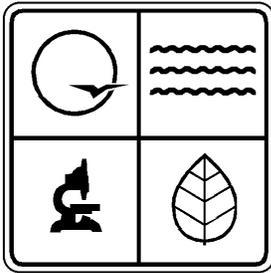


Appendix X

Missouri Smoke Management Plan



Missouri Department of Natural Resources

Smoke Management Plan

December 2007

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1.0 Introduction

Natural resource management's objective is to create, maintain and restore ecosystems. Many tools are available to managers to accomplish these objectives. One of the more important tools is prescribed fire (controlled open burning). The unhealthy ecosystems that exist today are often a result of past management strategies. The undesired effect of controlling natural fires in an attempt to save trees and property results in some tree and shrub species becoming established that would normally be eliminated by such fires. Other consequences are that insect infestations may go unchecked for many years and dangerous levels of combustible material can build up. Prescribed fires can correct these situations.

Prescribed fires are conducted within the limits of a fire plan and prescription that describes both the acceptable range of weather, moisture, fuel, and fire behavior parameters, and the ignition method to achieve the desired effects. Prescribed fire is a cost-effective and ecologically sound tool for forest, range, and wetland management. Its use reduces the potential for destructive wildfires and thus maintains long-term air quality. Also, the practice removes logging residues, controls insects and disease, improves wildlife habitat and forage production, increases water yield, maintains natural succession of plant communities, and reduces the need for pesticides and herbicides.¹

There is a reemphasis on public land management and ecosystem restoration. Land managers are actively managing areas in an attempt to make them healthy. Prescribed fires are proactive tools that simulate the natural fires that might occur in an area due to such events as lightning. This management attempts to mimic the frequency, size, and severity of fires that might occur in an area through natural causes.

In 1995, a Federal Wildland Fire Management Policy and Program Review was conducted in response to the unhealthy condition of our public wildlands, and the

¹ EPA's National Agriculture Compliance Assistance Center – www.epa.gov/agriculture/tburn.html

increase in unplanned fires that occurred in 1987, 1988, 1992 and again in 1994. As a result of this review, the five principal Federal fire/land management agencies [the Forest Service (FS) under the Department of Agriculture; and the Bureau of Land Management (BLM), National Park Service (NPS), Fish and Wildlife Service (FWS), and the Bureau of Indian Affairs (BIA) under the Department of the Interior] agreed on need for several changes to existing fire/land management practices. Their recommendations include the reintroduction of fire (allowing it to play its natural role) into Federal land management programs in “an ongoing and systematic manner, consistent with public health and environmental quality considerations.” The goals of this change in land management policy are to reduce unnatural fuel densities that contribute to increasing unplanned fire hazards, and to restore wildland ecosystems to their healthy natural states. The Federal agencies previously mentioned began increasing the use of fire in their most vulnerable wildlands in 1997. Annual treatment targets for all Federal land management agencies will be increased to more than 5 million acres per year by 2005.²

Wildland and prescribed fires had about equal acres burned in Missouri in 2006. As reported to the National Interagency Coordination Center, there was over 24,000 acres burned by wildland fires and over 21,000 acres burned by prescribed fires. On a national scale, Missouri was 28th in acres burned through wildland and prescribed fires in 2006. By comparison, in year 2000 over 13,000 acres were burned by wildland fires and over 8,000 acres by prescribed fires.³

The increased use of fire to restore ecosystems is a positive for the ecosystem, but is a concern for air quality. The smoke that can result from prescribed fires can have adverse effects on human health and welfare. Difficult and painful breathing, aggravated asthma, and respiratory illness are all linked to elevated particulate matter in the air.

Approximately eighty to ninety percent (80-90%) of wildfire smoke (by mass) is within the fine particulate size class (PM_{2.5}). This high percentage of fine particulate size highlights the concern about smoke.

² EPA’s Interim Air Quality Policy on Wildland and Prescribed Fires (U.S. EPA 1998)

³ www.nifc.gov/stats/ytd_st.htm

The major air pollutant of concern is the smoke produced. Smoke from prescribed fires is a complex mixture of carbon, tars, liquids, and different gases. This open combustion source produces particles of widely ranging size, depending to some extent on the rate of energy release of the fire. The major pollutants from wildland burning are particulate, carbon monoxide, and volatile organics. Nitrogen oxides are emitted at rates of from 1 to 4 grams/kilogram burned, depending on combustion temperatures. Emissions of sulfur oxides are negligible.⁴

Minimizing the adverse effects of smoke results from a concerted effort to utilize prescribed fires in a beneficial manner consistent with proven management strategies. These strategies include understanding and using meteorological conditions when scheduling burning to avoid sending smoke into a sensitive area, controlling the rate of emissions to promote dilution and dispersion, and minimizing smoke output per unit area through emissions reduction techniques.

In addition to minimizing the adverse effects that smoke can have on human health and welfare, smoke management is becoming increasingly important to meet federal and state air quality regulations. National Ambient Air Quality Standards (NAAQS) for particulate matter are a concern, especially for fine particulates. Fine particulates are those most closely associated with negative human health effects and with visibility reductions in the form of regional haze. In 1999, the U.S. EPA issued regional haze regulations to manage and mitigate visibility impairment from regional haze sources. The regional haze regulations call for states to establish goals for improving the visibility at Class I national parks and wildernesses. Missouri has two (2) Class I areas in the state, Mingo Wilderness Area and Hercules Glade Wilderness Area. See Appendix 4.1 for their location within the state. Fire, while not considered to be a main source of visibility impairment in any Class I area, is one source of regional haze.

⁴ EPA's National Agriculture Compliance Assistance Center – www.epa.gov/agriculture/tburn.html

Both regulators and land managers recognize the importance of fires and the resulting smoke. Regulators understand the important tool that fire provides to land managers in managing ecosystems. Land managers understand the importance of minimizing smoke production in meeting federal and state air quality standards. Smoke management is an increasingly important component of an air program that aims to protect human health and welfare and meet air quality standards while still providing for necessary prescribed fires.

2.0 Background

The purpose of the Missouri Smoke Management Plan (SMP) is to identify the responsibilities of the Missouri Department of Natural Resources, federal land managers, and state land managers to coordinate procedures that mitigate the impacts of prescribed fire and wildland fire used for resource benefits on public health, safety and visibility. This plan is designed to meet the policies of the U.S. Environmental Protection Agency's (EPA) Interim Air Quality Policy on Wildland and Prescribed Fires (April 1998). A complete copy of the policy can be found in the Appendix.

