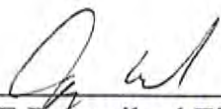
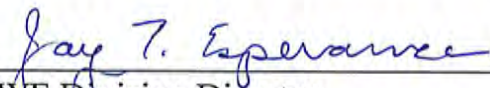




South Dakota Prescribed Fire Planning and Implementation Procedures Guide

Submitted by:  Date: 2/16/18
WF Prescribed Fire Program Manger

Approved by:  Date: 2-16-18
WF Division Director

Approved by:  Date: 2-12-2018
Secretary of Agriculture

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Introduction

Fire is an essential ecological process in many fire-dependent ecosystems. In large areas of the country, fire exclusion from these ecosystems has led to unhealthy forest, woodland and rangeland conditions. These areas are at risk of intense, severe wildfires that threaten communities and cause significant damage to key ecological components.

As one component of fire management, 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 or destroyed by wildfire.

The use of prescribed fire should be considered in the management strategy for any ecosystem, particularly those determined to be fire adapted.

Purpose

The purpose of this policy is to provide consistent interagency guidance, promote common terms and definitions, and provide standardized procedures, for the planning and implementation of prescribed fire.

This policy describes what is **minimally** acceptable for prescribed fire planning and implementation. Agencies may choose to provide more restrictive standards and policy direction, but must adhere to these **minimums**.

This policy provides the guidelines which the Wildland Fire Division (WF) will use and follow in all its prescribed burns. The purpose of this guide is to provide consistent interagency policy, establish common terms and definitions and identify planning and implementation processes for prescribed fire.

WF plans to utilize the Interagency Prescribed Fire Planning and Implementation Procedures Guide as the basis of the program. Minor changes will be needed to meet the needs of South Dakota and the agencies we cooperate with and are contained within this policy.

By following the Interagency Prescribed Fire Planning and Implementation Procedures Guide interagency guidelines will be met for prescribed fire implementation. These standards have a basis with which to plan, train and implement a more aggressive prescribed fire program within South Dakota. This will allow WF as well as other state agencies to be compatible with federal prescribed fire planning and implementation.

Scope

This policy develops common language and unified direction or guidance for all state agencies to follow. This policy describes what is minimally acceptable for prescribed fire planning and implementation.

Agencies may choose to provide more restrictive standards and policy direction, but must adhere to these minimums. This policy is not intended to address interagency business rules.

Reference individual agency's business rules for direction.

Authorities

The authority to conduct prescribed burning is found in South Dakota Codified Law 34-35-18 Setting Fires for Forest and Range Management. SDCL 34-35-18. (Setting fires for forest and range management. The secretary of agriculture or his designee may set fires in woods or prairie for the purposes of forest and range management provided that he has reasonable forces and equipment available to suppress the spread of the fire) allows the Secretary of Agriculture or his designee to set

fires in woods or prairie for the purposes of forest and range management provided that he has reasonable forces and equipment available to suppress the spread of the fire.

The minimum qualifications standard is the current *Wildland Fire Qualification System Guide*, PMS 310-1. State employees, local cooperators, and contractors working on State of South Dakota prescribed fires must meet PMS 310-1 standards unless local agreements or contracts specify otherwise. The main reference glossary for this policy is the

Glossary of Wildland Fire Terminology, <https://www.nwccg.gov/committees/data-standards-and-terminology-subcommittee>

Prescribed Fire Planning Documents

This section describes common planning documents used to ensure quality and setting the proper objectives for prescribed fire plans.

Land/Resource Management Plan

Where applicable, overall direction for prescribed fire is provided to the wildland fire management program by Land/Resource Management Plan (L/RMPs). These plans serve as the document to initiate, analyze, and provide the basis for using prescribed fire to meet resource management objectives.

Policy Statement

Each prescribed fire conducted by WF or other state agency will have a prescribed fire plan prepared in advance of the planned ignition. These plans will require approval by the Agency Administrator/Line Officer. Any changes in the plan must be initialed and dated on the front cover page of the plan by the reviewing officials (See the amendments section of this policy for further explanation).

Each prescribed fire conducted by WF or other state agency shall be implemented in compliance with an approved plan.

All prescribed fires conducted on private lands will have a prescribed burning release statement signed by the landowner or legal designee. (Attached to this policy)

Every prescribed fire plan shall have definite and measureable resource management and/or training objectives.

Wildfires may be used to accomplish prescribed burn objectives on a very limited basis with a written plan in effect prior to the incident.

All plans are valid for a maximum of five years from the date of Agency Administrator signature.

WF will not approve any prescribed fire plan written by another state or local agency that does not adhere to the guidelines set forth in this policy while burning on state lands.

Another agency conducting a prescribed burn, and requesting staffing assistance from WF shall have in place an approved prescribed fire plan.

Prescribed fire plans for low complexity broadcast burns outside the Black Hills Forest Fire Protection District (BHFFPD) can be written so that all burn units within a county are included in one plan. The WF Supplemental Unit Information Form (broadcast burn version) must be completed for each project area listed in the county wide burn plan and signed by the WF Agency Administrator prior to ignition. The WF Supplemental Unit Information Form (broadcast burn version) is located in Appendix C of this policy.

Prescribed fire plans for low complexity pile burning within the Black Hills Forest Fire Protection District (BHFFPD) can be written so that all burn units within a county are included in one plan. Custer

State Park shall draft a pile burning plan for pile burning projects within Custer State Park. The WF Supplemental Unit Information Form (pile burning version) must be completed for each project area listed in the county wide burn plan and signed by the WF Agency Administrator prior to ignition. The WF Supplemental Unit Information Form (pile burning version) is located in Appendix D of this policy.

Prescribed fires with multiple day ignitions planned must have a Prescribed Fire Go/No-Go Checklist (PMS 486 (11/13)) completed for each day of ignitions.

Prescribed fire may be used for training as long as it meets the procedures set forth in this policy.

Lessons Learned

Two categories of problems can arise on prescribed fires:

- Problems as a result of poor planning of a prescribed fire
- Problems that occur during implementation of the prescribed fire

The effect of all errors related to these two categories is cumulative. Together, these errors can diminish the probability of success. Planning problems are often the easiest to overcome because they are typically not time sensitive. This policy provides the framework to overcome planning problems.

A variety of methods and techniques have been used to review and analyze outcomes and identify “lessons learned”. To promote organizational learning and improve both organizational and individual performance in prescribed fire planning, “Lessons Learned” have been incorporated into sections of this policy. The lessons learned are not an all-encompassing compendium, but represent a synthesis of significant events, interactions and discussions with individual burn bosses and other subject matter experts.

Lessons learned sections are identified by the following format:

Lessons Learned:

How Lessons Learned are used in this policy

The lessons learned presented in this policy are not policy requirements. There is no expectation that the statements contained in the “Lessons Learned” sidebars be addressed in prescribed fire plans. They are included as reminders for consideration and discussion as the plan is being prepared or implemented on the ground.

Additional prescribed fire lessons learned and other materials to improve organizational learning are available from the Wildland Fire Lesson Learned Center at <https://www.wildfirelessons.net/>.

Implementation Organization and Qualifications

During prescribed fire planning and operations, all federal and state agencies will accept each other’s standards for qualifications. The minimum qualifications standard is *Wildland Fire Qualifications System Guide*, PMS 310-1. State employees, local cooperators and contractors working on federal agency prescribed fires must meet the PMS 310-1 standards unless local agreements specify otherwise.

No less than the minimum implementation organization described in the approved Prescribed Fire Plan may be used for implementation. The complexity of each prescribed fire or phase of fire(s) determines the organization(s) needed to safely achieve the objectives specified in the prescribed fire plan.

The prescribed fire complexity rating is determined using the required *Prescribed Fire Complexity Rating System Guide*, PMS 424. The minimum supervisory position qualifications determined by prescribed fire complexity are identified in Table 1.

Table 1. Qualifications requirements related to Prescribed Fire Complexity

Position	High Complexity	Moderate-Low Complexity	Low Complexity
RXM1	Optional	Optional	Optional
RXM2	Not Allowed	Optional	Optional
RXB1	Required	Optional	Optional
RXB2	Not Allowed	Required	Optional
RXB3	Not Allowed	Not Allowed	Required
FIRB	Optional	Optional	Optional

Holding Function: Holding will be managed by personnel qualified at the appropriate Incident Command System (ICS) wildland fire operations position as required by complexity, assigned resources, and operational span-of-control. For some projects, there may be no holding requirements or the holding duties are assumed by the Burn Boss.

Prescribed Fire Burn Boss Type 3

The RXB3 is not included in the PMS 310-1. The RXB3 is included in this document for those wanting to employ the position.

A Prescribed Fire Burn Boss Type 3 (RXB3) will only be allowed to conduct low complexity prescribed fires where the final complexity is rated low. The requirements for Prescribed Fire Burn Boss Type 3 are identified in Table 2.

Table 2. Requirements for Prescribed Fire Burn Boss Type 3

Category Requirement	Requirement(s) for Each Category
Required Training:	Intermediate Wildland Fire Behavior (S-290) Firing Operations (S-219)
Required Experience:	Satisfactory performance as Firefighter Type 1 (FFT1) + Successful position performance as a Prescribed Fire Burn Boss Type 3 (RXB3) One evaluation in the RXB3 taskbook must have taken place on a broadcast burn
Physical Fitness Level:	Arduous
Positions That Maintain Currency For RXB3:	Prescribed Fire Burn Boss Type 2 (RXB2) Prescribed Fire Burn Boss Type 1 (RXB1) Prescribed Fire Manager Type 1 (RXM1) Prescribed Fire Manager Type 2 (RXM2)

RXB3 Maintains Currency	Firefighter Type 1 (FFT1) Firefighter Type 2 (FFT2)
Other Training That Supports Development of Knowledge and Skills:	Wildland Fire Chain Saws (S-212) Portable Pumps and Water Use (S-211) Smoke Management and Air Quality for Land Managers Online Training ¹

¹ <https://www.frames.gov/partner-sites/emissions-and-smoke/educational-resources/tutorial/>

Responsibilities

Prior to prescribed fire implementation, thorough planning and review processes must be conducted. Prescribed fire actions should be developed from resource/fire management objectives carried forward from L/ RMPs or FMPs (or both) where these plans are in place. A prescribed fire plan must be completed, reviewed, and approved before ignition can begin. The agency administrator has final approval authority for all prescribed fire plans, unless special circumstances warrant higher review and concurrence (such as may occur during higher preparedness levels or for extremely large, complex projects). In addition, the agency administrator approves and signs the *Agency Administrator Ignition Authorization* (Element 2A *Prescribed Fire Plan*). The prescribed fire burn boss has the responsibility to complete and sign the *Prescribed Fire GO/NO-GO Checklist* (Element 2B *Prescribed Fire Plan*). The prescribed fire burn boss ensures that all prescription, staffing, equipment, and other plan specifications are met before, during and after the prescribed fire.

Every prescribed fire plan must receive a technical review. The technical reviewer and prescribed fire plan preparer must be qualified or have been previously qualified as a prescribed fire burn boss at an experience level equal to or higher than the complexity being reviewed. Either the technical reviewer or the prescribed fire plan preparer must be current in their qualification, minus the physical fitness requirement.

Only a RXB1 can review plans at high complexity. Either an RXB1 or RXB2 can review plans of moderate-to-low complexity. An RXB3 is allowed to function as a prescribed fire plan preparer for a low-complexity plan, but not a technical reviewer. Low complexity plans will be technical reviewed by and RXB2 or RXB1.

Agency or individual unit policy may require additional reviews.

Interagency mixed ownership prescribed fire plans require a technical review, then approval from each agency administrator.

Lessons Learned: The success of a prescribed fire depends on the continuity of open and comprehensive conversations among the agency administrator, planners, cooperators, dispatch centers, and those actually implementing the prescribed fire plan. Gaps or weaknesses in coordination and communication greatly increase the probability of failure of the prescribed fire.

Prescribed fire and implementation position roles and responsibilities are listed below.

Agency Administrator

The agency administrator is the line officer (or designee) of the agency or jurisdiction that has been delegated or assigned the authority and responsibility for the prescribed fire. The agency administrator for the State of South Dakota is the WF Division Director. Prescribed fire plans written for SD Game, Fish and Parks owned land must have a signature line for the Regional Supervisor and the Division Director.

