. driver, operator, and engine support.
		B. Vehicle maintenance.	B. Thorough inspection of vehicle and ignition equipment. Electrical connections and grounds all in working order.
		C. Close proximity to fire, intense heat, erratic behavior.	C. Same as 5. B, known escape routes.

X = This Project	ACTIVITY	HAZARDS	ACTION TO ELIMINATE HAZARD
		D. Rough terrain/roads, ground fuels, side hills and slopes.	D. Terra torch use restricted to roads or two tracks, pre-scouted paths or routes only.
		E. Chemical exposure, mixing/transferring.	E. Trained personnel only. Well ventilated area. Use PPE. All containers grounded.
		F. Flammable vapors, liquids, and solids.	F. Terra torch mixing group will wear 100% cotton clothing. All containers grounded. Clean up all spills.
		G. Slippery surfaces from spilled fuel.	G. Make every effort to avoid spilling fuel, install non-slip material on decking, absorbent material for spills will be in torch kit.
	5.1.4 Helitorch or PSD	A. Hazards of aircraft use combined with ignition systems.	A. Aviation operations to be coordinated by certified personnel. HEMG on project site. Trained and experienced personnel operating ignition equipment. Separate operating plan and JHA developed.
		B. Flight routes, project area and flight following coordinations (MOA's, TFR's etc.).	B. Follow guidelines and restrictions as stated in IHOG, file special use safety plan, coordinate w/Aviation Management Specialist and Dispatch Centers.
		C. Apparatus viability.	C. Aerial ignition apparatus thoroughly maintained, inspected, tested before installing into aircraft, pilot has ultimate GO/NO GO authority.
	6. Holding (includes all of item 4)	A. Carrying sharp tools.	A. Keep tool guards on while traveling, remove only while in use.
		B. Tool use.	B. Proper crew training, with close supervision by crew boss.
		C. Snag falling.	C. Falling and bucking to be done only by trained personnel.
		D. Burned off snags or widow-makers.	D. Avoid entering burned over areas. Post lookout, flag. Obtain professional faller if needed.
		E. Burns from radiant heat and hot embers.	E. Nomex clothing, hard hats and gloves required.
		F. Rolling debris.	F. Post lookouts, brief crew as to potential hazard areas.
		G. Erratic fire behavior	G. To be covered by burn boss in pre-burn briefing, escape route shall be known by everyone.

X = This Project	ACTIVITY	HAZARDS	ACTION TO ELIMINATE HAZARD
	7.Mop-up: Included all hazards in items 4, 5, 6, and the following	A. Slippery, wet surfaces.	A. All PPE required.
		B. Smoke inhalation.	B. Crews will be rotated in and out of dense smoke.
		C. Fatigue, long hours of work.	C. Shifts of duty shall not exceed 12 hours, except in emergencies. Crews will work no longer than 7 days on with 1 day off or 14 on with 2 off. Work in pairs, have rested drivers available.
		D.	D.