The EPA will allow States/tribes flexibility in their approach to regulating fires managed for resource benefits. They are not required to change their existing fire regulations if those regulations adequately protect air quality. However, there are incentives for States/tribes to certify to EPA that they have adopted and are implementing a SMP that includes the basic components identified in this policy. The main incentive is that, as long as fires do not cause or significantly contribute to daily or annual PM_{2.5} and PM₁₀ NAAQS violations, States/tribes may allow participation by burners in the basic SMP to be voluntary and the SMP does not have to be adopted into the State Implementation Plan (SIP). Another incentive is the commitment by EPA to use its discretion not to redesignate an area as nonattainment when fires cause or significantly contribute to PM NAAQS violations, if the State/tribe required those fires to be conducted within a basic SMP. Rather, if fires

cause or significantly contribute to violations, States/tribes will be required to review the adequacy of the SMP, in cooperation with wildland owners/managers, and make appropriate improvements.⁵

Consistent with these policies, the department's Air Pollution Control Program has contacted the various federal and state land managers that work within Missouri to develop this SMP. Federal land managers are subject to laws and requirements through federal planning mandates. This includes the preparation of short and long-term plans and the evaluation of environmental impacts. The Appendix contains a copy of the Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide that standardizes procedures specifically associated with the planning and implementation of prescribed fires on a federal level. The United States Department of Agriculture (USDA) Forest Service has the National Forest Management Act, the U.S. Department of the Interior has the Integrated Resource Management Plan, the National Park Service has the Resource Management Plan and the Fish and Wildlife Service has the Comprehensive Conservation Plan. State land managers also have requirements similar to those of federal land managers for preparing burn plans.

3.0 Smoke Management Plan

States/tribes will be allowed the flexibility (prior to measuring violations of the PM or PM_{2.5} NAAQS attributable to fires managed for resource benefits) to decide when a SMP is needed and how the program will be designed to prevent adverse air quality impacts. This does not preclude wildland owners/managers from including smoke management components in burn plans for fires that they conduct in the absence of an applicable State/tribal program.⁶

⁵ EPA's Interim Air Quality Policy on Wildland and Prescribed Fires (U.S. EPA 1998)

⁶ EPA's Interim Air Quality Policy on Wildland and Prescribed Fires (U.S. EPA 1998)

The SMP establishes a basic framework of procedures and requirements for managing smoke from fires managed for resource benefits and are typically developed by States/tribes with cooperation and participation by wildland owners/managers. The purpose of a SMP is to mitigate the nuisance and public safety hazards (e.g., on roadways and at airports) posed by smoke intrusions into populated areas; to prevent deterioration of air quality and NAAQS violations; and to address visibility impacts in mandatory Class I Federal areas. Some strong indications that an area needs a SMP are: (1) citizens increasingly complain of smoke intrusions; (2) the trend of monitored air quality values is increasing (approaching the daily or annual NAAQS for PM_{2.5} or PM₁₀) because of significant contributions from fires managed for resource benefits; (3) fires cause or significantly contribute to monitored air quality that is already greater than 85 percent of the daily or annual NAAQS for PM_{2.5} or PM₁₀; or (4) fires in the area significantly contribute to visibility impairment in mandatory Class I Federal areas.⁷

None of the four indicators listed above currently shows a problem in Missouri.

State/tribal air quality managers, public wildland managers, private and Indian wildland owners/managers, and the general public should collaborate in the development and implementation of a State/tribal SMP. The State/tribal air quality manager must certify in a letter to the Administrator of EPA that at least a basic program has been adopted and implemented in order to receive special consideration under this policy of air quality data resulting from fire impacts, as explained in section VII of EPA's interim air quality policy. The SMP does not have to be incorporated into the SIP/Tribal Implementation Plan (TIP) or be Federally enforceable, however. The following describes the basic components of a certifiable SMP. There is considerable latitude within the components for individual State/tribal preferences.⁸

⁷ EPA's Interim Air Quality Policy on Wildland and Prescribed Fires (U.S. EPA 1998)

⁸ EPA's Interim Air Quality Policy on Wildland and Prescribed Fires (U.S. EPA 1998)

Basic components of a smoke management program identified in the Interim Policy include:

- Authorization to Burn
- Minimizing Air Pollutant Emissions
- Smoke Management Components of Burn Plans

Actions to Minimize Fire Emissions

Air Quality Monitoring

Evaluate Smoke Dispersion

Public Notification and Exposure Reduction Procedures

- Public education and awareness
- Surveillance and Enforcement
- Program evaluation

These components outlined in the Interim Policy are present in the federal and state land managers burn plans for Missouri. Land managers have detailed planning and implementation procedures for their prescribed fires. As an example, Appendix 4.4 contains the Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide for federal land managers. This guide provides consistent interagency policy for what is minimally acceptable for prescribed fire planning and implementations. Within this guide, procedures for fire projects are outlined in great detail. These projects are analyzed under the National Environmental Policy Act.⁹

The Missouri Air Conservation Commission has authority under statute 643.050 to promulgate regulations to preserve and protect the state's air resources. At this time, the department intends to allow federal and state land managers to maintain authority to prepare and implement burn plans and to voluntarily notify us of their fire plans. These federal and state land managers will maintain their present protocol for preparing fire plans and seeking authorization to implement fire plans. The department will maintain this voluntary smoke management plan since these prescribed fires have not resulted in air quality problems and will coordinate, to the extent possible, the prescribed burns in

the state. If these prescribed fires cause or significantly contribute to violations, the department's Air Pollution Control Program will review the adequacy of the SMP, in cooperation with wildland owners/managers, and make appropriate improvements. Copies and examples of federal and state land manager burns plans can be found in the Appendix.

3.1 Authorization to Burn

The EPA does not directly regulate the use of fire within a State or on Indian lands. The EPA's authority is to enforce the requirements of the CAA. The CAA requires States and tribes to attain and maintain the NAAQS adopted to protect public health and welfare. This policy recommends that States/tribes implement SMP's to mitigate the public health and welfare impacts of fires managed for resource benefits. While SMP's will also mitigate nuisance smoke intrusions, nuisance issues have been left for the individual air quality agencies to address.¹⁰

If a State/tribe determines that a SMP is needed, they can adopt any type of program they believe will prevent NAAQS violations and address visibility impairment. For example, general fire regulations may establish basic parameters, such as wind speed, direction, location and distance to sensitive receptors, etc., within which fires can be ignited or naturally ignited fire can be allowed to continue to burn. States/tribes may allow wildland owners/managers to voluntarily notify them of fire plans or may require prior authorization. They may also exempt de minimis fires (fires that will cover fewer than X acres or consume less than Y tons of fuel, as established by the State/tribe) from meeting the regulations. Such regulations leave much discretion to wildland owners/managers as to when to ignite fires, and what management strategy to follow with naturally ignited fires. States/tribes may exercise enforcement authorities when wildland owners/managers are found to have ignited the fire outside of the parameters of the rule,

⁹ Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide (September 2006)

¹⁰ EPA's Interim Air Quality Policy on Wildland and Prescribed Fires (U.S. EPA 1998)

or not to have appropriately responded to air quality impacts caused by naturally ignited fires. General fire regulations may be adequate for areas where fires managed for resource benefits rarely cause or contribute to air quality problems. However, when plans to use fire on a large scale could cause significant air quality impacts, or several wildland owners/managers within an airshed are expected to use fires concurrently, a more structured SMP requiring cooperation and coordination of fire activities may be required to minimize emissions and mitigate the air quality impacts.¹¹

Federal and state land manager burn plans contain multiple reviews and approvals prior to authorization. These reviews include procedural and technical reviews of the plan. In addition, individual burns are subject to burn/no-burn decisions prior to initiating a burn.

The state's open burning regulations provide exemptions for open burning associated with agricultural activities related to the growing and harvesting of crops and for open burning for natural resource management purposes. There is language within the regulations that makes it a violation to permit open burning which causes or constitutes a public health hazard, nuisance, or a hazard to vehicular or air traffic. This allows the director a great deal of authority to prevent or stop burning that is occurring.