Agency administrator responsibilities:

- Review and approve the final complexity rating.
- Approve prescribed fire plans, and understand the risks and benefits associated with it.
- Agency administrator's approval signature (Element 1 Signature Page, *Prescribed Fire Plan*) indicates that the prescribed fire plan meets agency policy and necessary agreements are in place.
- Ensure only trained and qualified personnel participate in planning and conducting the prescribed fire.
- Ensure projects are monitored, evaluated, and documented in the project file.
- Discuss the conditions under which the prescribed fire is to be conducted with the burn boss and sign, date and establish an implementation time period on the Element 2A Agency Administrator Ignition Authorization, *Prescribed Fire Plan*.
- Ensure coordination with neighbors, cooperators and air quality regulators has occurred.
- Ensure all prescribed fires are conducted in accordance with the approved prescribed fire plan and established standards and guidelines.
- Ensure periodic reviews and inspections of the prescribed fire program are completed. Specify when the agency administrator is to be notified that contingency actions are being taken.
- Report all wildfires resulting from prescribed fires through the chain of command.
- Provide for the timely declaration of prescribed fire as wildfire.
- Ensure prescribed fires declared as wildfires are reviewed according to established guidelines.
- Ensure prescribed fires that receive a National Ambient Air Quality Standards (NAAQS) Notice of Violation (NOV) are reviewed according to established guidelines.
- Has authority to adjust prescription parameters on a case by case basis.

Fire Management Officer or Fire Program Manager or Fuels Program Manager

As delegated and assigned, the fire management officer (FMO) or fire or fuels program manager is responsible to the agency administrator for the planning, implementing and monitoring of the prescribed fire program in accordance with agency policy and direction.

FMO, Fire or Fuels Program Manager Responsibilities:

- Ensure compliance with national, regional, tribal and local fire policy and direction, as well as applicable state and local laws.
- Ensure an approved prescribed fire plan exists for each prescribed fire project.

- Ensure all prescribed fires are conducted in accordance with the approved prescribed fire plan and established standards and guidelines.
- Plan the prescribed fire program of work based on the Unit's budget and work plan.
- Ensure the National Interagency Mobilization Guide direction is followed at Preparedness Levels IV and V. See the National Interagency Mobilization Guide for details (USDA, USDI, et al, 2013).
- Ensure both the prescribed fire plan preparer and the technical reviewers are qualified or qualified less currency at the level of complexity or higher.
- Ensure trained and qualified personnel are available to participate in the prescribed fire program.
- Assign the prescribed fire burn boss.
- Ensure the unit can implement the project(s) and order additional resources as needed.
- Participate in prescribed fire to wildfire conversion declarations, if necessary and if responsibility is assigned in the plan.
- Act as liaison to the agency administrator, and update them on the progress of prescribed fires as needed. May act as liaison to other agencies, news media, air quality authorities, transportation agencies and safety officials.
- Provide coordination, oversight and direction to the prescribed fire manager or prescribed fire burn boss (or both), dispatch office or other designated fire management personnel.
- Ensure projects are monitored, evaluated, and documented as a part of the project file. Ensure project accomplishments are reported through the local office and comply with agency and local reporting requirements.
- Ensure periodic reviews and inspections of the prescribed fire program are completed.

Prescribed Fire Plan Preparer

The prescribed fire plan preparer is the individual responsible for the preparation of the prescribed fire plan. Several people may be involved in preparation of the prescribed fire plan, but the prescribed fire plan preparer is responsible for the final plan content.

Any qualified prescribed fire burn boss or trainee may develop the initial complexity analysis and participate in the development of the prescribed fire plan. The preparation of the final complexity analysis and prescribed fire plan must be overseen, recommended, and signed by a burn boss qualified at the appropriate level as defined in Table 1 above. (Element 1 Prescribed Fire Plan).

Burn boss trainees can be co-signers as preparer of a prescribed fire plan if their work was overseen by a fully qualified burn boss. At a minimum, NWCG qualifications will be accepted.

Prescribed fire plan preparer responsibilities:

- Prepare the prescribed fire plan in accordance with the South Dakota Prescribed Fire Policy.
- Coordinate with the resource management or technical specialists (or both) to ensure that the plan meets resource management and operational objectives.
- Interact with the technical reviewer to ensure that all plan elements are adequately addressed.
- Complete and sign the complexity analysis.

- Brief agency administrator and gain approval of the final complexity rating by signature.

Technical Reviewer

The technical reviewer is responsible for reviewing each prescribed fire plan element for content as well as evaluating the risk and complexity analysis to ensure that the goals and objectives can be safely and successfully achieved. The technical reviewer must be qualified or previously qualified as a burn boss at or above the level of project complexity. At a minimum, NWCG qualifications will be accepted. The technical reviewer should have local knowledge of the area, experience burning in similar fuel types, or have previous experience conducting an on-site review (or all three). The technical reviewer must be someone other than the prescribed fire plan preparer.

Technical reviewer responsibilities:

- Ensure prescribed fire plans meet State of South Dakota Prescribed Fire Policy and direction.
- Ensure the complexity analysis accurately represents the project, so the agency administrator understands the risks to identified values and ensures adequate mitigation is provided in the prescribed fire plan to justify the pre and post risk ratings. This may require on-site review in Wildland Urban Interface (WUI) or high-complexity situation by the technical reviewer.
- Provide concurrence with the calculated prescribed fire complexity determination.
- Check the prescription parameters by fuel types to ensure that the project, as planned, has a reasonable chance or realistic opportunity of meeting the resource management objectives.
- Ensure the fire behavior calculations or prescription parameters are appropriate and within the acceptable range (or both).
- Ensure the ignition, holding and contingency plans are consistent with the predicted fire behavior and fuel types inside and outside the planned ignition unit(s).
- Complete and sign Appendix B Technical Reviewer Checklist, *Prescribed Fire Plan* and the Element 1 Signature Page, *Prescribed Fire Plan*.

Prescribed Fire Manager

The prescribed fire manager (RXM1/RXM2) is responsible for implementing and coordinating assigned prescribed fire activities. A prescribed fire manager may be assigned during periods when multiple, simultaneous prescribed fires are being conducted; when multiple prescribed fires will be conducted within a short time or simultaneously; or when there is complex interagency involvement.

Prescribed fire manager responsibilities:

- Review prescribed fire plans prior to implementation.
- Monitor all prescribed fire operations.
- Ensure all operations are conducted in a safe manner and in accordance with the approved plan(s) and standards and guidelines.
- Act as coordinator or liaison among the burn organization(s), unit FMOs and other offices, agencies, air quality authorities, news media, transportation agencies, safety officials and interested publics.
- Declare a prescribed fire a wildfire, if necessary and if responsibility is assigned in the plan.
- Obtain and interpret long-term weather forecasts and smoke dispersion forecasts.
- Brief the burn bosses and direct operational assignments according to policies, priorities

and standards.

- Set priorities for allocation of resources.
- Ensure completion of all required documentation including the evaluation and documentation of accomplishments, fire behavior and fire effects, operation procedures and cost summaries.

Prescribed Fire Burn Boss

The prescribed fire burn boss (RXB1/RXB2/RXB3) is responsible to the agency administrator, prescribed fire manager, fire management officer or local fire management organization for implementing the prescribed fire plan.

Prescribed fire burn boss responsibilities:

- Review the prescribed fire plan prior to implementation and ensure all required elements and objectives are addressed, and have a good understanding of the complexity determination.
- Inspect the prescribed fire project area and or ignition unit(s) to validate prescribed fire plan elements including location of identified values and areas of special concern as well ensuring that holding/contingency plans adequately address expected fire behavior outside the unit(s).
- Obtain current weather and smoke management forecasts, updates and special advisories from a meteorologist.
- Ensure pre-burn considerations and monitoring is completed.
- Maintain communication with the agency administrator, prescribed fire manager, fire management officer (FMO) or local fire management organization.
- Ensure the Element 2A. Agency Administrator Ignition Authorization, *Prescribed Fire Plan* is valid.
- Take to the field those portions of the prescribed fire plan necessary for completing the briefing and safe project implementation.
- Complete and sign the Element 2B. Prescribed Fire Go/No-Go Checklist *Prescribed Fire Plan*.
- Ensure availability of contingency resources and or capabilities within maximum acceptable response times.
- Ensure all operations are conducted in a safe manner and in accordance with the approved plan and established standards and guidelines, ensuring that the safety and welfare of all assigned personnel and public is maintained.
- Verify qualifications of all assigned personnel.
- Ensure all assigned personnel are briefed at the beginning of each operational period and any new personnel arriving to the prescribed fire receive a briefing prior to engaging.
- Conduct the test fire and document the results.
- Supervise assigned personnel and direct the ignition, holding and monitoring operations. Responsible for implementation including mop up and patrol unless otherwise assigned to other qualified personnel.
- Manage or delegate responsibility for the management of any “incident within the incident”.

- Declare the prescribed fire out unless the responsibility for it is formally passed to another prescribed fire burn boss, prescribed fire manager, or other designated personnel with the local fire management organization.
- Determine when the prescribed fire is not within prescription parameters (both short- and long-term) or is not meeting prescribed fire plan objectives.
- Declare a prescribed fire a wildfire, if necessary and if responsibility is assigned in the plan.
- Manage or delegate responsibility, as identified in the plan, for the management of any wildfire, if a wildfire declaration occurs.
- Ensure reports are completed.
- Coordinate with adjacent landowners, cooperators and permit holders as designated in the prescribed fire plan.
- Ensure adjacent landowners and other notifications are made and are documented, prior to ignition as designated in the prescribed fire plan.
- Ensure necessary agreements are in place.

Firing Boss

The firing boss (FIRB) reports to the prescribed fire burn boss or assigned level of organization identified in the plan, and is responsible for supervising and directing ground or aerial ignition operations according to standards in the prescribed fire plan (or both).

Firing boss responsibilities:

- Review the prescribed fire plan and inspect the ignition unit prior to implementation.
- Provide input to burn boss prior to finalizing the Element 2B Prescribed Fire Go/No-Go Checklist, *Prescribed Fire Plan*.
- Brief personnel on project objectives and ignition operations.
- Complete the test fire according to the ignition plan at the direction of the prescribed fire burn boss.
- Conduct ignition operations in a safe manner according to the ignition plan.
- Identify the impacts of ignition on the control and desired fire effects.
- Coordinate ignition operations with the holding operations.
- Firing boss is not a mandatory position for prescribed fires. Ignition operations and responsibilities may be managed by personnel qualified at the appropriate ICS wildland fire operations standard and as required by the prescribed fire complexity, assigned resources, and operational span-of-control.

For some prescribed fires the ignition responsibilities are assumed by the prescribed fire burn boss.

Holding Function

The supervisory position in charge of the holding forces reports to the prescribed fire burn boss or assigned level of organization identified in the plan. There is no specific NWCG-holding specialist approved position for this function. Holding functions will be managed by personnel qualified at the appropriate ICS wildland fire operations standard and as required by the prescribed fire complexity,

assigned resources, and operational span-of-control. The position is assigned by name and qualifications using PMS 310-1 position codes.

Holding function responsibilities:

- Review the prescribed fire plan and inspect the ignition unit prior to implementation.
- Provide input to the burn boss prior to finalizing the Element 2B Prescribed Fire Go/No-Go Checklist, *Prescribed Fire Plan*.
- Brief holding personnel on project objectives and holding operations including identification of special features to be protected as identified in the prescribed fire complexity analysis and prescribed fire plan.
- Conduct holding operations in a safe manner according to the holding plan.
- Coordinate holding operations with the ignition operations.
- Confine the fire to a predetermined area, and oversee mop up and patrol.
- Maintain communication with assigned supervisor and adjacent resources regarding holding progress and problems.

The holding function is not a mandatory position for prescribed fires. For some prescribed fires, there may be no holding requirements or the holding responsibilities are assumed by the prescribed fire burn boss.

Fire Effects Monitor

The fire effects monitor (FEMO) 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.

Fire effects monitor responsibilities:

- Review the monitoring plan prior to implementation.
- Monitor, obtain and record weather data.
- Monitor and record fire behavior data throughout the burn operations.
- Reconnoiter the ignition unit or area assigned (or both).
- Plot the burned area and final perimeter on a map.
- Monitor and record smoke management information.
- Monitor and record first-order fire effects.
- Provide monitoring summary of the fire.
- Provide fire behavior and weather information to prescribed fire personnel as appropriate.

Resource Specialist

The resource specialist is responsible for ensuring the prescribed fire project is planned in a manner supporting the unit's resource management goals and objectives.

Resource specialist responsibilities:

- Provide resource management representation in the preparation of the prescribed fire plan.
- Review prescribed fire plan including the values identified in the complexity analysis before each plan is submitted for approval.
- Evaluate the prescribed fire project in terms of meeting identified resource objectives.