The department's Air Pollution Control Program is in the process of replacing the state's four (4) existing open burning regulations with a new rule. The new rule consolidates the existing rule requirements and is written to improve rule compliance and enforcement.

3.2 Minimizing Air Pollutant Emissions

When the use of fire is selected as the best means to accomplish management goals, there are several ways to reduce emissions from a single fire. The approaches fall into four categories and their applicability varies by fuel type, (1) minimize the area burned, (2)

¹¹ EPA's Interim Air Quality Policy on Wildland and Prescribed Fires (U.S. EPA 1998)

reduce the fuel loading in the area to be burned, (3) reduce the amount of fuel consumed by the fire, (4) minimize emissions per ton of fuel consumed. These emission reduction techniques rely almost exclusively on reducing the amount of fuel consumed by a particular fire.¹²

Basic smoke management practices could include, among other practices, steps that will minimize air pollutant emissions during and after the burn, evaluate dispersion conditions to minimize exposure of sensitive populations, actions to notify populations and authorities at sensitive receptors and contingency actions during the fire to reduce exposure of people at such receptors, identify steps taken to monitor the effects of the fire on air quality, and identify procedures to ensure that burners are using basic smoke management practices.

3.3 Smoke Management Components of Burn Plans

Actions to Minimize Fire Emissions

The burn plan should show the steps taken by the respective entity prior to, during, and after the burn to reduce air emissions. This could include such activities as reducing the burn acreage, using non-fire alternatives, and rapid and complete mop-ups in an area.

Air Quality Monitoring

The burn plan should identify how the burn may affect air quality in sensitive areas near the prescribed burn and how this will be monitored. Personnel should at a minimum visually monitor the progress of the burn and evaluate the burns potential to interfere with the people and property in the vicinity. This would include mechanisms to alert the public should the burn present a problem. For burns expected to take more than a day, other monitoring techniques that might include PM monitors may be necessary to determine concentrations near sensitive areas.

¹² EPA's Interim Air Quality Policy on Wildland and Prescribed Fires (U.S. EPA 1998)

Evaluate Smoke Dispersion

The burn plan should identify the anticipated dispersion of the smoke from the burn site prior to the event. Effort should be made to minimize the exposure of sensitive populations to smoke and to avoid impacting the visibility in Class I Federal areas. This would also include efforts to minimize the impact of smoke along highways and airways. The distance and directions to sensitive areas should be evaluated and checked against atmospheric conditions. Wind speed, wind direction, mixing heights, and other dispersion conditions should have minimum requirements that need to be met prior to authorizing a burn.

Public Notification and Exposure Reduction Procedures

The burn plan should identify actions that will be taken prior to initiating a burn to make local authorities aware of actions being taken in their area. This would also include contingency actions to be taken should a burn go beyond its predicted dispersion area and impact sensitive populations and areas.

3.4 Public Education and Awareness

The department's Air Pollution Control Program will be coordinating the promulgation of new rule 10 CSR 10-6.045 Open Burning Requirements with an educational effort to improve the rules visibility within the state. Pamphlets explaining the new rule and the harmful effects of smoke will be produced and made available to the regional offices, other state agencies, and to other interested organizations to distribute. The department's Air Pollution Control Program will focus on groups that could potentially have a significant impact on air monitoring through open burning, such as farmers that burn crop stubble or land managers that utilize prescribed burns.

3.5 Surveillance and Enforcement

Missouri has five (5) regional offices covering all areas of the state. In addition, satellite offices are located in several of the regions. Staff in these offices are involved in monitoring compliance with state regulations and in enforcing those regulations.

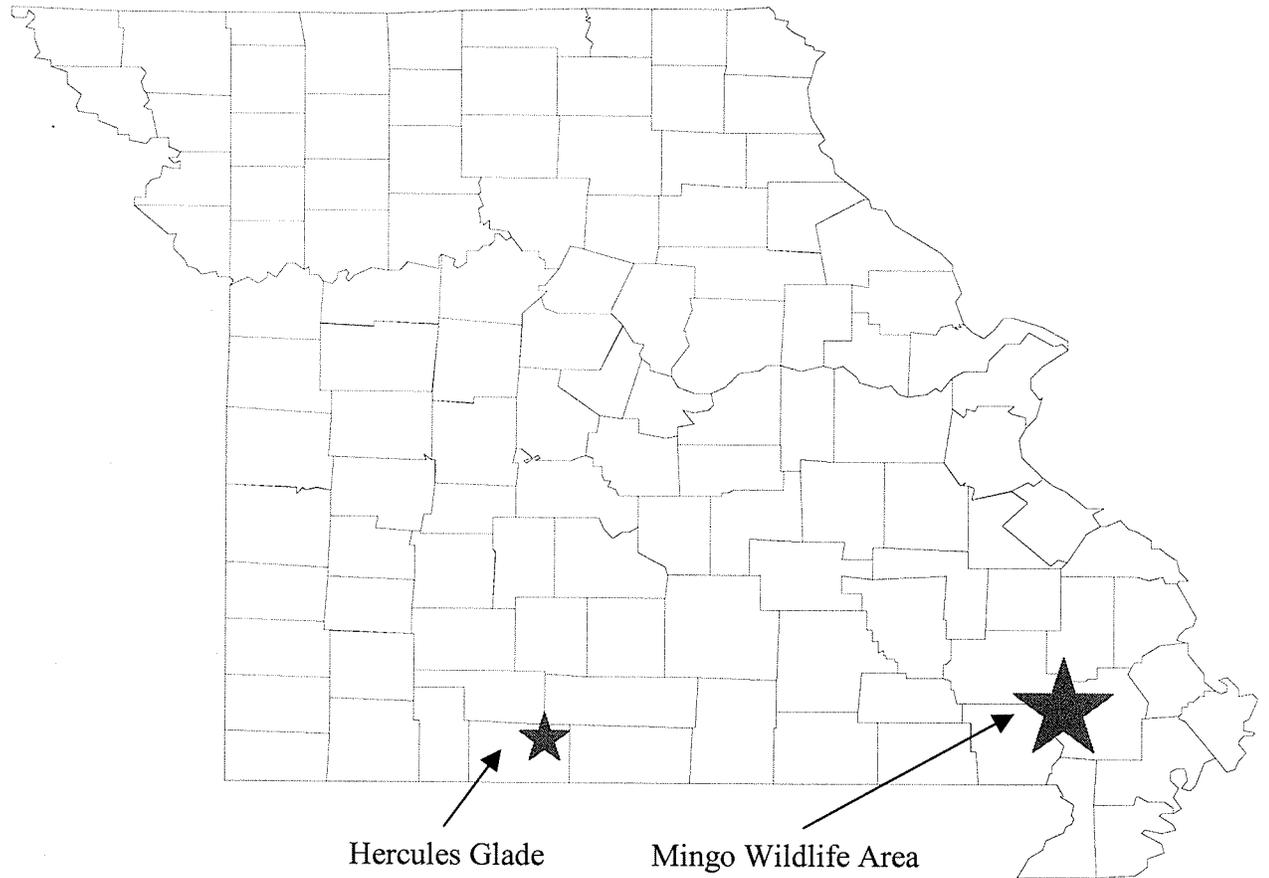
3.6 Program Evaluation

The department's Air Pollution Control Program monitors the state's air resources through a network of air monitoring sites located throughout the state. A map of the statewide network is found in the appendix.

The Missouri Department of Natural Resources and Local Agencies in St. Louis City, St. Louis County, and Springfield operate approximately 201 ambient air quality monitoring instruments at 44 locations in the state. The intent of this network is to determine the nature of the air quality in the state, and determine the location and severity of any problems. Monitors evaluate pollutant levels related to the National Ambient Air Quality Standards, which are health and welfare based standards developed by the U.S. Environmental Protection Agency. Trends from these monitoring sites indicate changes in air quality over time, and provide information on air quality relationships in various parts of the state. In addition, monitoring for various air toxics is conducted, as well as monitoring to understand the chemical makeup of some air pollutants, to help evaluate pollutant sources and controls.

4.0 Appendix

4.1 Map of Class I Areas within the state of Missouri



4.2 Map of Statewide Network of Air Monitoring Sites

Missouri Air Quality Monitoring Sites, 2007

St. Louis Area

Site# Site Name

- 01 Hall Street
- 02 Margaretta
- 03 Blair Street
- 04 North Market
- 05 Mound Street
- 06 South Broadway
- 07 West Alton
- 08 Orchard Farm
- 09 Ferguson
- 10 Maryland Heights
- 11 Ladue
- 12 Clayton
- 13 Sunset Hills
- 14 Pacific
- 15 Arnold

Kansas City Area

Site# Site Name

- 16 Trimble
- 17 Watkins Mill State Park
- 18 Liberty
- 19 Rocky Creek
- 20 Troost
- 21 Van Brunt
- 22 Richards Gebauer-South

Outstate Area

Site# Site Name

- 27 Sherman
- 28 Herculaneum, Broad St.
- 29 Herculaneum, Main St.
- 30 Herculaneum, Bluff
- 31 Herculaneum, Drankin H.S.
- 32 Herculaneum, Circle Street
- 33 St. Genevieve
- 34 Farrar
- 35 Bonne Terre
- 36 Mingo
- 37 Hercules Glades
- 38 Carthage
- 39 El Dorado Springs
- 40 Foley
- 41 Clarksville
- 42 Mark Twain State Park
- 43 St. Joseph Pump Station
- 44 Mercer

Springfield Area

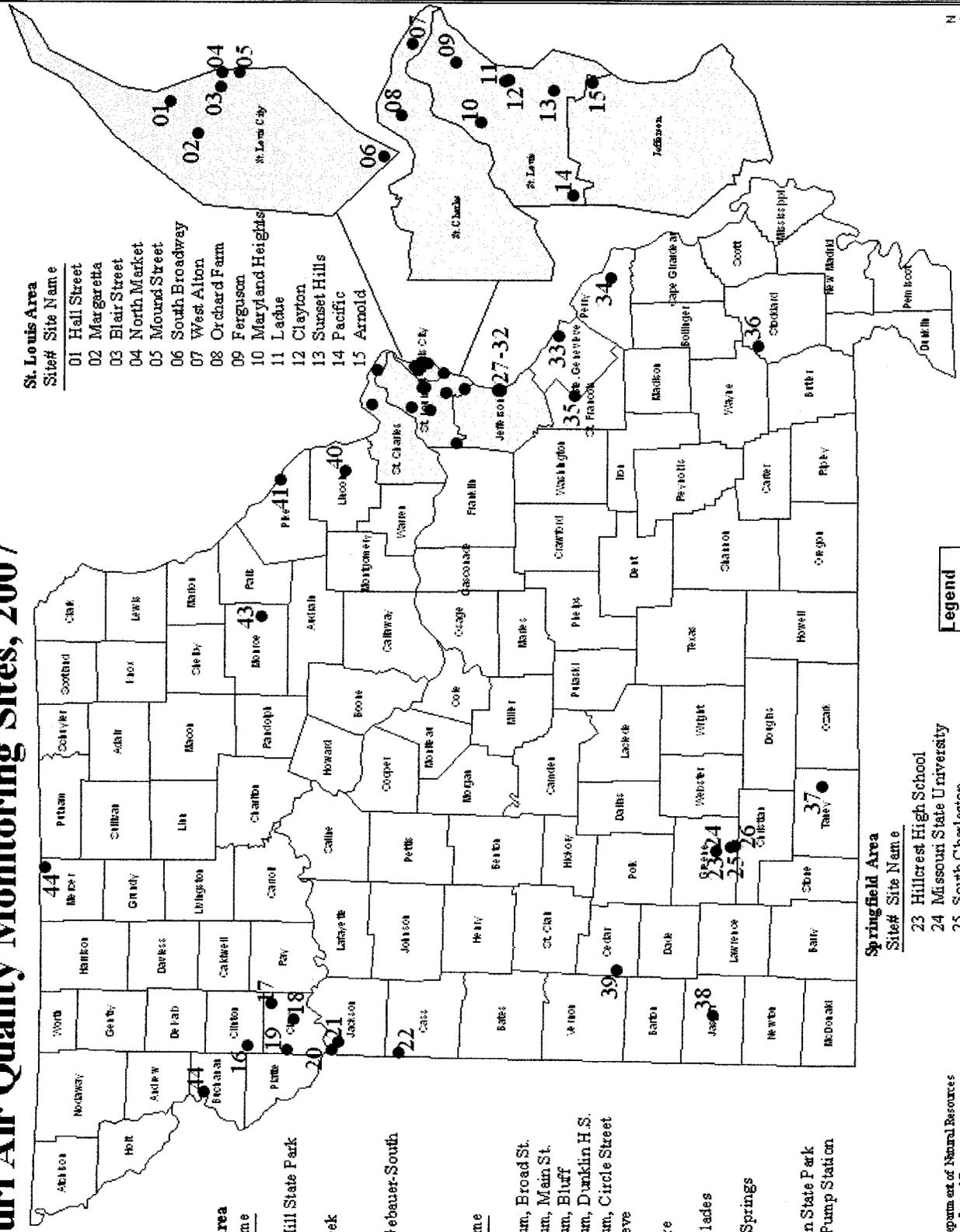
Site# Site Name

- 23 Hillcrest High School
- 24 Missouri State University
- 25 South Charleston
- 26 James River South

Legend

● Monitor

Missouri Department of Natural Resources
Air Pollution Control Program
Prepared/Updated by Patricia Malro-04/05/2007



4.3 EPA's Interim Air Quality Policy on Wildland and Prescribed Fires

INTERIM
AIR QUALITY POLICY ON
WILDLAND AND PRESCRIBED
FIRES

April 23, 1998

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LIST OF WHITE PAPERS AVAILABLE ON THE WORLD WIDE WEB

Background on the Role of Fire

What Wildland Fire Conditions Minimize Emissions and Hazardous Air Pollutants and Can Land Management Goals Still Be Met?