Resource Advisor

If the prescribed fire plan identifies use of a resource advisor (READ), the position is responsible for ensuring the prescribed fire project is implemented in a manner supporting the unit's resource management goals and objectives. The READ is responsible to the agency administrator or tribal administrator.

Resource advisor responsibilities:

- Evaluate the prescribed fire project in terms of understanding the values identified in the complexity analysis and meeting identified resource objectives.
- Provide resource information to the prescribed fire burn boss.
- Present information at briefings on the values identified in the complexity analysis, resources, priorities and issues of concern.
- Coordinate with adjacent landowners, cooperators and permit holders as designated in the prescribed fire plan or by the burn boss.

Specialized Positions

In addition to the positions previously discussed, the following positions, along with other specialized positions, may be used in prescribed fire planning and or implementation depending on the scale and complexity of the project. If these positions are used in implementation, the prescribed fire plan should identify where the position fits within the prescribed fire organization.

- Helitorch Manager (HTMG)
- Plastic Sphere Dispenser Operator (PLDO)
- Helitorch Mixmaster (HTMM)
- Safety Officer (SOF1/2/R)
- Fire Behavior Analyst (FBAN)
- Long-term Analyst (LTAN)
- Strategic Operations Planner (SOPL)
- Incident Meteorologist (IMET)
- Air Quality Specialist (AQSP)

Amendments

When changes to a prescribed fire plan are necessary, the plan must be amended to identify the affected sections; the reason for the change(s); and have the changes clearly identified. For amendments, the need for additional technical review will be determined and justified in writing by the agency administrator. Amendments take place before ignition. Amendments to the prescribed fire plan require agency administrator approval and signature. Approval may be given verbally and documented on the prescribed fire plan with date and time of approval.

Prescribed fire plan amendments must consider affects to the complexity of the prescribed fire, and therefore the final complexity rating must be reviewed and a new complexity analysis performed if the proposed amendment(s) will result in a change to the Risk or Technical Difficulty of one or more elements in the complexity analysis.

Common reasons for amending the prescribed fire plan may include:

- Changes or corrections to objectives.
- Changes in the prescribed fire plan that may affect complexity determinations.

- Changes to fire behavior prescription parameters.
- Changes to project area boundaries resulting in either an increase or decrease in the project area.
- Changes in the minimum required resources or capabilities identified in the plan.
- Major changes to ignition methods including ground ignition to aerial ignition; aerial ignition to hand ignition; hand drip torch ignition to use of terra torch ignition (includes all-terrain vehicle mounted ignition devices); or hand ignition from roadways to hand ignition from boats or other watercraft.

Flexibility can be built into the plan that will allow for a range of adjustments during the prescribed fire that can reduce the need for an amendment. When building flexibility, the range of identified options must remain within the scope of the complexity analysis.

Examples of flexibility that can be built into a prescribed fire plan:

- The prescribed fire plan may state that on the ignition day and subsequent days of the prescribed fire, a mix of the number and kinds of hand crews and engines may be modified as long as stated production capabilities are not compromised.
- As the prescribed fire progresses from ignition to holding, to mop up and patrol, specified capabilities and or types of resources may be adjusted. If these flexibilities are built into the prescribed fire plan, there must be a clear statement as to the work capability requirements of the resources at the various stages of the prescribed fire.
- Minor changes in ignition-unit boundaries to facilitate ignition and or holding, as long as the area has been analyzed and approved in a land/resource management plan, require no change in holding or ignition resources, is within the project boundaries, and does not require additional agreements.
- Additional resources may be assigned to the project without amending the burn plan if the addition of these resources does not change the complexity of the prescribed fire or require additional supervisory positions. These changes must be documented in the daily briefing.

Safety

Firefighter and public safety is the first priority in every fire management activity. Prescribed fire plans and activities must reflect this commitment. Every person involved in a prescribed fire is responsible for identifying safety issues and concerns. It is the responsibility of individuals participating in prescribed fire activities to notify their immediate supervisor of any possible misunderstanding of assigned tasks or safety concerns related to the assignment.

NWCG-established work/rest guidelines and span-of-control apply to wildland fire operations. The management of crew, overhead, and support personnel should follow work/rest guidelines to assure safe, productive fire operations, and is the responsibility of all supervisory fire management personnel (refer to NWCG *Interagency Incident Business Management Handbook*, PMS 902).

Exposure to smoke during prescribed fire operations can be a safety concern. Research has shown that exposure to smoke on prescribed fires, especially in holding and ignition positions, often exceeds that on wildfires. At a minimum, smoke exposure must be addressed in a job hazard analysis or its equivalent and incorporated into the applicable sections of the prescribed fire plan as needed. Public safety impacts from smoke should be addressed in Element 13 Public & Personnel Safety, Medical.

The *Interagency Standards for Fire and Fire Aviation Operations (Redbook)* establishes interagency guidance for required personal protective equipment (PPE) while working on a prescribed fire. This

information can be found in the Safety and Risk Management chapter (Chapter 7).

Transportation and use of any product containing chemicals (drip torch fuel, aviation gas, sphere dispensers, fusees, fuel thickener, etc.) must be in compliance with the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200 (OSHA, 2012)), Department of Transportation regulations (49 CFR Part 171 (Department of Transportation, 2013)), and agency-specific guidance. Material Safety Data Sheets (MSDS) for hazardous materials used on projects should be reviewed when developing the job hazard analysis.

The *Interagency Transportation Guide for Gasoline, Mixed Gas, Drip Torch Fuel, and Diesel*, PMS 442 establishes interagency guidance for the ground transportation of gasoline, mixed gas, drip-torch fuel, and diesel in government vehicles driven by government employees. The PMS 484 is based on the U.S. Department of Transportation (DOT) and OSHA regulations.

The *Interagency Ground Ignition Guide*, PMS 443 was developed to ensure that all ground ignition operations are performed safely and efficiently. The PMS 484 includes information on types of ground ignition devices; standards/specifications for equipment; normal and emergency operating procedures for use, qualifications for operators, job hazard analyses, and material safety data sheets for the fuels used during ignition.

Processes designed for reporting and correcting unsafe situations and are applicable to prescribed fire applications can be found at the National Interagency Fire Center *SAFENET* (<https://safenet.nifc.gov/>) site and USDI Office of Aviation Services *Aviation Safety Communiqué SAFECOM* (<https://www.safecom.gov/>) site.

Consider using a safety officer on high complexity prescribed fires and others where the complexity or other risk analysis shows a need.

Risk Management

Sound risk management is a foundation for all fire management activities. Risks and uncertainties relating to fire management activities must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity.

Risk is the likelihood or possibility of hazardous consequences in terms of severity or probability.

Prescribed fire should be assessed in terms of values that could be impacted, how severe the threat may be, and the likelihood of undesirable effects. Actions should be developed to minimize or eliminate threats and manage risk. Risk management is the process whereby management decisions are made and actions taken concerning control of hazards and acceptance of remaining risk.

Prescribed fires present an inherent level of risk. Risk is at all levels, from decision-makers to on-the-ground fire-fighters and the public. The overall prescribed fire planning process includes a risk assessment, and reflects an understanding of the interaction of objectives and implementation limitations for the project.

Risk management consists of mitigation strategies and implementation activities to improve outcomes and minimize negative consequences. For prescribed fire, the risk assessment is accomplished by completing the complexity analysis process that identifies and characterizes risk to identified values and the technical difficulty or complexity of the ‘work’ involved to mitigate impacts to them. The complexity analysis process identifies values, risks, mitigation measures, and the technical difficulty of implementation actions to be addressed in the prescribed fire plan and will acknowledge any remaining unmitigated risk in the final rating. During the implementation phase of prescribed fires, personnel may encounter uncertain and dynamic conditions, where they must continuously evaluate

risks with an eye towards maintaining a safe working environment, meeting the prescribed fire objectives (on time, within budget and with available resources) and addressing social and political concerns.

The risk management process identified in the *Incident Response Pocket Guide*, PMS 461, helps identify, evaluate and mitigate time-sensitive risks and hazards associated with prescribed fire implementation.

Prescribed Fire Plan

The *Prescribed Fire Plan*, PMS 484-1, <https://www.nwccg.gov/publications/484-1>, is the site-specific implementation document. It is a legal document that provides the agency administrator the information needed to approve the plan, and the prescribed fire burn boss with the information needed to implement the prescribed fire. A prescribed fire project must conform to the written plan.

Prescribed fire plans will vary in their degrees of detail. The size and complexity of a prescribed fire project will determine the level of detail required. The Prescribed Fire Plan must be used. Each element must be addressed and assembled in the sequence identified in the template. Should an element not apply to a specific prescribed fire plan, then it may be marked as “not applicable” (N/A).

Many of the plan elements are linked together and issues in one element can have cascading effects throughout the prescribed fire planning and implementation process.

Programmatic or multiple unit(s) prescribed fire plans with similar conditions may be appropriate.

Lessons Learned Attention to project and unit design will resolve many implementation issues and simplify development of the prescribed fire plan.

Start from scratch. Approach each prescribed fire plan as a new project. Don't be tempted to cut-and-paste as you will miss critical details and differences between projects and areas.

A diversity of viewpoints in the design, plan development and technical review phases leads to better plans. Prescribed fire plan development and complexity analysis are team, not individual, events.

Follow through with what is put in the plan. If it's in the plan, either follow it, or amend the plan.

What words you use in the plan matter. Use of the terms “must” and “shall” convey mandatory compliance; “ought” and “should” convey required compliance, except for justifiable reasons; and “may”, “can” and “consider” convey optional compliance.

Build the plan to capture your thought process and rationale, so that if you leave and someone else inherits your plan or an off-unit burn team will implement the prescribed fire, it will have a good chance at success if they read and follow your plan.

If an interagency mixed-ownership prescribed fire plan is being prepared, development of all appropriate elements within the plan will be conducted on an interagency basis. Interagency agreements, memorandums of understanding (MOU) or private landowner agreements (Prescribed Burning Release).that outline responsibilities are required to implement prescribed fire on multiple ownerships.

The following are discussions of each individual element required as part of a complete prescribed fire plan and the implementation procedures related to the element.

Element 1: Signature Page

The following information must be filled out on the signature page:

- Administrative unit name.
- Project Name (Prescribed fire name), Prescribed fire unit name, Ignition unit name
- At a minimum, three dated signatures are required: a prescribed fire plan preparer, a technical reviewer, and an agency administrator. Additional reviewer signatures, such as resource specialists or advisors, may be included as required by agency or local policies. For mixed ownership plans, additional agency administrator signatures are required. For prescribed burn plans on GFP owned land a signature from the Regional Supervisor and the Division Director are required on the signature page.
- Final complexity rating(s).
- Minimum burn boss qualification.
- If the plan needs to be amended, the signed and dated amendments must be attached to the prescribed fire plan (refer to Amendments).
- Agency or local policy may establish a periodic review or revalidation process (or both). The documentation of the periodic review and revalidation can be included on the signature page.
- The agency administrator's approval signature indicates that the prescribed fire plan meets agency policy, has undergone a technical review, and that necessary agreements are in place.

Element 2: Agency Administrator Ignition Authorization and Prescribed Fire Go/No Go Checklist

Element 2A. Agency Administrator Ignition Authorization

The *Agency Administrator Ignition Authorization* is required to be completed prior to ignition. It provides the agency administrator's authorization to implement the prescribed fire plan.

The authorization establishes a time period for the implementation of the prescribed fire plan. If ignition of the prescribed fire is not initiated prior to the expiration date determined by the agency administrator, a new authorization is required. An "acting" agency administrator may sign the agency administrator ignition authorization, if qualified by agency policy and authority to do so has been delegated to them.

If the prescribed fire plan is amended after the agency administrator has signed the ignition authorization, the ignition authorization must be reviewed and revalidated.

The ignition authorization establishes the agency administrator's expectations and provides approval that the prescribed fire may be ignited within the identified time period. It is not intended that the ignition authorization be signed at the same time the prescribed fire plan is approved. The ignition authorization provides the flexibility for the prescribed fire to be ignited within a specified time period even if the agency administrator is unavailable during that time period.

Prior to signature it is recommended that the agency administrator discuss the key items listed in the *Agency Administrator Ignition Authorization* with the FMO or burn boss (or both), and that these

discussions and any additional instructions are documented. The time period authorized is negotiable among the agency administrator, FMO and burn boss and should reflect the discussion of the key items. Agency or local policy (or both) may dictate how far in advance of ignition the authorization may be signed.

All ignition authorizations should be included in the project file.

Element 2B. Prescribed Fire Go/No-Go Checklist

Prior to any ignition operations, the assigned prescribed fire burn boss will complete and sign the *Prescribed Fire Go/No-Go Checklist*. The questions in the template are the minimum standard and agencies may elect to add questions and/or approval signatures. For each day of active ignition on a prescribed fire, a separate *Prescribed Fire Go/No-Go Checklist* is required.

Lessons Learned: Obtain and discuss input from others on the prescribed fire including holding, ignition, READ, and safety prior to saying GO. Different perspectives can help counter blindness to changes on the ground. More information on change blindness can be found on the Wikipedia site at (https://en.wikipedia.org/wiki/Change_blindness). This interaction gives the firing boss and holding operations an identified platform and timeframe to have their concerns discussed and remedied before saying GO.

Discussion between the burn boss and ignition operations regarding any issues identified allows mitigations or solutions to be developed before lighting the match.

Element 3: Complexity Analysis Summary and Final Complexity

Risk management is the foundation for all prescribed fire activities. Risks and uncertainties relating to prescribed fire activities must be understood, analyzed, communicated, and managed as they relate to the cost of either doing or not doing an activity.

The prescribed fire complexity rating must be completed using the *Prescribed Fire Complexity Rating System Guide*, PMS 424 (<https://www.nwcg.gov/publications/424>)

The *Summary and Final Complexity Worksheet*, PMS 424-1 (<https://www.nwcg.gov/publications/424-1>) is a focused, subjective assessment by experienced prescribed fire burn bosses and evaluated by Agency Administrators (AA). This tool is designed to assist in providing insight and improving understanding of the significant risk-related elements of the prescribed fire.

A decision support tool that illuminates the risk to values associated with the prescribed fire implementation.

Identification of the technical difficulty (complexity) of managing the risks to the values.

Assignment of a complexity rating of high, moderate, or low to the prescribed fire and the level of prescribed fire burn boss qualification level required to implement the prescribed fire.

A process that can be used to identify prescribed fire plan elements or characteristics that may pose special problems or concerns, for example critical holding points (adjacent values needing protection, areas of potentially problematic fire behavior chimneys, saddles, heavy fuels, etc.), the need for multiple prescribed fire organizations, specialized equipment, and special risks or hazards.

Lessons Learned: Ensure critical holding points identified in the Complexity Analysis are brought forward and incorporated into Element 9: Pre-burn Considerations and Weather as well as Element 16: Holding Plan.

Following the procedures in the *Prescribed Fire Complexity Rating System Guide*, PMS 424, a preliminary rating will be determined early in the prescribed fire plan development stage. It will identify potential concerns that may be mitigated during the plan preparation process. Once the prescribed fire plan is near completion, the final complexity rating is made. The final complexity rating will be used as a basis for determining the prescribed fire organization, prescribed fire burn boss type, and mitigation measures.

The Final Complexity Determination Rationale in the *Summary and Final Complexity*, PMS 424- 1, will clearly justify the summary rating for prescribed fire organization and prescribed fire burn boss type. It must also identify risks from the complexity analysis that are rated higher than the summary complexity rating and cannot be mitigated. At a minimum, risks from the complexity analysis that are rated high and cannot be mitigated must be discussed in the summary and final complexity rating rationale.

The *Summary and Final Complexity* worksheet must be signed and dated by the prescribed fire plan preparer, the technical reviewer and agency administrator. The signed worksheet printed copy is inserted into the prescribed fire plan as Element 3 Complexity Analysis Summary and Final Complexity, *Prescribed Fire Plan*.

Separate prescriptions or organizations (or both) for different stages of implementation may result in single or multiple complexity analyses and ratings. For example, a plan may have separate prescriptions for spring and fall burning that may require different organizations and constitute the need for additional complexity analyses.

Some prescribed fires may be implemented over a period of time and progressive or sequential actions may reduce complexity, organization and prescribed fire burn boss qualifications. For example a large scale, high-complexity prescribed fire that has been blacklined, portions burned and operations suspended for a period of time then resumed to continue or finish the prescribed fire, may have a lower complexity associated with it than when the project was initiated. A separate complexity analysis is required if a burn boss qualification is to be utilized that is less than initially required.

A single complexity analysis may be used to handle multiple phases of implementation or separate burn organizations. Sufficient detail should be included to differentiate between the element ratings and provide sufficient rationale to explain the differences. Further, the complexity rating summary must adequately summarize the difference in ratings resulting from assessing the different phases or organizations, and how those differences affect the summary complexity determination.

Lessons Learned: Viewing the complexity analysis as just another checklist or form, rather than an integral component of risk management, can result in missing key items during the plan preparation process and during implementation.

Complexity analyses for long-duration prescribed fires should take into consideration the uncertainty associated with seasonal changes in fuels and weather conditions.

A prescribed fire may allow for a RXB1, a RXB2, or a position with various levels of fire experience to be responsible for the prescribed fire, dependent upon the phase of the prescribed fire. In these situations, the complexity analysis should describe specific criteria that would lead to use of the different skill levels.

Taking the initial complexity analysis to the field helps in determining initial ratings and needed adjustments for the final complexity to be incorporated into the plan.

Element 4: Description of Prescribed Fire Area

A. Physical Description

This section of the plan describes the physical features within and adjacent to the prescribed fire project area.

- Location: The location of the prescribed fire project area and ignition units, including a legal description, Universal Transverse Mercator (UTM) or latitude/longitude (or both), county, and state. A description is needed of the physical, natural or human-made boundaries (or a combination), including ignition unit(s) of the prescribed fire project.
- Size: Area, in acres, of the prescribed fire project with a breakdown by ignition unit(s) and/or ownership, if applicable.
- Topography: Identify the upper and lower range of elevation, slope(s) maximum/minimum and average, and aspect(s) of the prescribed fire project area.
- Project Area: The prescribed fire project area covers the entire area where fire will be ignited and may be allowed to burn under the plan as documented in the land/resource management plan. The project area may include multiple ignition units.

B. Vegetation and Fuels Description

Provide a description of current vegetation and fuels in the project area. Identify any reference material used.

☐ On-site fuels data: Describe the structure and composition of the vegetation type(s) and fuel characteristics. The description may include natural or activity fuels, total fuel load (both live and dead) in tons/acre; dead fuel load by time-lag size classes; live fuel load (woody/herbaceous); fuel bed depth; and vertical and horizontal arrangement within the project boundary.

☐ Adjacent fuels data: Identify conditions (fuels, slope, and aspect) in and adjacent to boundaries especially those that may be at risk if fire moves outside of the project area or ignition unit.

Describe the percent of the ignition unit composed of each vegetative type and the corresponding fuel model(s).

C. Description of Values

List and discuss special features, natural resources, values, hazards, issues and constraints including those identified in the LMP. Also refer to the On-site, Off-site and Public/Political interest values identified in the complexity analysis.

D. Maps

Maps will be developed and included in Appendix A of the Prescribed Fire Plan. At a minimum, the plan will include a vicinity and project map. The number of maps, map size and scale, legend and level of detail should be appropriate for the complexity of the project. All maps will include the standard mapping elements: title, name of preparer(s), date, north arrow, scale and legend.

- Vicinity Map: Map scale will be such that the ignition units can be located on the ground and in sufficient detail to guide implementation.
- Project Map(s): The project map(s) identify features in sufficient detail to guide and assist in operational implementation of the prescribed fire. The project map should show the unit boundary, topographic features and values identified in the complexity analysis and other features such as fences, power poles, areas to be protected, potential hazards, areas of special concern, and control line locations in most cases. Specific locations of sensitive values such as historical or cultural sites (or both) should not be displayed on project maps. The pre-burn briefing should address location and avoidance techniques. Fuels or Fuel Model Map(s): Optional, but recommended for long-duration or landscape-level projects.

Include as needed to describe the spatial complexity of the fuels. Display the distribution of the fire behavior fuel models or other fuels classifications, such as Fuels Characteristic Classification System (<https://www.fs.fed.us/pnw/fera/fccs/index.shtml>), within and adjacent to the project and ignition units.

- Smoke Impact Area Map(s): Optional, but recommended for projects with critical smoke receptors or significant smoke concerns. This is a large-scale map that identifies the potential smoke impact areas for the project and ties in with. The local air quality authority usually defines the categories to be considered for the smoke impacts.

Lessons Learned: Poor unit design and failure to consider the fuels and other conditions outside the ignition unit(s) or project area (or both) have been identified as common denominators of prescribed fires that have been declared wildfires.

Project design and understanding how fire may move across the landscape is critical to the successful implementation of long-duration prescribed fires.

Fuels are often the source of unexpected or overlooked sources of trouble. The most common item overlooked is higher-than-expected fuel loadings or changes in fuel beds that result in greater-than-expected fire behavior.

Even within a season, conditions that may arrest fire spread at one point may become burnable at another. Always check whether the ‘barriers’ you’re counting upon will function as a barrier under the likely conditions you face. Ask the question: “under what conditions will this barrier fail or not function?”

Element 5: Objectives

Describe in clear, concise statements the specific measurable resource and prescribed fire objectives. Objectives are well-defined statements describing how a treatment accomplishes project goals. Objectives should be specific, measurable, attainable, realistic and time sensitive (SMART) and used as a measure of project success, as determined through methods described in the monitoring element. Objectives need to be measurable and quantifiable so prescription elements can be developed to meet them.

Element 6: Funding

Identify the funding source(s) and estimated cost(s) of the prescribed fire. Itemize by phase if desired.

If there is an expectation (agency or local policy) that the prescribed fire burn boss needs to track implementation cost in the prescribed fire plan, identify the process for tracking and expenditures for project expenses.

Element 7: Prescription

The prescription is the measurable criteria during which a prescribed fire may be ignited to meet the prescribed fire objectives.

The prescription will describe a range of low-to-high limits for the environmental or fire behavior parameters (or both) required to meet prescribed fire objectives. Describe only those parameters needed to identify the acceptable prescription window to meet prescribed fire objectives. In addition to the prescribed fire objectives, the prescription should take into consideration constraints such as smoke management issues and perimeter control concerns.

Lessons Learned: The prescription must be carefully developed due to its links with other elements of the prescribed fire plan. You must link the objectives to the prescription. The prescription influences multiple elements of the plan, including ignition plan, holding plan, contingency plan, needed organizations and determining the complexity of the prescribed fire.

In many cases, burning under the extremes of all prescriptive parameters would not meet or may possibly exceed the desired prescribed fire behavior characteristics. Empirical evidence (historical evidence or researched data) and judgment may be used to identify or calibrate prescriptions.

Weaknesses in modeling can be overridden, but must be justified with empirical evidence and/or verified with actual fire behavior. Separate prescriptions may be needed for multiple fuel model conditions to address seasonal differences or types of ignition (or both).

Examples of ignition include black lining, aerial ignition, etc.

Separate prescriptions may result in multiple complexity ratings and organizations. For example, a separate prescription may be needed for black-lining operations if conditions will be significantly different from the primary prescription or if the holding resources differ from those identified for ignition and holding phases. Separate prescriptions may result in the need to identify multiple levels of management, organizational structures, implementation measures and pre-burn considerations.

If the prescription parameters are being exceeded, the prescribed fire burn boss must evaluate fire controllability and whether fire effects will meet objectives. The prescribed fire burn boss must take action to ensure objectives are being met, or take appropriate actions to maintain control of or secure the fire.

Fire behavior characteristics for fuel models within the maximum spotting distance or adjacent to the project boundaries (or both) must be considered and modeled. Holding and contingency plans must be developed with consideration of the predicted fire behavior outside the ignition unit or project area (or both) that may occur during the identified prescription window.

Include a short narrative that describes the desired fire behavior identified in the prescription and discuss how it will achieve the desired treatment objectives.

The level of fire behavior modeling and the tools used should be commensurate with the scale and complexity of the fuel beds within the ignition units and landscape. Depending on objectives and conditions, spatial fire models, such as FlamMap, a fire behavior mapping and analysis program, and FARSITE, a fire behavior and fire growth simulator, may need to be used in addition to non-spatial modeling to establish the prescription window.

Consider using the skills of a FBAN, a LTAN, or air quality specialist (or a mix of all three) to develop prescriptions for long-duration prescribed fires and other complex projects. Include modeling or empirical evidence documentation (or both) as an appendix.

Lessons Learned Failure to consider the potential fire behavior in fuels outside of the ignition units or project area has been identified as a common denominator of prescribed fires that have been declared wildfires.