Air Monitoring for Wildland Fire Operations

Emissions Inventories for SIP Development

Estimating Natural Emissions From Wildland and Prescribed Fire

I. PURPOSE

This policy statement has been prepared in response to plans by some Federal, tribal and State wildland owners/managers to significantly increase the use of wildland and prescribed fires to achieve resource benefits in the wildlands.¹ Many wildland ecosystems are considered to be unhealthy as a result of past management strategies. The absence of fire effects has allowed plant species (e.g., trees and shrubs) that would normally be eliminated by fires to proliferate, vegetation to become dense and insect infestations to go unchecked. Wildland owners/managers plan to significantly increase their use of fires to correct these unhealthy conditions and to reduce the risk of wildfires to public and fire fighter safety. The largest increases are expected mainly on Federal lands in western States in ecosystems where fires would naturally occur every few years (35 years or less) if not suppressed. Fire has continued to be a management tool used by many public and private wildland owners/managers in the southeastern States. However, Federal land managers in the southeast also plan to significantly increase their use of fire above current annual levels.

This policy statement integrates two public policy goals, (1) to allow fire to function, as nearly as possible, in its natural role in maintaining healthy wildland ecosystems, and (2) to protect public health and welfare by mitigating the impacts of air pollutant emissions on air quality and visibility. This document provides guidance on mitigating air pollution impacts caused by fires in the wildlands and the wildland/urban interface. It identifies the responsibilities of wildland owners/managers and State/tribal air quality managers to work together to coordinate fire activities, minimize air pollutant emissions, manage smoke from wildland and prescribed fires managed for resource benefits, and establish emergency action programs to mitigate the unavoidable impacts on the public. This policy is not intended to limit opportunities by private wildland owners/managers to use fire so that burning can be increased on publicly owned wildlands. Thoughtful use of fire by private, public and Indian wildland owners/managers within SMP's is promoted to maintain healthy wildland ecosystems. Neither is this policy intended to

¹This document contains EPA policy and, therefore, does not establish or affect legal rights or obligations. It does not establish a binding norm and it is not finally determinative of the issues addressed. In applying this policy in any particular case, the EPA will consider its applicability to the specific facts of that case, the underlying validity of the interpretations set forth in this memorandum, and any other relevant considerations, including any that may be required under applicable law and regulations.

imply that States/tribes should relax existing SMP's or limit a State's/tribe's ability to regulate fires managed for resource benefits.

The EPA used a deliberative process involving a multi-stakeholder workgroup to develop recommendations for this policy. The workgroup did not reach consensus on all of the issues raised. The EPA addressed all of the recommendations and concerns raised by the stakeholders to the extent possible. The multi-stakeholder workgroup also produced several "white papers" on a number of topics previously identified in earlier drafts of the policy as Appendices to the policy. These papers will be published as a separate document and can also be found on EPA's TTN2000 website:

<http://134.67.104.12/html/o3pmrh/pbissu.htm>, and on the Western States Air Resources Council (WESTAR) website: http://www.westar.org/proj_frame.html. A list of these papers is provided in the Table of Contents.

II. SCOPE AND APPLICABILITY

The EPA does not directly regulate the use of fire within a State or on Indian lands. The EPA's authority is to enforce the requirements of the CAA. The CAA requires States and tribes to attain and maintain the NAAQS adopted to protect public health and welfare. This policy recommends that States/tribes implement SMP's to mitigate the public health and welfare impacts of fires managed for resource benefits. While SMP's will also mitigate nuisance smoke intrusions, nuisance issues have been left for the individual air quality agencies to address.

This policy applies to all wildland and prescribed fires managed to achieve resource benefits on public, Indian and privately owned wildlands, regardless of the cause of ignition (e.g., lightning, arson, accidental, land management decision, etc.) or purpose of the fire (e.g., natural, resource management, hazard reduction, etc.).

Federal land management agencies sometimes manage naturally ignited fires to achieve resource benefits. Planning for naturally ignited fires is obviously limited, but the agencies require fire management plans to be included in land use plans for an area before a naturally ignited fire can be managed for resource benefits. Fires ignited in areas without fire management plans are

unwanted or wildfires. The interface between this policy and the Natural Events Policy² regarding ambient PM₁₀ concentrations caused by wildfires is addressed in section VII.

This policy does not apply to other open burning activities, such as burning at residential, commercial or industrial sites; open burning of land clearing waste or construction debris. It also does not apply to open burning of agricultural waste, crop residue or land in the USDA Conservation Reserve Program. The EPA is working with the USDA Agriculture Air Quality Task Force to develop equitable policies for emissions from activities that could be classified as agricultural burning.

This policy addresses the impacts of air pollutant emissions from fires managed for resource benefits on public health and welfare. The primary indicators of public health impacts used are ambient air quality impacts above the NAAQS for fine particles with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers (PM_{2.5}), and particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM₁₀). There are both 24-hour (daily) and annual NAAQS for PM_{2.5} and PM₁₀. Emissions of nitrogen oxides (NO_x), VOC, and CO from fires can also impact the NAAQS for NO₂, O₃, and CO. However, the actions required to reduce VOC and CO emissions are the same as those recommended in this document to mitigate impacts on the PM_{2.5}, and PM₁₀ NAAQS. Emissions of NO_x, on the other hand, can increase under some of the burning conditions used to decrease emissions of other pollutants.

The effects of fire emissions on the public welfare aspects of the NAAQS for PM are addressed in terms of visibility impairment and regional haze. The policy also addresses the treatment of fire emissions to meet other CAA requirements, such as prevention of significant deterioration (PSD) and conformity with SIP's or TIP's.

III. BACKGROUND

A. The Role of Fire in the Wildlands

The role of fire in North American ecosystems has been undergoing change since people began to play a more active role in managing their natural resources. Native Americans actively used fire to alter vegetative patterns, to ease travel, or for hunting purposes. Prior to European

²See memorandum from Mary D. Nichols, Assistant Administrator for Air and Radiation to EPA Regional Offices titled Areas Affected by PM₁₀ Natural Events, May 30, 1996.

settlement, fire played a natural role as a necessary disturbance phenomena, keeping fuel density in check as well as insects and the diseases they carry, thereby maintaining North American wildlands in a healthy state. After European settlement and the introduction of grazing herds of cattle and sheep, and the practice of fire suppression, public land management agencies have recognized that not allowing fire to play its natural role in our wildlands has had unintended negative effects. When forests and grasslands are not allowed to burn naturally (lightning serving as the principal source of ignition) the result can be heavy accumulation of dead vegetation which provides fuel for unwanted fires (wildfires). Because of this unhealthy build-up of fuels, the risk of catastrophic wildfires is much greater as evidenced by several recent fires in our national forests and other publicly owned lands. These fires put firefighters and the general public in danger while destroying millions of acres of forests and costing millions of dollars to suppress. The lack of fire also has unintended ecological effects, leading to the loss of habitat for rare species and the decline of ecosystems. Fire exclusion can lead to an alteration in natural community types, and an important loss of biodiversity. Many plant and animal species are on the decline because they exist in fire-dependent habitats that haven't burned in decades. This situation has led to a rethinking of Federal land management and fire management policy.

B. Changes in Fire Management Policy

In 1995, a Federal Wildland Fire Management Policy and Program Review was conducted in response to the unhealthy condition of our public wildlands, and the increase in unplanned fires that occurred in 1987, 1988, 1992 and again in 1994. As a result of this review, the five principal Federal fire/land management agencies [the Forest Service (FS) under the Department of Agriculture; and the Bureau of Land Management (BLM), National Park Service (NPS), Fish and Wildlife Service (FWS), and the Bureau of Indian Affairs (BIA) under the DOI] agreed on need for several changes to existing fire/land management practices. Their recommendations include the reintroduction of fire (allowing it to play its natural role) into Federal land management programs in "an ongoing and systematic manner, consistent with public health and environmental quality considerations." The goals of this change in land management policy are to reduce unnatural fuel densities that contribute to increasing unplanned fire hazards, and to restore wildland ecosystems to their healthy natural states. The Federal agencies previously mentioned

began increasing the use of fire in their most vulnerable wildlands in 1997. Annual treatment targets for all Federal land management agencies will be increased to more than 5 million acres per year by 2005.

C. Air Quality Considerations

Burning wildland vegetation causes emissions of many different chemical compounds such as small particles, No_x , CO and organic compounds. The components and quantity of emissions depends in part on the types of fuel burned, its moisture content, and the temperature of combustion. Complex organic materials may be absorbed into or onto condensed smoke particles. Tests indicate that, on average, 90 percent of smoke particles from wildland and prescribed fires are PM_{10} , and 70 percent are $\text{PM}_{2.5}$.

Historically, EPA's NAAQS for PM have tended to focus emission control efforts on "coarse" particles--those larger than $\text{PM}_{2.5}$. Before 1987, EPA's PM standards focused on "Total Suspended Particles," including particles as large as 100 micrometers in diameter. The EPA revised the standards in 1987 to focus control on PM_{10} in response to new science showing that it was the smaller particles capable of penetrating deeply into the lungs that were associated with the most adverse health effects. For comparison, a human hair is about 70 micrometers in diameter.

The most recent review of health studies focused attention on the need to better address the "fine" fraction particles - $\text{PM}_{2.5}$. These more recent studies provide consistent and coherent, "evidence that serious health effects (mortality, exacerbation of chronic disease, increased hospital admissions, etc.) are associated with exposures to ambient levels of PM found in contemporary urban airsheds even at concentrations below current U. S. PM standards" (Criteria Document-U.S. EPA 1996a, p. 13-1). PM concentrations currently found in many communities are associated with adverse health effects in the general population, including increased mortality and morbidity, altered lung function, increased respiratory symptoms, aggravated respiratory and cardiovascular disease. Sensitive sub-populations, such as children, the aged and those with existing cardiopulmonary or infectious respiratory disease, may experience effects at lower levels of PM than the general population, and the severity of effects might be greater. These studies are the basis for the July, 1997 promulgation of new NAAQS for $\text{PM}_{2.5}$, which are designed to

protect public health, with an adequate margin of safety.

Fine particles are also a major cause of visibility impairment in such places as national parks that are valued for their scenic views and recreation.

D. Visibility Impairment

Visibility conditions are affected by scattering and absorption of light by particles and gases. The fine particles most responsible for visibility impairment are sulfates, nitrates, organic compounds, soot and soil dust. Fine particles are more efficient per unit mass than coarse particles at scattering light. Light scattering efficiencies also go up as humidity rises, due to water adsorption on fine particles, which allow the particles to grow to sizes comparable to the wavelength of light. There are distinct regional variations in visibility between eastern and western States, due, to generally higher relative humidities in the East. Naturally occurring visual range in the East may be between 105 to 190 kilometers, while natural visual range in the West is between 190 to 270 kilometers.

Visibility is an important public welfare consideration because of its significance to enjoyment of daily activities in all parts of the country. Protection of visibility as a public welfare consideration is addressed nationally through the secondary PM NAAQS which are equivalent to the primary PM NAAQS. Visibility protection is particularly important in the 156 mandatory Class I Federal areas, "Areas of Great Scenic Importance," and is addressed for these areas by the special provisions of Sections 169A and 169 B of the CAA.

The effects of smoke from wildland and prescribed fires on air quality will be discussed throughout this document. The term air quality, as used in this document, refers to ambient concentrations of pollutants (primarily PM in locations accessible to the general public), and, where applicable, to impacts on visibility in mandatory Class I Federal areas. Thus, wherever this document discusses the need for wildland owners/managers to consider the impacts of their actions on air quality, this may include consideration of the effects of their actions on visibility in mandatory Class I Federal areas.

Existing requirements to consider effects on visibility which are reasonably attributable to a single nearby source or small number of sources are contained in the regulations published by EPA in 1980 at 40 CFR 51.300 (Protection of Visibility). Additional regulations are currently

being developed to address impairment of visibility that is more regional in its character and origins ("regional haze"). This interim policy may be revised to be made consistent with the regional haze rules when they become final.

Please refer to the white paper, "Background on the Role of Fire," for more complete background information. See Section I to obtain a copy.

IV. DESCRIPTION OF POLICY

The EPA's policy regarding wildland and prescribed fires managed for resource benefits is that owners/managers of public, private and Indian wildlands should collaborate with State/tribal air quality managers (air regulators) to achieve their goals of: (1) allowing fire to function in its natural role in the wildlands, and (2) protecting public health and welfare by minimizing smoke impacts. The EPA urges air quality managers to participate in public land use planning activities which involve selecting appropriate resource management treatments, including the use of fire, and to help identify air quality criteria for fire management plans. Air quality managers are urged to help evaluate the potential impacts of alternative resource treatments and assure that air quality concerns (also visibility and regional haze concerns, where appropriate) are adequately addressed in the public land use planning process. They are urged to solicit information from private and Indian wildland owners/managers on plans to use fire for resource management, to encourage them to consider appropriate alternative treatments, and to assist them in evaluating the potential air quality impacts of alternatives to meet particular management objectives.

Wildland owners/managers are urged to: (1) notify air quality managers of plans to significantly increase their future use of fire for resource management, (2) consider the air quality impacts of fires and take appropriate steps to mitigate those impacts, (3) consider appropriate alternative treatments, (4) and participate in the development and implementation of State/tribal SMP's.

The EPA will allow States/tribes flexibility in their approach to regulating fires managed for resource benefits. They are not required to change their existing fire regulations if those regulations adequately protect air quality. However, there are incentives for States/tribes to certify to EPA that they have adopted and are implementing a SMP that includes the basic components identified in this policy. The main incentive is that, as long as fires do not cause or

significantly contribute to daily or annual PM_{2.5} and PM₁₀ NAAQS violations, States/tribes may allow participation by burners in the basic SMP to be voluntary and the SMP does not have to be adopted into the SIP. Another incentive is the commitment by EPA to use its discretion not to redesignate an area as nonattainment when fires cause or significantly contribute (see section VII.B.) to PM NAAQS violations, if the State/tribe required those fires to be conducted within a basic SMP. Rather, if fires cause or significantly contribute violations, States/tribes will be required to review the adequacy of the SMP, in cooperation with wildland owners/managers, and make appropriate improvements.

If States/tribes do not certify that a basic SMP is being implemented, no special consideration will be given to PM violations attributed to fires managed for resource benefits. Rather, EPA will call for a SIP revision to incorporate a basic SMP and/or will notify the governor of the State or the tribal government that the area should be redesignated as nonattainment. The SMP adopted in response to the SIP/TIP call must require mandatory participation for greater than de minimis fires, and must be adopted into the SIP/TIP so that it is Federally enforceable. Also, the SIP/TIP must meet all other CAA requirements applicable to nonattainment areas.