Inadequate prescription development has cascading effects throughout the prescribed fire plan including ignition, holding and contingency plan elements.

Long-duration prescribed fires that continue into fire weather conditions that may escalate fire behavior, have an increased likelihood of problems due to increased fire behavior especially in units with heavy fuel loadings. Adjustments of complexity levels, holding and contingency plans are examples of additional planning that might be necessary.

In addition to assisting with prescription development, FBANs and LTANs provide fire behavior forecasts during implementation to avoid being surprised with unplanned or unanticipated fire intensity and spread.

Wind Ninja can be used to assess wind flow across complex terrain and determine fire movement or identify critical holding points.

Prescription development needs to consider the seasonal changes in both live and dead fuels conditions.

When using the Scott and Burgan dynamic fuel models - RMRS-GTR-153 (Scott, et al., 2005) to write a prescription, be aware that live herbaceous moisture content shifts between live and dead and significantly affects fire behavior. BehavePlus -RMRS-GTR-249 (Heinsch, et al., 2010) can also be used to see how changing the live fuel moisture affects changes to fire behavior related to fine dead-fuel moisture.

Describing the prescription in a matrix that illustrates fire behavior outputs associated with different combinations of weather and fuels variables is an effective method to graphically identify the prescription window.

A well-written description of expected fire behavior that's based on the ignition pattern and timing provides additional understanding of calculated fire behavior values by making them realistic and achievable.

Element 8: Scheduling

- A. Implementation Schedule: Identify the general implementation schedule including time of day for ignition, duration of ignition or season(s) and note any constraints (dates, or days of the week etc.) on when the project may not be conducted.
- B. Projected Duration: For prescribed fires with multiple ignitions or ignition days, estimate project duration.

For multi-unit projects or long-duration prescribed fires, identify any special sequencing requirements, for example, Unit 5 must be completed before implementing Unit 12.

Additionally, the agency administrator's ignition authorization may identify additional scheduling constraints.

When implementing prescribed fires at National Preparedness Levels IV and V, see *National Interagency Mobilization Guide* for additional requirements (USDA, USDI, et al, 2013).

Element 9: Pre-burn Considerations and Weather

A. Considerations

Describe on- and off-site actions and consideration, including mitigation and design features, to be conducted and any other considerations to be addressed prior to implementation.

Examples include clearances, mitigation actions generated by the complexity analysis, line to be built, preparation of critical holding points, snags to be felled or protected, equipment to be pre-positioned, special features to be protected, warning signs to be placed, weather recording, fuels condition sampling, monitoring needs, responsibilities, and timeframes.

Describe any fuel sampling and weather data that may need to be obtained (see Element 7: Prescription and Element 14: Test Fire). This data should be taken at the project site. If this is not possible, use the closest representative site.

B. Method and Frequency for Obtaining Weather and Smoke Management

Forecast(s): Identify in the plan the method and frequency for obtaining weather and smoke management forecast(s). Spot weather or local area forecasts are required prior to ignition on all ignition days. The burn boss is required to obtain a spot forecast or local area forecast on any days the fire is actively spreading to determine holding, mop up or patrol staffing needs. A smoke management forecast should be obtained when residual smoke has potential to impact smoke-sensitive areas. A copy of the forecasts will be included in the project file.

C. Notifications

Include a list of organizations (including news media) and individuals who are to be notified prior to ignition, with information necessary to make the contacts. Reasonable efforts will be made to notify adjacent landowners (or their agents) and other potentially impacted publics. Attempts or actual notifications (or both) will be documented with date and method and placed in the project file.

Lessons Learned Failure to implement required line construction and other pre-burn work has been identified as a common denominator of prescribed fires that have been declared wildfires. Identifying who is responsible and the timeframes for the pre-ignition work can mitigate problems.

Forecasted but not communicated weather events have been identified as a contributing factor in wildfire declarations. Since the burn boss was unaware of the changes coming, staffing and shift times were not adjusted in advance of the event.

Climate information can be used to identify numerous conditions that may be conducive to undesirable events such as air-quality violations, and prescribed fires that are declared wildfires that lead to property loss or not meeting land-management objectives. Climate information that can inform prescribed fire planning and implementation include simple descriptions of climate averages and departures from normal (for example, temperature and precipitation anomalies) and value-added indices that incorporate climate information to highlight wet or dry conditions (for example, Palmer Drought Severity Index (PDSI); Keetch-Byram Drought Index (KBDI); Standardized Precipitation Index (SPI)).

In general, drought should be given serious consideration in prescribed fire planning as it affects both fire behavior and effects. For long-duration prescribed fires, a specific drought threshold or indicator appropriate to the project area should be included for consideration as part of the weather evaluation. For example, “If the KBDI is greater than 600, the underlying drought conditions are going to increase the risk of a wildfire declaration should one or more other factors occur (for example, strong frontal passage, wind shift with gusty winds etc.)”

Element 10: Briefing

All assigned personnel must be briefed at the beginning of each operational period to ensure personnel safety considerations (including the job hazard analysis or other agency-specific risk analysis) and prescribed fire objectives and operations are clearly defined and understood.

Briefing checklists are required to be included in the prescribed fire plan. The checklist is completed during the implementation briefing. The list includes, but is not limited to the following topics:

- Burn organization and assignments
- Prescribed Fire objectives and prescription
- Description of the prescribed fire project area including any values, special considerations and sensitive features identified in Element 4
- Expected weather and fire behavior
- Communications
- Ignition plan
- Holding plan
- Contingency plan and assignments
- Wildfire declaration
- Safety and medical plan
- Aerial ignition briefing (if aerial ignition devices will be used)

The briefing checklist should list briefing topics only, not re-state what is listed in the prescribed fire plan for that element. Additional items may be added if needed.

The burn boss will ensure that any new personnel arriving to the prescribed fire

receives a briefing prior to assignment.

Although optional, an Incident Action Plan (IAP) is recommended for large, multi-day or high complexity prescribed fires. If an IAP is used, it must address the briefing checklist items.

Lessons Learned: Briefing on how the prescribed fire will burn through the various fuels inside and outside the ignition unit(s) (expected fire behavior) based on ignition sequence and timing better prepares ignition and holding personnel to judge fire behavior changes as conditions might change to favor more intense burning.

Obtain and discuss input from others on the prescribed fire including holding, ignition, READ, and safety. At the end of briefing ask, “What am I/we missing?” or “Is there anything that I am not seeing?”

Element 11: Organization and Equipment

The complexity analysis process is useful to determine the organizational capabilities needed to safely achieve the objectives specified in the prescribed fire plan. Specify the minimum required implementation organization or capabilities, equipment and supplies needed for each phase of the prescribed fire until declared out. Minimum organization needs may also be specified for high vs low range of the acceptable fire behavior prescription or other prescribed fire plan elements. Consider specifying line production rates, as opposed to specific number and kind of resources (crews, engines, dozers, etc.). A prescribed fire burn boss will be assigned to every prescribed fire as determined by project complexity (Table 1). The prescribed fire burn boss is responsible for the fire until declared out unless responsibility is formally passed to another appropriate management level or to the local fire management organization.

Collateral duty positions will be identified in the organization chart of the prescribed fire plan. Standard ICS fire management principles for span-of-control and length of assignments will be adhered to when developing burn implementation organization(s) and used in managing prescribed fires. On prescribed fires with large organizations, use the ICS organization and staffing commensurate with the level of complexity. Consider the use of a prescribed fire manager in conducting multiple prescribed fires.

Before implementation (all phases) of the prescribed fire, documentation in the form of an organization chart must be completed. Changes to the staffing and assignments during implementation should be documented in unit logs or prescribed fire organizers and included in the project file.

No less than the minimum organization, identified for the applicable phase, described in the approved prescribed fire plan will be used for implementation.

Any changes to the planned organization that reduce capability to less than minimum organization or capability identified or increase complexity will require an amendment.

Different minimum organizations or capabilities may be identified for different phases of implementation (for example, holding versus mop up and patrol, different ignition operations, different prescriptions). Identifying variances in the prescribed fire plan template would minimize the need for an amendment.

Multiple prescriptions for one prescribed fire plan are permissible (Element 7: Prescription). Multiple prescriptions may require identifying and developing multiple organizations.

Lessons Learned: Fire behavior, weather predictions, and staffing levels will fluctuate on long-term prescribed fire. As activity increases and decreases, the qualifications of on-site leadership must be reassessed to accurately consider the prescribed fire complexity.

On long-duration projects, IAPs can provide the day-to-day operational type planning and documentation that is responsive to the fluctuations of fire behavior and staffing.

Element 12: Communication

A communication plan must be specific to the project's implementation to address safety and tactical resource management needs. It should identify and assign command, tactical, and air operations frequencies as needed. In addition, required telephone numbers should be included.

Lessons Learned: Communication issues are often implicated in wildfire declarations – whether infrastructure issues such as poor reception, or social interactions.

Element 13: Public & Personnel Safety, Medical

Safety Hazards and Mitigation

Provisions for public and personnel safety must be described. All personnel who are within the active prescribed fire area are required to wear personal protective equipment. The plan

needs to identify and analyze the safety hazards unique to the individual prescribed fire project and specify personnel safety and emergency procedures. It must include safety hazards (including smoke exposure, smoke on roads, and other impacts) and measures taken to reduce those hazards. A job hazard analysis or other agency-specific risk assessment is required for each prescribed fire.

Emergency Medical Procedures, Emergency Evacuation Methods, and Emergency Facilities

The emergency medical procedures and evacuation methods discussion should address stabilization and transport of accident victim(s). Identification of medical evacuation options, clarification of local, county, state, or federal resource capabilities, ordering procedures, role of dispatch centers, and key contacts or liaisons should be included. Consider incorporating the *Standardized Medical Emergency Procedures for Incident Management Teams*, *Standardized Communication Center Protocols*, and an expanded ICS 206 Medical Plan that includes emergency medical procedures into the prescribed fire plan.

Element 14: Test Fire

Provisions for a test fire are required in the plan. The test fire should be ignited in a representative location and results must be documented. The test fire should be ignited in an area that can be easily controlled. The purpose of the test fire is to verify that the prescribed fire behavior characteristics will meet management objectives and to verify predicted smoke dispersion. In many applications, analysis of the initial ignitions may provide adequate test fire results. On multiple-day projects, evaluation of current active fire behavior, in lieu of a test fire, may provide a comparative basis for continuing and must be documented.

Prior to ignition of either the test fire or ignition operations, compare the prescribed fire plan prescription elements against local area or spot weather forecasts, other predicted conditions, and the actual on-site conditions to determine if conditions are suitable for either the test fire or active ignition (Element 9: Pre-burn Considerations and Weather).

The prescribed fire burn boss should determine if observed fire behavior will achieve prescribed fire objectives during the operational period to continue with active ignition.

Lessons Learned: Test fires conducted in locations that were in cooler or moister locations, or in fuels with a different kind of fire behavior than the prescribed fire area, yielded misleading results (for example, fire behavior was lower: lower flame lengths or rate of spread (or both)).

Test fires ignited early in the day can sometimes lead a burn boss to under predict fire behavior in the afternoon.

Test fires that are not ignited according to the ignition plan can provide unrealistic examples of fire behavior, for example, how quickly fire will reach momentum for burning intensity, and the effects of area ignitions that encompass large areas of unburned fuel. Variations of ignition timing can also exceed test fire characteristics producing high burning intensity that exceeds objectives and creates unexpected problems for ignition and holding personnel.

Test fires for units with aerial ignition can be misleading. They will only show ease of ignition, burning intensity for a small area, and smoke characteristics where wind is the dominant force. Aerial ignition has the potential of near mass ignition where the fire's energy will exceed that of the wind. Burning intensity increases rapidly and can easily exceed holding capabilities caused by radiant heat as well as increasing opportunity for lofting large firebrands.

On multiple-day projects, where in lieu of a test fire, an evaluation of current active fire behavior may provide a comparative basis for continuing, initiate a separate test fire and evaluate results if there is any doubt about whether the current fire behavior is a good representation of the potential fire behavior.

Element 15: Ignition Plan

General ignition operations should be described. Examples could include firing methods, devices, techniques, and sequences within individual units or between multiple units, patterns, and minimum ignition staffing for single or multiple-unit operations.

During active ignition, actual firing patterns, techniques, sequences, patterns and staffing will be determined and adjusted to meet objectives as dictated by topographic, fuels and weather factors.

Maps showing proposed firing patterns may be included. If aerial ignition is planned, include aviation operations, organization, and safety within the prescribed fire plan, aerial ignition plan, or in an agency-specific aviation operating plan. Refer to the *Interagency Helicopter Operations Guide*, PMS 510 and the *Interagency Aerial Ignition Guide*, PMS 501 for more detailed information on this topic.

Multiple prescriptions and ignition operations (blackline, primary, aerial, etc.) may require developing multiple ignition organizations.

Element 16: Holding Plan

General procedures for operations to maintain the fire within the project area, meet project objectives and protect values at risk (consistent with Element 4) until the fire is declared out must be described. This should include mop up and patrol procedures. Describe values to be protected and associated critical holding points and mitigation actions. The holding plan must be developed taking into consideration the predicted fire behavior outside the project or ignition unit boundaries.

Describe minimum capabilities needed for all phases of implementation, including needs for critical holding points and associated mitigation actions (Element 11: Organization and Equipment). If used, attach or reference fire behavior modeling outputs or worksheets and/or

documented empirical evidence to justify minimum holding resources required. Different organizations may be identified for different phases of implementation (for example, holding versus mop up and patrol, different ignition operations, different prescriptions). Multiple prescriptions (blackline, unit, for example) may require separate complexity ratings and separate holding organizations for each of the prescriptions.

If on-site resources are insufficient to meet the prescribed fire plan objectives, then the burn boss should consider implementing the contingency plan or wildfire declaration.

Lessons Learned: A significant number of prescribed fires are declared wildfires during mop up and patrol phase of implementation. Consideration of which conditions will trigger either step up or step down of mop up and patrol efforts will help reduce risk of having to go to a wildfire declaration.

Element 17: Contingency Plan

The contingency plan is the portion of the prescribed fire plan that considers low probability but high consequence events and the actions needed to mitigate them.

Contingency planning is the determination of what additional actions or additional resources (or both) are needed to keep the prescribed fire within the scope of the prescribed fire plan. At a minimum, this element will address contingency options related to maintaining the prescribed fire within the ignition unit and or prescribed fire project area.

Contingency planning can also address not meeting prescribed fire objectives, critical holding points, smoke management considerations such as impacts to critical smoke receptors, staffing, accidents, “incidents within incidents” and other unanticipated events.

See Appendix B for supporting information and concepts that can assist in developing contingency plans.

The contingency plan establishes Management Action Points (MAPS) or limits that indicate when additional actions (tactical and non-tactical) or resources, or both, will be needed. If it is determined that contingency resources are not needed, the rationale should be documented in this element of the prescribed fire plan.

Contingency needs should be based on the tactics to mitigate events or impacts to prescribed fire objectives or the values at risk. Contingency resources are the minimum resources or capabilities required to implement the MAPs or limits and should be based upon the values at risk and the prescription window identified in Element 7: Prescription. For purposes of this element, the terms *capabilities* and *resources* are interchangeable.

These resources may be on or off-site as required by the prescribed fire plan. If the identified contingency resources will not be on-site, the maximum acceptable response time for those resources must be identified. If off-site, the identified minimum contingency resources pay status will be determined by agency or local policy.

Separate contingency plans may be developed to address seasonal differences, types of ignitions or phases (for example, active ignition, mop up, holding, monitoring, etc.) of implementation as described in the prescriptions and ignition and holding plans developed for the prescribed fire. When developing separate contingency plans the most technically difficult contingency plan should be considered when analyzing the complexity of the prescribed fire (Element 3).

The minimum number and type of contingency resources may vary depending on the location, implementation phase and applicable MAP or limit. The burn boss will verify and document availability of contingency resources and response time throughout each phase of implementation as described in the plan. If the contingency resources availability falls below the minimum required for the current location and implementation phase, actions must be taken to secure operations until the needed resources are replaced.

Contingency resources identified for MAPs, or limits, can be activated individually or collectively by the burn boss or as identified in the prescribed fire plan. The same contingency resource can be identified for multiple prescribed fire projects. When specific contingency resources are identified for more than one prescribed fire, the local fire management organization(s) should evaluate and document adequacy of all contingency resources within the area.

This evaluation should consider:

- Local, current, and predicted fire danger
- Local and regional wildland fire activities.

Once a contingency resource is committed to a specific wildland fire action (wildfire or prescribed fire), it can no longer be considered a contingency resource for another prescribed fire project and a suitable replacement contingency resource must be identified or the ignition secured.

The agency administrator will determine if and when he or she is to be notified that contingency actions are being taken.

If the contingency actions are successful at bringing the project back within the scope of the prescribed fire plan, the project may continue.

Documentation of implemented contingency actions and contingency resources ordered should be included in the project file.

Lessons Learned The ability to successfully manage the unexpected depends on having comprehensive contingency plans and updating them as needed during the prescribed fire. Most burn bosses expect that they will have a successful outcome. However, when they made the wildfire declaration, many felt that adequate contingency plans were not in place.

Contingency plans with identified MAPs (spatial or temporal) should be identified and addressed prior to ignition. The availability and effectiveness of contingency resources also need to be well planned and coordinated prior to ignition.

Contingency plans for long-duration prescribed fires should address how the burning will be stopped if adverse conditions are experienced, such as a weather system that limits smoke dispersion, or fire behavior that is no longer meeting objectives. Several questions must be answered beforehand, such as “Where are the likely control or internal check lines or other barriers that could be used?”, and “What are the MAPs?”

When calculating contingency resource needs or capabilities the fire behavior outside of the ignition unit will usually be different than within the unit, specifically with flame lengths and rates of spread of a head fire.

The intent of contingency planning is not to get stuck in an endless “do-loop” cycle and develop MAPs for every potential scenario but it should focus attention on the areas most likely to cause problems.

Spatial fire behavior modeling can assist in identifying potential problem areas and development of MAPs.

Contingencies for unplanned smoke impacts need to consider both the day and days following active ignition.

Many smoke related problems occur at night (post ignition) or days following ignition when most resources have been demobilized.

Consider what might happen if two or three things go wrong at the same time. The probability will be very low, but the impact can be extreme. Almost every major prescribed fire disaster involved multiple failures.

Element 18: Wildfire Declaration

The prescribed fire plan will specify who has the authority to declare a prescribed fire a wildfire.

A prescribed fire, or a portion or segment of a prescribed fire, must be declared a wildfire by those identified in the plan with the authority to do so, when either or both of the following criteria are met:

- Prescription parameters are exceeded and holding and contingency actions cannot secure the fire by the end of the next burning period, or,
- The fire has spread outside the project area or is likely to do so, and the associated contingency actions have failed or are likely to fail and the fire cannot be contained by the end of the next burning period

A prescribed fire can be declared a wildfire for reasons other than those identified above, if events cannot be mitigated as determined by the burn boss and agency administrator.

Once a prescribed fire is declared a wildfire it cannot be changed back to a wildfire.

A description is needed of the actions to be taken when a prescribed fire is declared a wildfire. The description will include:

- Wildfire declaration (by whom)
- IC assignment
- Notifications
- Extended attack actions and opportunities to aid in wildfire (Optional)
- Agency or local policy may limit the strategic and tactical responses available for a prescribed fire that is declared a wildfire

Element 19: Smoke Management and Air Quality

In this element describe how the project will comply with local, county, state, tribal, and federal air quality regulations. Identify what permits, if any, are needed. Identify smoke sensitive receptors, including population centers, recreation areas, hospitals, airports, transportation corridors, schools, non-attainment areas, Class I areas, and restricted areas that may be impacted. Include modeling outputs and mitigation strategies and techniques to reduce the impacts of smoke production, if required by State Implementation Plans (SIPs), Tribal Implementation Plans (TIPs), and/or state or local regulations. Refer to the *Smoke Management Guide for Prescribed and Wildland Fire*, PMS 420-2 and Appendix A Basic Smoke Management Practices for other smoke management planning suggestions and smoke management techniques for reducing or redistributing emissions. Ensure that the smoke sensitive receptors are identified as values in the complexity analysis and the technical difficulty of mitigating smoke and air quality are reflected in the complexity rating.

Special considerations must be taken to address smoke when the project is in a non-attainment area for a National Ambient Air Quality Standards including ensuring compliance with SIP or TIP provisions (or both) and addressing conformity. Projects that will potentially impact Class I areas should address any efforts to minimize smoke impacts on visibility. Comply with all local, state, tribal and federal pre-burn and post-burn data reporting requirements.

A Notice of Violation (NOV) issued by an air quality regulatory agency for a prescribed fire will initiate a formal review (See Air Quality Notice of Violation (NOV) Review).

Lessons Learned: Coordination and discussions with smoke management regulatory agencies before, during, and after prescribed fires is essential to positive outcomes. These discussions are anchored by mutual understandings of long-term prescribed fire program goals, the role and external pressures influencing regulator actions, and the relationships and trust by all involved.

Smoke can often create enormous problems when projections are absent or inaccurate and when actual conditions change but are not communicated to affected and interested parties. Public health and safety issues caused by smoke, when cities, airports, and highways become “unexpectedly” smoked in, can quickly become the burn boss and agency administrator’s number one concern.

The longer the duration of the prescribed fire, the greater the likelihood of significant smoke impacts or long-range impacts.

For long-duration prescribed fires, daily smoke management forecasts may not be adequate. Forecasts that address the long-term stability of the air mass and what changes can be expected over time should be obtained.

Long-term smoke impacts need to be accounted for and management coordinated with air or smoke regulators (or both), as it is significantly more complex than a single, one-day pulse of smoke.

Element 20: Monitoring

Prescribed fire monitoring is defined as the collection and analysis of repeated observations or measurements to evaluate changes in condition and progress toward meeting a management objective. Monitoring is required to ensure that prescribed fire plan objectives are met. For a prescribed fire, at a minimum specify the weather (forecast and observed), fire behavior and fuels information, and smoke dispersal monitoring required during all phases of the project and the procedures for acquiring it, including who and when.

Lessons Learned: For long-duration prescribed fires monitoring of smoke transport and impacts is highly recommended. Consider a range of monitoring activities including a visual smoke report, webcams to identify smoke plume and smoke haze or ambient air quality monitors.

When conducting long-duration prescribed fires it is important to do periodic assessments and document what the conditions are, what was seen and what was done. All of it goes back into a feedback loop tied to the MAPs set up for holding and contingency.

Element 21: Post-burn Activities

A description of the post-burn activities must be completed. Consider adding who is responsible that the activities are accomplished and in what timeframe. This may include preparing a post-burn report, finalizing the project file, safety mitigation measures, close out of applicable pre-burn considerations, mitigations and rehabilitation needs.

Prescribed Fire Plan Appendices

- A. Maps: Vicinity, Project or Ignition Units (or both), Optional: Fuel or Fuel Model, Smoke Impact Areas
- B. Technical Reviewer Checklist
- C. Complexity Analysis
- D. Agency-Specific Job Hazard Analysis or Risk Assessment

- E. Fire Behavior Modeling Documentation or Empirical Documentation
- F. Smoke Management Plan and Smoke Modeling Documentation (Optional)

Prescribed Fire Plan Technical Review

Every prescribed fire plan must receive a technical review prior to agency administrator approval. The technical reviewer and prescribed fire plan preparer must be qualified or have been previously qualified as a prescribed fire burn boss at an experience level equal to or higher than the complexity being reviewed. Either the technical reviewer or the prescribed fire plan preparer must be current in their qualification, minus the physical fitness requirement.

The technical reviewer should have local knowledge of the area, experience burning in similar fuel types, or have previous experience conducting an on-site review (or all three). The technical reviewer must be someone other than the prescribed fire plan preparer.

Only a RXB1 can review plans at high complexity. Either an RXB1 or RXB2 can review plans of moderate-to-low complexity. An RXB3 is allowed to function as a prescribed fire plan preparer for a low-complexity plan, but not a technical reviewer. Low complexity plans will be technical reviewed by and RXB2 or RXB1.

An off-unit technical review is encouraged to provide an additional independent perspective. It is acceptable for other specialists to assist with the technical review of certain portions of the plan, however; a primary technical reviewer must be designated as technical review signatory. For example, a fire behavior analyst may review the fire behavior calculations; the aviation manager may review the air operations plan; or resource specialists may review impacts to their area of interests. It is recommended that at least once every year, each unit should send a moderate- or high-complexity prescribed fire plan off unit for technical review.

The results of the technical review must be documented on Appendix B Technical Reviewer Checklist, *Prescribed Fire Plan*.

Agency or individual unit policy may require the need for additional reviews prior to agency administrator approval of the prescribed fire plan.

Project File

All prescribed fire project files must contain the following information. Agencies or administrative units may require additional information.