Fire data requirements for SIP's/TIP's are addressed in section VIII of this policy. Guidance for meeting CAA requirements to show conformity of Federal fire activities with SIP's, to address visibility/regional haze impacts, and to address prevention of significant deterioration of air quality are addressed in section IX.

The following are guiding principles for implementing this policy:

- Air quality and visibility impacts from fires managed for resource benefits should be treated equitably with other source impacts.
- Land and vegetation management practices should be promoted that are best for wildland ecosystems, yet protect public health and avoid visibility impairment.
- States/tribes should foster collaborative relationships among wildland owners/managers, air quality managers and the public to develop and implement SMP's.
- States/tribes will be allowed the flexibility (prior to measuring violations of the PM_{2.5} or PM₁₀ NAAQS attributable to fires managed for resource benefits) to decide when a SMP

is needed and how the program will be designed to prevent adverse air quality impacts. This does not preclude wildland owners/managers from including smoke management components in burn plans for fires they conduct in the absence of an applicable State/tribal program.

- All parties (wildland owners/managers, air quality managers and the public) are expected to act in good faith and will be held accountable for implementing their respective parts of fire and SMP's.

V. COLLABORATION AMONG LAND AND AIR QUALITY MANAGERS

Wildland owners/managers and air quality managers can overcome the barriers to achieving their goals of: (1) returning fire to its natural role in the wildlands and (2) protecting air quality and visibility, by working together toward those ends. Wildland owners/managers should notify State/tribal air quality managers if they are planning to significantly increase the use of fire to manage wildland resources. Air quality managers with Federal/State/local public wildlands within their jurisdictions have a responsibility to participate in the public planning processes conducted for the management of those publicly owned lands. To arrive at the best choice of resource treatments and response to fire, it is essential that the air quality impacts of planned land management activities are adequately addressed. Air quality managers, by participating in the public land use planning process, can help select the scope of land uses; help evaluate alternative management tools and help identify when fire is appropriate; and review projected air quality and visibility impacts. Air quality managers should also consult with private wildland owners/managers to determine long-range resource management objectives and help them evaluate the applicability of alternative treatments based on air quality and visibility considerations.

Wildland owners/managers also have a responsibility to participate with the other stakeholders and State/tribal air quality managers in developing rules and SMP's for fires managed for resource benefits. Air quality managers that intend to develop or revise regulations, plans or policies applicable to fires should solicit the early participation of all affected wildland owners/managers in making those revisions.

A. Land and Vegetation Management

Wildlands are managed by Federal, State and local public agencies (referred to in this document as public land management agencies); tribal and BIA authorities; and private land owners. The goals of public land management agencies vary, but are generally to develop, maintain and enhance wildlife habitat; protect endangered plant and animal species; preserve and protect cultural resources, scenic vistas and wilderness; provide for recreation; and to sustain production of natural resources. The goals of private wildland owners/managers may be sustained production of natural resources, preservation of wildlife habitat, improved grazing conditions, etc. The goals of tribal wildland owners/managers are generally similar to public land management agency goals, but may also include aspects of private land owners. Another common goal of all wildland owners/managers is to minimize the potential for catastrophic wildfires that could result from heavy accumulations of vegetative fuels.

1. Alternative Treatments

Wildland owners/managers may have an array of tools, including fire, that can be used to accomplish land use plans, depending on the resource benefits to be achieved. Several factors should be considered when selecting appropriate treatments. Those factors include the costs of treatment, the environmental impacts (e.g., air and water quality, soils, wildlife, etc.), and whether fire must be used to meet management objectives. The best combination of treatments are those that meet management goals with the most favorable environmental impacts at the most reasonable costs.

a. Utilization and mechanical treatments

Mechanical treatments may be appropriate tools when management objectives are to reduce fuel density to reduce a wildfire hazard, or to remove logging waste materials (slash) to prepare a site for replanting or natural regeneration. On-site chipping or crushing of woody material, removal of slash for off-site burning or biomass utilization, whole tree harvesting, and yarding (pulling out) of unmerchantable material may accomplish these goals. Mechanical treatments are normally limited to accessible areas, terrain that is not excessively rough, slopes of 40 percent or less, sites that are not wet, areas not designated as national parks or wilderness, areas not protected for threatened and endangered species and areas without cultural or paleological resources.

b. Chemical treatments

When the management objective is to preclude, reduce or remove live vegetation and/or specific plant species from a site, chemical treatments may be appropriate tools. Other potential environmental impacts caused by applying chemicals must also be considered, however.

c. Fire treatments

Fire is one of the basic tools relied upon by wildland owners/managers to achieve a myriad of management objectives in fire dependent ecosystems. Most North American plant communities evolved with recurring fire and, therefore, are dependent on recurring fire for maintenance. The natural fire return interval may vary from 1-2 years for prairies, 3-7 years for some long-needle pine species, 30-50 years for species such as California chaparral, and over one hundred years for species such as lodgepole pine and coastal Douglas-fir. When one management objective is to maintain a fire dependent ecosystem the effects of fire cannot be duplicated by other tools. In such cases, fire may be the preferred management tool even when other treatments may be equally effective for meeting other objectives. Fire can also be used to reduce heavy fuel loads and prevent catastrophic wildfires.

When fire is the chosen management tool, a combination of treatment methods may be the best approach to achieving the desired resource benefits with minimum air quality impacts. Combinations of treatments may include mechanically pretreating an area to thin the fuel load prior to the use of fire.

2. Role of Federal Land Managers (FLM's)

The major Federal agencies with land management responsibilities include the USDA FS, the DOI NPS, and FWS, BLM, and BIA. These agencies manage national parks, forests, monuments, wilderness areas, prairie grasslands, sea shores, Indian lands, wildlife refuges, etc. The Department of Defense and Department of Energy also manage millions of acres of Federal land at military bases, training centers and for other purposes.

a. Federal land use and fire management planning

Federal land use planning is an open process for setting land use and management goals and objectives. The planning process is designed for public participation, and must comply with NEPA. State/tribal air quality managers are given the opportunity to participate in land use

planning as part of normal intergovernmental consultation procedures. It is important for air quality managers to participate in public land use planning decisions to ensure that air quality concerns are adequately addressed. Through the public participation process, issues are identified and alternatives are discussed regarding methods for implementing land management activities such as trail building, improvement of wildlife habitat, timber harvesting, use of fire, etc. The environmental impacts of these activities are analyzed including, among other things, impacts on cultural resources, wildlife, vegetation, soils, riparian areas, wetlands, water quality, air quality, and visibility. Consideration of the air quality impacts of land management activities is essential to arriving at the best choice of treatments and response to fire.

Two or more levels of land use planning are conducted by FLM's to achieve management goals. First, broad scale and long-range land use plans must be developed for administrative units (e.g., forests, parks, refuges, sanctuaries, etc.). The land use plan identifies the scope of actions and goals for the lands and resources administered, and typically covers a 10 to 15-year period.

In addition to land use plans, there are other shorter term (typically 1-5 years) planning efforts where decisions are made concerning specific activities and programs, including the use of fire to achieve resource benefits. These may include programmatic plans, such as FMP's, or specific project plans.