- Prescribed fire plan (and amendments)
- Monitoring data including weather, fire behavior, fire effects and smoke dispersal observations
- Weather forecasts
- Notifications
- Documented prescribed fire organization(s)
- Any written agreements related to implementation
- All Agency Administrator Ignition Authorization(s)
- All Prescribed Fire Go/No-Go Checklist(s)
- Depending on the scope and complexity of the prescribed fire, optional information or

further documentation (or both) that may be included in the project file include:

- After Action Review
- Incident action plans, unit logs
- News releases, and other public contact documentation
- Costs
- Actual ignition patterns and sequences used
- Appropriate smoke management information
- Agency individual fire occurrence form
- Detailed post burn report
- Permits
- Reference documents that helped in development of the plan
- Final burn perimeter, progression and/or accomplishment maps
- Photo or video documentation

Lessons Learned: Sometimes it can take several attempts to complete a successful prescribed fire. Other times, a prescribed fire plan covers several entries or several ignition units. The project file should be used to capture information about weather, ignition, fuels and fire effects to assist the team for the next unit.

This section can also be used to take note of site-specific conditions valuable for the next entry – diurnal or seasonal winds, for instance.

Prescribed fire organizers have been developed locally and are an efficient way to document many of the actions and other information associated with the daily operations.

Reviews

Reviews assess and identify areas to improve the safety and effectiveness of prescribed fire planning and implementation. The primary purpose of a review is to assist continuous program improvement by promoting individual and organizational learning through the sharing of lessons learned. Units are encouraged to review prescribed fires whenever a learning opportunity presents itself regardless of the outcome, either positive or negative.

When lessons learned and recommendations are incorporated into practice in a timely manner, individual and organizational learning is improved.

Outcome Reviews

Units are encouraged to review prescribed fires covering the full spectrum of outcomes: the successful, routine and the unintended. By reviewing all outcomes of prescribed fires, fire personnel can learn when things go right, the same as when events do not turn out as planned. They gain understanding of performance and variability, in all its forms, and familiarity and skill in conducting reviews.

The level and type of outcome or post-event review is determined by the appropriate agency administrator using applicable laws, executive orders, departmental rules and agency policy. A number of tools can be used individually or concurrently to meet these needs. When determining what tools to use agency administrators should consider the outcome of the prescribed fire with respect to its objectives, sensitivity to external influence, public opinion and political concerns, and should consider what tool would best help the prescribed fire program and what other programs could or should learn from the event.

Two outcome reviews are required:

1. Declared Wildfire Reviews
2. Air Quality Notice of Violation Reviews

At a minimum, all outcome reviews will contain the following information:

- Executive Summary
- Setting – environmental, social and political
 - Prescribed fire objectives
 - Prescribed fire prescription
 - Prescribed fire outcomes
- Narrative and chronology
- Lessons Learned identified by the participants
- Lessons Learned identified by the team (if used)
- Summary
- Maps and photos
- Recommendations and follow-up action items with timeframes for completion (if required by agency policy)

When teams are formed to conduct reviews, agency administrators should clearly communicate leader's intent to the team and the affected prescribed fire unit regarding purpose of the review,

- Intended audience for the review,
- How will review be conducted,
- Expected products,
- Timeframe for completion, and
- Responsibility for disseminating products and communicating with key partners.

Lessons Learned: Teams should listen before asking questions and approach the review with an attitude of seeking to understand the leader's intent.

Declared Wildfire Reviews

The agency administrator will be notified of a declared wildfire. The agency administrator is required to make the proper notifications in accordance with agency policy.

The declared wildfire review process will be initiated by the appropriate agency administrator. Although other types of reviews may be required by agency policy, the minimum requirement of the declared wildfire review is to help prevent future wildfire declarations. This will be accomplished by analyzing key prescribed fire plan and implementation interactions and gathering knowledge and insight from the local participants for improvement of their own prescribed fire planning and implementation. The analysis and lessons learned are then disseminated for the benefit of the broader prescribed fire community.

Following the wildfire declaration, the burn boss should document the incident, including all actions prior to and after the declaration. To assist and prepare for the review team, a new file should be set up that includes the project file and other pertinent information.

The new file should include:

- Chronology of events
- Prescribed fire report
- Unit logs and individual statements
- Weather observations taken on site
- Remote Automated Weather Station (RAWS)
- National Fire Danger Rating System (NFDRS) data for the day of the wildfire declaration from the nearest station(s)
- Photos
- Other pertinent information not contained in the project file

In addition to the common outcome review elements, the declared wildfire review must include the following analysis and may be addressed in a separate review:

- An analysis of the seasonal severity, weather events, and on-site conditions leading up to the wildfire declaration.
- An analysis of the prescribed fire plan for consistency with agency policy and guidance related to prescribed fire planning and implementation.
- An analysis of prescribed fire implementation for consistency with the prescription, actions, and procedures in the prescribed fire plan.
- The approving agency administrator's qualifications, experience, and involvement.
- The qualifications and experience of key personnel involved.

When addressing these topics, it is recommended to clearly separate the analysis from the lessons learned process. The analysis of these topics can usually be accomplished through review of documentation.

An independent, peer-based review team is recommended for conducting a declared wildfire review. The number of individuals assigned to the team and their functional expertise should be commensurate with the scope and focus of the review and the intended products. Interagency participation is highly recommended for declared wildfire reviews.

Air Quality Notice of Violation Reviews

An Air Quality Notice of Violation (NOV) Review would follow direction in “Declared Wildfire Reviews” that support understanding of the planning, decisions, and actions taken that contributed to the NOV. In addition, the elements below, which are unique to smoke incidents affecting air quality, must be addressed. The review may use the Guidance for After-Action-Review of Smoke Impacts found at the National Interagency Fire Center site <https://www.nifc.gov/smoke>.

At a minimum, the NOV review will include:

- A discussion of the smoke-sensitive receptors, estimated smoke effects including modeling, identified in the prescribed fire plan, and any actual smoke monitoring observations and effects related to the prescribed fire project.
- A discussion of predicted versus actual ambient air quality using best on-site fuels

information available (for example, fuel conditions, fire behavior, fuel consumption), emissions production (quantity and duration) and weather.

- If needed, a comparison between pre-prescribed fire smoke dispersion modeling and post-prescribed fire modeling using best on-site information available.
- Discussion of the smoke management practices used for the prescribed fire and the role of cumulative smoke impacts from other prescribed fire activities regarding how they affected the issuance of the NOV.

A separate review of all or some of the following items may be required by agency or local policy:

- An assessment of the smoke management training of personnel,
- Policies for smoke management,
- Performance of the smoke management elements of the prescribed fire plan for the prescribed fire under review.

Additional Review Types

In addition to outcome and technical reviews, the following types of reviews can be conducted:

- Before Action Review
- Technical On-Site Peer Review
- After Action Review

Before Action Review

A Before Action Review (BAR) comes at the beginning of a project rather than the end, so that the project can be improved rather than reviewed. Unlike a typical critiquing session, in which project team members are asked, “What might go wrong?”, the BAR operates on the assumption that the project has failed and so asks, ‘What did go wrong?’. The team members’ task is to generate plausible reasons for the project’s failure.

An effective approach is to:

- Draw out the planned prescribed fire on a sand table, flip chart, computer, or chalk board.
- Gather the prescribed fire team around this sketch, computer representation, or sand table of the prescribed fire.
- Include a diversity of viewpoints: line officers, fire behavior, the lowest ranked person on your prescribed fire crew, a biologist, archeologist, silviculturist, and so on. The more diverse perspectives included the better.
- After a full briefing and review of the plan, team members identify the reasons they can think of for the failure, especially the extreme events.
- Share the reasons with the team and discuss.
- Identify potential solutions and mitigations and incorporate them into the prescribed fire plan and implementation.

Technical On-Site Peer Review

The technical on-site peer review, also known as a “plan in hand review”, can occur as part of the prescribed fire plan technical review phase (see Technical Reviewer) or prior to the plan being submitted for technical review. A team of on- and off-unit peers and specialists are assembled and on-site review of the plan is conducted to:

- Evaluate if the complexity analysis accurately represents the project.
- Identify gaps or potential problems in the ignition, holding and contingency plans.
- Identify potential changes to the prescribed fire plan.

After Action Review

Each operational shift on a prescribed fire should have an informal after action review

(AAR). The questions to answer in conducting an AAR include:

- What did we set out to do (what was planned)?
- What actually happened?
- Why did it happen that way?
- What should be sustained?
- What can be improved?

In addition to prescribed fire team AARs, burn bosses should make a habit of going back to their notes and evaluating where they did well, and not so well, at anticipating and containing the unexpected. Burn bosses should ask themselves: “What did I miss seeing? Why did I miss seeing it? What surprised me?” Burn bosses should consider sharing their observations with others in a burn boss report and include the report in the project file.

Certain events or a culmination of events that may affect future prescribed fire implementation or policy (or both) can be submitted via the Rapid Lesson Sharing found on the Wildland Fire Lessons Learned Center Web site at <https://wildfirelessons.net/>.

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Appendix A

Basic Smoke Management Practices

Fire is an essential ecological disturbance, providing many benefits to the environment in terms of wildlife, water and soil quality, and nutrient cycling. Prescribed fire can be a means of protecting communities and protecting air quality by mitigating the occurrence of large wildfires and reducing invasive species. However, fire produces smoke which contains particulate matter (PM), ozone precursors, greenhouse gases, and other trace gases. A direct control cannot be put on a prescribed fire—unlike other air pollution sources such as a power plant smoke stack—rather a variety of environmental factors must be taken into account to manage both the prescribed fire itself and the smoke produced from the prescribed fire.

Basic Smoke Management Practices (BSMPs) applied on prescribed fire can mitigate the impacts of smoke to public health, public safety and nuisance, and visibility. The USDA Forest Service and Natural Resources Conservation Service have created a Technical Note that outlines a suite of BSMP options that a fire manager can utilize to reduce the impacts of smoke from prescribed fires (USDA Forest Service and Natural Resource Conservation Service, 2011).

The publication *Smoke Management Guide for Prescribed and Wildland Fire*, PMS 420-2, provides more information on managing smoke and is available on the NWCG Web site at <https://www.nwcg.gov/pms/pubs/pubs.htm>. More information on smoke can be found in the National Interagency Fire Center Web site <https://www.nifc.gov/smoke> and the NWCG Smoke Committee page on The Wildland Fire Lessons Learned Center Web site at <https://wildfirelessons.net/>.

Appendix B

Contingency Planning Aids

When events do not go as planned, whether the result is positive or negative may come down to how well the prescribed fire was planned. Without a well-developed plan, small issues can become emergencies. Two tools that can assist in understanding contingency planning and aid in the development of contingency plans are:

1. PACE Planning
2. Management Action Points

PACE Planning

PACE Planning stands for:

- Primary
- Alternate
- Contingency
- Emergency

PACE is a risk containment/contingency planning tool that may be used in prescribed fire planning and implementation.

With PACE, instead of just one fallback option, there are multiple options. In prescribed fire planning the **Primary** and **Alternate** plans are part of Element 16, Holding Plan. Often, the alternate plan is a variation of the primary plan used if conditions change. The Element 17 **Contingency** Plan, *Prescribed Fire Plan* exists in case something doesn't go as planned, and the **Emergency** Plan, which exists in case

everything goes wrong, is addressed in Element 18: Wildfire Declaration.

Unexpected events such as strong downdrafts from thunderstorms miles away, jet stream winds unexpectedly touching down, equipment breakdown, diverted or delayed resources, or a new nearby wildfire are only a few examples of unexpected events that can occur during the implementation of a prescribed fire that can be addressed with PACE Planning.

Plans can be either written (prescribed fire plan) or verbal (during the actual implementation). It is essential that they be clearly understood by *all those* who could be called on to assist in the prescribed fire.

The primary and alternate components of the holding plan address the resources and actions necessary to keep the prescribed fire within the project area and meet objectives within the identified prescription. The resources necessary for this component would be identified as the minimum holding resources in the prescribed fire plan.

Contingency planning addresses the “what if?” for handling the unexpected. The contingency plan is the portion of the prescribed fire plan that considers low probability but high consequence events and the actions needed to mitigate those events. The contingency plan identifies one or more actions that are initiated at a certain time and place or under a certain set of conditions or Management Action Points.

The emergency plan is the portion of the prescribed fire plan that describes initial actions if the prescribed fire is declared a wildfire.

PACE planning not only provides alternatives to the primary plan, it prepares the prescribed fire organization to deal with changes—changes that often are inevitable. PACE planning accounts for this by preparing parallel solutions that can quickly adjust to change.