The FMP's are strategic plans that define how wildland and prescribed fires will be managed to meet land use objectives. The FMP's must contain prescriptive criteria which are measurable and will guide selection of appropriate management actions in response to fires. The criteria can relate to suppression actions or describe when fire can be managed to gain resource benefits. This allows the use of a full range of appropriate management responses to fire, which may include: full suppression of a wildland fire; suppression on part of a wildland fire while allowing another portion of the fire to continue playing a natural ecological role and achieve resource benefits; or the use of prescribed fire.

Project plans are strategic plans to accomplish specific actions and goals established in a land use plan. Project plans may involve decisions regarding trade-offs between using mechanical, chemical and fire treatments. When projects include fires treatments, burn plans are also required. Burn plans are operational plans for managing specific fires. Burn plans prepared by

FLM's should include smoke management components to minimize fire emissions and mitigate air quality impacts.

b. Evaluating environmental impacts

Federal agencies evaluate the environmental impacts of the tools used for resource management on publicly owned lands using NEPA. They generally consider the impacts on, among other things, plant and animal species in the area, aquatic life, cultural resources, soil conditions, riparian areas, wetlands, water quality, air quality and visibility. Such analyses should be undertaken at both the individual project planning level and at the regional planning level if warranted by the extent of similar activities over a large area.

The impacts of resource management activities, particularly fire, on air quality can vary significantly by region. The impacts can be strongly affected by meteorology; existing air quality; the size, timing and duration of the activity; and other activities occurring in the same airshed at the same time. State/tribal air quality managers can provide technical assistance with evaluating potential air quality impacts, thus aiding FLM's in their selection of tools and evaluation of the environmental impacts.

Air quality and visibility impact evaluations of fire activities on Federal lands should:

- include recent historic (e.g. 10 years) and projected (life of the plan) annual or seasonal emissions from wildland and prescribed fires. Emission projections should be based on estimates provided by wildland owners/managers of acres burned, pre-burn fuel loading by vegetation type and consumption,
- be related to analyses of cumulative impacts of fires on regional and subregional air quality, when possible.
- identify applicable regulations, plans or policies (e.g. burn plans, authorization to burn, conformity, etc.),
- identify sensitive receptors,
- include description of planned measures to reduce smoke impacts,
- identify the potential for smoke intrusions into sensitive areas, and model air quality and visibility impacts, when possible,
- describe ambient air monitoring plans, when appropriate.

3. Role of State and Other Public Land Managers

State and local land management agencies manage publicly owned lands similar to Federal lands. These agencies differ from agency to agency, but can include forestry, conservation, park service, or fish and game agencies, as well as State or local fire protection agencies. Many agencies prepare long-range land use plans as well as project specific plans. The FMP's, similar to those prepared by Federal agencies, may also be prepared. Public land management agencies generally assess the environmental impacts of proposed projects, such as fires managed for resource benefits, although the impacts evaluated vary from agency to agency.

Some State/local wildland managers also have responsibilities for private lands. Such responsibilities may include using fires and other fuels reduction programs aimed at reducing the potential for wildfires in the wildland/urban interface.

Land use planning for State and locally owned wildlands, although somewhat different from the Federal process, also requires preparation of written documents that are subject to public review. State/local wildland managers should notify air quality managers of long-range plans to use fire for resource management. They should consider alternative management tools and evaluate the potential air quality impacts of fires. State/local wildland managers should also participate in the development of State SMP's.

4. Role of Private Land Managers

Private wildland owners/managers may or may not prepare written land use or project plans depending on the organization and the size of the property. States/tribes may or may not require written plans, but activities on privately owned lands must meet all applicable State and Federal environmental requirements. State requirements include any specific SIP requirements applicable to private land owners which are designed to ensure that the State complies with CAA requirements. Private land owners/managers should provide information to the State on long-range plans to use fire for resource management and should participate in the development of State SMP's.

5. Role of Indian Land Managers

Land use plans for Indian wildlands are not subject to review by the general public and are not subject to State regulations. Activities on Indian lands must meet the requirements of the CAA and the TIP, however, if one has been adopted. It is important that Indian wildland managers consider alternative vegetation management tools and consider the air quality impacts of the management practices chosen both on and off of Indian lands. They are encouraged to collaborate with other near-by wildland owners/managers and air quality managers on regional SMP's to assure that fires managed for resource benefits will not cause adverse air quality impacts at sensitive receptors in the region.

6. Role of Air Quality Managers

State air quality managers which have publicly owned wildlands within their jurisdiction, have a responsibility to participate in the public planning process conducted for those lands to be assured that air quality concerns are adequately addressed and they can meet the goals of their SIP's. They can participate in selecting the scope of land uses, identify air quality issues, and participate in evaluating and selecting alternative resource management tools. They can also participate in identifying basic air quality criteria for fire prescriptions. To accomplish this, air quality agencies should heed solicitations of public participation from land managers and contact public land management agencies within their jurisdiction

State/tribal air quality managers should also encourage private and Indian wildland owners/managers to consider alternative treatments and help them evaluate the potential air quality impacts of alternatives to meet particular management objectives.

B. Air Quality Management

State/tribal air quality managers are responsible for adopting plans and rules sufficient to attain and maintain national and State air quality standards, prevent significant deterioration of air quality, remedy existing visibility impairment and prevent future impairment in mandatory Class I Federal areas caused by manmade sources of pollution. This is accomplished mainly by developing SIP's and TIP's. The SIP's/TIP's include all programs and rules required by the CAA to meet and assure maintenance of Federal standards. The SIP's/TIP's are frequently amended as State/tribal rules are revised and new rules are adopted to meet changing CAA requirements. The

EPA has the authority to adopt and implement Federal Implementation Plans (FIP's) to address air quality protection in areas where States or tribes do not adopt plans.

1. Role of State/Local Air Quality Managers

The SIP's are developed in an extensive public process involving workshops and public hearings in which all stakeholders are invited to participate in developing the technical components of the plans including: (1) emission inventories; (2) modeling analyses; (3) attainment demonstrations; (4) transportation and general conformity emission budgets; (5) analyses of air quality data; and (6) control strategy development. State/local air quality managers should solicit information on the planned use of fire for resource management from all wildland owners/managers, just as they obtain information on other emission sources within their jurisdiction, when fires are expected to significantly impact air quality. Air quality managers should also work with adjacent States to mitigate potential impacts from interstate transport of smoke.

2. Role of Tribal Air Quality Managers

Eligible tribes may develop TIP's to administer CAA requirements on Indian lands. The CAA recognizes tribal governments as the most appropriate parties to regulate the environment on Indian lands and grants EPA the authority to approve tribal programs. The EPA has developed strategies for Federally implementing CAA requirements if tribes do not adopt TIP's.

Tribal air quality managers should solicit information on the planned use of fire for resource management within their jurisdiction and the potential for air quality impacts on or from adjacent jurisdictions. They are encouraged to collaborate with other near-by air quality managers to develop regional SMP's which assure that fire activities will not cause adverse air quality impacts at sensitive receptors in the region.

3. Role of Public Land Managers

Public land managers have the responsibility to participate with the other stakeholders and air quality managers in developing SIP's. Public land managers, as experts in what is needed to meet land use and other environmental objectives, need to provide information on the areas that are to be treated with fire, air pollutant emissions estimates, and assistance in developing programs to track emissions, monitor air quality and visibility, and mitigate air quality impacts.