With that in mind, PACE could be used in other prescribed fire plan elements to identify Primary, Alternate, Contingency and Emergency options. Identification of check lines and options to secure prescribed fire operations mid-implementation are an example of alternate and contingency planning.

The most important benefit of PACE planning is that it helps create a culture that is constantly thinking of alternatives. What if this does not work? What if conditions change? What if something goes wrong?

The organization that thinks in alternatives is prepared for the unexpected—and positioned to take advantage of it.

Management Action Points

Management Action Points (MAPs) can be used to describe actions that may be implemented during the project. MAPs should be appropriate to the scale and complexity of the prescribed fire project. MAPs can be used in several elements of the prescribed fire plan including the Ignition Plan, Holding Plan, Contingency Plan and Smoke Management and Air Quality.

MAPs are clearly specified conditions that, if reached, prompt implementation of tactical and/or other non-tactical actions to meet prescribed fire objectives. MAPs are usually spatial, but can also be temporal or otherwise tied to conditions that cannot be conveyed geographically using points, lines, or polygons.

If MAPs are tied to a geographic feature, it should be identifiable on the ground or from an aerial platform. If the MAP is supposed to identify a place where actual tactical actions are to take place, it should be placed in an area that is defensible and safe under foreseeable conditions.

The key factor in any possible implementation of a MAP action is *anticipation*. Actions must be

identified and performed before being forced to do so. If an action is forced, it may be too late.

Conditions defined by MAPs need to be related to the fire activity, which would relate to firefighter and public safety, location of fire to the MAP, smoke, weather, fuels, calendar dates, resource availability or a combination of any of these (and other) elements. If the conditions defined by the MAP are met, it's critical to act quickly for successful accomplishment of the prescribed fire objectives.

MAPs should be placed where tactical and non-tactical opportunities may be greatest for successful implementation. MAP actions (tactics or non-tactical) should protect firefighter and public safety, effectively coordinate and communicate critical information with cooperators and public; and protect values at risk. Some examples of actions to address with MAPs are (the following list is not all inclusive):

- Tactical actions, such as direct or indirect hand or machine fireline construction; aerial water or retardant drops; firing operations; structure protection (wrap or application of water, foam, gel, or pre-treatment of hazardous fuels); or any combination of these actions for any given MAP.
- Non-tactical actions such as: review of decisions, or discussion of new communications; increased monitoring actions; implementing road or area closures; ordering resources for tactical or logistical operations; notification of cooperators or public (cooperators, adjacent agencies and private landowners, county commissioners, county sheriff's, permit holders, outfitters, other forest users, and others as appropriate); sending news releases and/or conducting public meetings; and ordering and staging resources.

During project design and identification of MAPs, take advantage of a combination of favorable topographic features (ridge tops, drainage bottoms), fuel conditions (areas that transition from heavy to light fuels, past large fire areas, fuel treatment areas), weather, land ownership boundaries (if the other above mentioned factors are favorable), and human-made features such as roads or trails in delineating MAPs.

MAPs should be tied to a readily identifiable feature so prescribed fire personnel will know when to implement an action. If tactical actions are planned for a MAP, the MAP should be located in an area where there is a high probability of that action being successful (defensible). The use of any MAPs for tactical operations is subject to consideration of the fire behavior, fire weather, and its possible influence on the safety of firefighting resources, subject to carrying out the tactical operations. If it is deemed unsafe to conduct tactical operation from any particular MAP, a different MAP or action should be considered. Other factors in the development and documentation of a MAP should be considered. Some of these factors include:

- Addressing the condition when the identified MAP action would be implemented.
 - Think about when the action might be started in terms of the prescribed fire anticipated to, or reaching the MAP or some other factor that might initiate the action.
- Consider the management intent for implementing the action. In other words, why is it important? Is it tied to a prescribed fire objective or a constraint?
 - What is the reason for establishing the MAP? Is it to protect a value, coordinate with other agencies, inform the public, or some other reason?
- As discussed before, what is the specific action that needs to take place?

- Is it a tactical or non-tactical action and does it specifically address what needs to occur?
- What are the resources needed and how much time is involved in completing that action?
 - Are the resources needed to implement the action currently on the prescribed fire or do they need to be ordered?
 - About how much time is needed to obtain and to use those resources to complete the action?
- What might be the subjective probability of success given the current and forecasted incident situation?
 - Are the logistics and implementation of the action going to be complex which might impact the probability of success given the situation?
- If for some reason the action can't be implemented due to an unforeseen circumstance, what is the consequence of not taking that identified MAP action?
 - Do the agency administrator and resource allocation personnel know the consequence of not taking the action if resources are not available?
- Who is responsible for the implementation of that action?
 - Is it clear who will be responsible to ensure the action is implemented?
- Who is responsible for tracking MAP status?

The following is an example that can be addressed for each MAP:

Designator and Description: Enter unique identifier for management action point and description such as “MAP 1, Bear Creek”.

Condition: State when the recommended actions will be implemented. Example: “When the fire is anticipated to reach within 24 hours or has reached/crossed the MAP”.

Management Intent: Describe the intent of planning and implementing the actions at this MAP. An example such as “to meet the objective of protecting the private land in Deer Creek” or “to keep the fire contained within the proposed Great Burn Wilderness”.

Recommended Action(s) to Consider: Described the actions to be taken for the MAP. When listing actions, a key word to use is “consider”. An example would be, “Consider using aerial retardant to delay the spread of the fire to the east toward the X subdivision”.

Recommended Resources: Describe the resources or capability needed to carry out the recommended actions.

Timeframe: Enter the relevant timeframes such as the maximum expected resource response time or the maximum time to initiate the recommended actions.

Describe the consequences of not taking the recommended action(s) (Optional): An example such as; “There is a high likelihood that private land will be burned and structures may be lost” or “there is a high probability that fire will burn out of the wilderness and threaten/impact BPA transmission lines”.

Responsibility: Identify who is responsible for implementing each action. For example, “PIO” for conducting a public meeting or the “county sheriff” for implementing evacuations”.

Date Each Action is Initiated: If a specific action is implemented, record the date initiated

The following are examples of two different formats that may be useful when identifying MAPs. MAPs are entered into Element 17: Contingency Plan.

Example 1 format of a MAP:

Designator and Description: M.A.P. #1 – Taylor Canyon

Condition: Torching with spotting across the Taylor River and Taylor Canyon road, fire gets established south of road. Possible fire behavior includes uphill crown run.

Management Intent: Control any spots within 12 hours to prevent impacts to Bear Creek subdivision.

Recommended Action(s) to Consider:

- A. Initiate holding actions along Wilson Ridge north of Bear Creek.
- B. If spots occur during active ignition, evaluate whether to continue ignition or secure the burn where logical and feasible.
- C. Coordinate with County Sheriff on possible implementation of evacuation plan.

Recommended Resources:

- A. 2 Type 6 engines or equivalent, minimum of 10 FFT2 or above Type 3 dozer or equivalent
- B. Burn Boss
- C. Burn Boss

Timeframe:

- A. 1-2 hours maximum resource response time
- B. Immediately
- C. 2 hours

Describe the consequences of not taking the recommended action(s) (Optional):

- A. Fire would threaten the Bear Creek subdivision within 24 hours
- B. Increased holding problems if ignition unit not secured while dealing with spots.
- C. Evacuation if needed may be delayed, public safety would be compromised.

Responsibility:

- A. Holding Operations or Burn Boss
- B. Burn Boss in consultation with Ignition and Holding Operations
- C. Burn Boss or District Ranger

Date Each Action is Initiated:

- A.
- B.
- C.

Example 2 format of a MAP:

Management Action Point - Documentation Element	MAP Narrative
Designator and Description:	M.A.P. #1 – Taylor Canyon
Condition:	Torching with spotting across the Taylor River and Taylor Canyon road, fire gets established south of road. Possible fire behavior includes uphill crown run.
Management Intent:	Control any spots within 12 hours to prevent impacts to Bear Creek subdivision.
Recommended Action(s) to Consider:	<ul style="list-style-type: none"> A. Initiate holding actions along Wilson Ridge north of Bear Creek. B. If spots occur during active ignition, evaluate whether to continue ignition or secure the burn where logical and feasible. C. Coordinate with County Sheriff on possible implementation of evacuation plan.
Recommended Resources:	<ul style="list-style-type: none"> A. 2 Type 6 engines or equivalent, minimum of 10 FFT2 or above Type 3 dozer or equivalent B. Burn Boss C. Burn Boss
Timeframe:	<ul style="list-style-type: none"> A. 1-2 hours maximum resource response time B. Immediately C. 2 hours
Describe the consequences of not taking the recommended action(s) (Optional):	<ul style="list-style-type: none"> A. Fire would threaten the Bear Creek subdivision within 24 hours B. Increased holding problems if ignition unit not secured while dealing with spots. C. Evacuation if needed may be delayed, public safety would be compromised.
Responsibility:	<ul style="list-style-type: none"> A. Holding Operations or Burn Boss B. Burn Boss in consultation with Ignition and Holding Operations C. Burn Boss or District Ranger
Date Each Action is Initiated:	<ul style="list-style-type: none"> A. B. C.

Appendix C

APPENDIX G SUPPLEMENTAL UNIT INFORMATION

Level 3 Prescribed Fire Plan – Supplemental Unit Information	Project Name:		
	Unit Number(s):		
	LAT/LONG	N	W
	Burn Dates		

ELEMENT – 4 – DESCRIPTION OF PRESCRIBED FIRE AREA

- A. Physical Description (Location, Size, Topography)-
- B. Vegetation and Fuels Description –
- C. Description of Values (Unique Features)-
- D. Unit Maps Attached (Vicinity, Project, Smoke Impact)-

ELEMENT 9 PRE- BURN CONSIDERATIONS/NOTIFICATIONS

- A. Unit Specific Pre-burn Considerations –
- B. Unit Specific Notifications

TO BE CONTACTED	WHEN	PHONE NUMBER	RESPONSIBILITY
	Prior to ignition		

ELEMENT 11 ORGANIZATION AND EQUIPMENT

- A. Unit Specific Personnel and Equipment Needed -

ELEMENT 13 PUBLIC & PERSONNEL SAFETY, MEDICAL

- A. Unit Specific Safety Hazards –
- B. Emergency Medical Procedures, Emergency Evacuation Methods, Emergency Facilities–

ELEMENT 16 HOLDING PLAN

B. Unit Specific Holding Considerations -

C. Unit Specific Mop-up Considerations -

ELEMENT 17 CONTINGENCY PLAN

A. Unit Specific Contingency Considerations -

ELEMENT 19 SMOKE MANAGEMENT/AIR QUALITY

B. Unit Specific Smoke Considerations (Wind Direction etc.)-

Submitted by: (RxB3):	Date:
Agency Administrator:	Date:

Appendix D

APPENDIX G SUPPLEMENTAL UNIT INFORMATION

Level 3 Pile Disposal Prescribed Fire Plan – Supplemental Unit Information	Project Name:		
	Unit Number(s):		
	LAT/LONG	N	W
	Burn Dates		

ELEMENT – 4 – DESCRIPTION OF PRESCRIBED FIRE AREA

- E. Unit Acreage -
- F. Predominate Pile Type– Landing, Machine or Hand pile
Estimated number of Piles/Type -
- G. Unique Unit Features of Concern - (N/A if inapplicable)

H. Unit Maps Attached -

ELEMENT 9 PRE- BURN CONSIDERATIONS/NOTIFICATIONS

C. Unit Specific Pre-burn Considerations (N/A if inapplicable)

D. Unit Specific Notifications

TO BE CONTACTED	WHEN	PHONE NUMBER	RESPONSIBILITY
*WUI	Prior to ignition	Depend on location	Burn Boss or designee

ELEMENT 11 ORGANIZATION AND EQUIPMENT

D. Unit Specific Personnel and Equipment Needed (N/A if unchanged form minimum organization in Burn Plan)

ELEMENT 16 HOLDING PLAN

E. Unit Specific Holding Considerations (N/A if inapplicable)

F. Unit Specific Mop-up Considerations (N/A if inapplicable)

ELEMENT 17 CONTINGENCY PLAN

C. Unit Specific Contingency Considerations (N/A if inapplicable)

ELEMENT 19 SMOKE MANAGEMENT/AIR QUALITY

D. Unit Specific Smoke Considerations (Wind Direction etc.) (N/A if inapplicable)

Submitted by: (RxB3):	Date:
District AFMO (operations), Zone FMO, on call Duty Officer Concurrence:	Date: