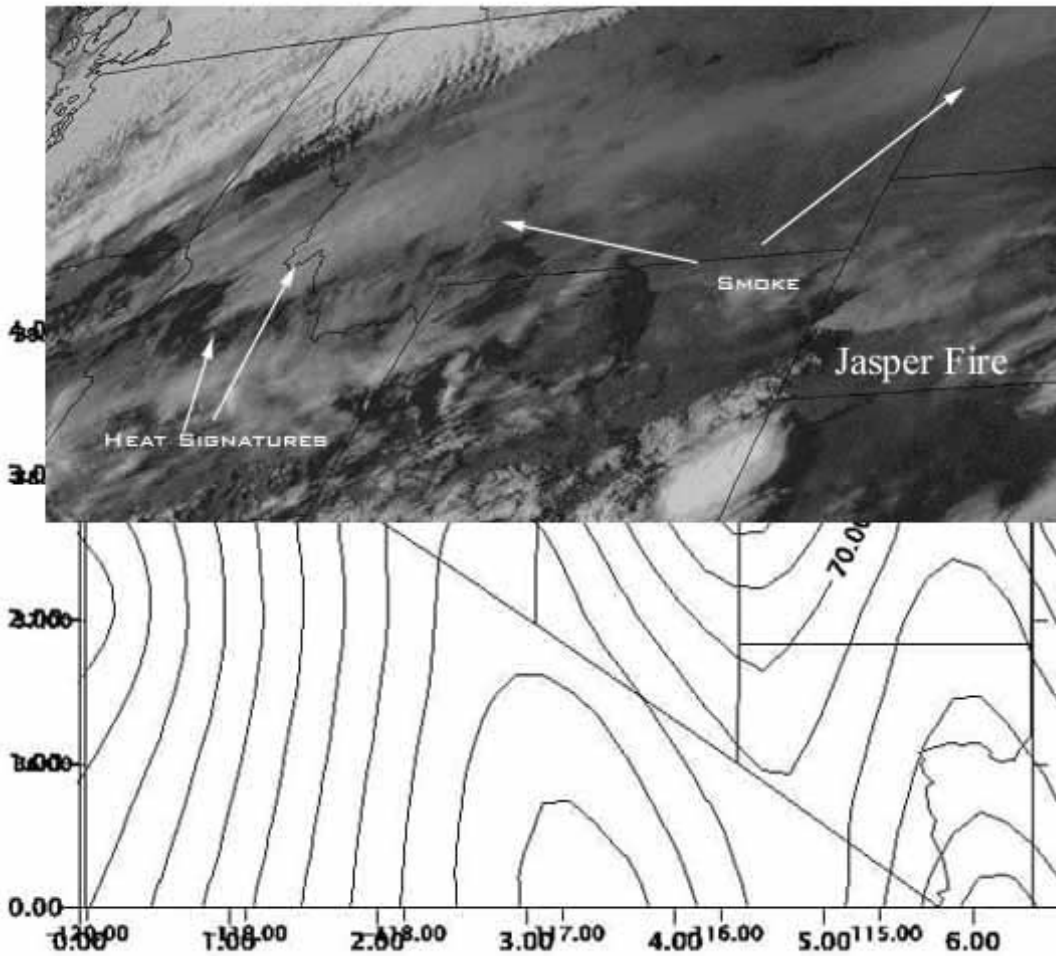




Wildland Fire Elements of a Basic Smoke Management Program



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LIST OF ACRONYMS, ABBREVIATIONS, AND SYMBOLS

ug/m ³	Micrograms Per Cubic Meter	PM	Particulate Matter
Back-ground Document	Refers to EPA's <i>Prescribed Burning Background Document</i>	PM _{2.5}	Particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers. NAAQS – 65 ug/m ³ 24-hour; 15 ug/m ³ annual.
BACM	Best Available Control Measures	PM ₁₀	Particulate matter with an aerodynamic diameter less than or equal to 10 micrometers. NAAQS – 150 ug/m ³ 24-hour; 50 ug/m ³ annual.
BART	Best Available Retrofit Technology		
BMP	Best Management Practice		
CEM	Continuous Emission Monitoring	PSD	Prevention of Significant Deterioration
CO	Carbon Monoxide		
EPA	U.S. Environmental Protection Agency	RACM	Reasonably Available Control Measures
FAQ	Frequently Asked Questions	RAWS	Remote Automated Weather Station
FEJF	Fire Emissions Joint Forum	SASEM	Simple Approach Smoke Estimation Model
FR	Federal Register	SCFC	South Carolina Forestry Commission
GCVTC	Grand Canyon Visibility Transport Commission	SIP	State Implementation Plan
Interim Policy	Refers to EPA's <i>Interim Air Quality Policy on Wildland and Prescribed Fires</i>	SLAMS	State/Local Air Monitoring Systems
ITEP	Institute for Tribal Environmental Professionals	SMP	Smoke Management Program
MOU	Memorandum of Understanding	USC	United States Code
NAAQS	National Ambient Air Quality Standards	USDA	U.S. Department of Agriculture
NEPA	National Environmental Policy Act	USDI	U.S. Department of the Interior
NOV	Notice of Violation	USGAO	U.S. Government Accounting Office
NWCG	National Wildfire Coordinating Group	WFIP	Wildland Fire Implementation Plan
		WRAP	Western Regional Air Partnership

EXECUTIVE SUMMARY

This document was developed by the Fire Emissions Joint Forum (FEJF) to assist regulatory authorities, such as state/local/tribal agencies, in developing basic smoke management programs for wildland fire. The FEJF was formed to assist the Western Regional Air Partnership (WRAP) in addressing the fire-related air quality recommendations of the Grand Canyon Visibility Transport Commission (GCVTC report, June 1996). The FEJF, and the WRAP, are broad stakeholder-based partnerships including western governors (or designees), state air quality agencies, federal/state/private land managers, tribes, the Environmental Protection Agency, environmental groups, industry, academia, and others.

States and tribes on whose land wildland fire occurs should develop and implement smoke management programs (SMPs) in collaboration with land owners/managers and the public when fire is, or has to the potential to be, a significant source of air pollution. The seven elements of a basic SMP identified here are organized according to the basic components of a certifiable SMP as described in EPA's *Interim Air Quality Policy on Wildland and Prescribed Fires*.

Authorization to Burn: The regulatory authority should establish a system to authorize a prescribed burn based on air quality and meteorological conditions on the day of the burn. The information from an approved burn should be made available for emissions tracking and inventory purposes.

Minimizing Air Pollutant Emissions: Land owners/managers are encouraged to consider alternatives to burning. When fire is selected as the preferred method of fulfilling land management objectives, then emission/impact reduction techniques should be used and documented to minimize air pollution.

Smoke Management Components of Burn Plans: Federal land managers should include smoke management components in burn plans. Consistent smoke management information in burn plans will help ensure adequate notification and documentation for smoke intrusions; and assist with compliance assurance, SMP evaluation, and public and agency review processes.

Public Education and Awareness: Regulatory authorities and land owners/managers need to educate the public on the role of fire, the health effects of smoke, and what is being done to address smoke from wildland fire as aggressively as is possible and appropriate. It is equally important to educate burners about SMP requirements and available emission/impact reduction techniques.

Surveillance and Enforcement: The regulatory authority should establish criteria for surveillance and enforcement to ensure compliance with the burn plans, regulations, and standards designed to comply with the National Ambient Air Quality Standards and protect visibility at Class I areas.

Program Evaluation: Each element of a SMP should be evaluated as often as needed, but at least once every three to five years to ensure SMP effectiveness for meeting air quality and land

management goals, consistent data reporting, and adequate data collection for emission inventories.

Optional Air Quality Protection: Regulatory authorities are encouraged to adopt additional smoke management requirements as needed. Regulatory authorities are encouraged to consider additional protection around smoke sensitive areas, and develop performance standards and emission goals.

I. PURPOSE

Elements of a Wildland¹ Fire Basic Smoke Management Program was developed for the Western Regional Air Partnership (WRAP) by the Fire Emissions Joint Forum's (FEJF) Basic Smoke Management Program Task Team. The purpose of this document is to identify elements of basic smoke management programs (SMP) to assist regulatory authorities, such as state agencies, in developing and implementing SMPs. An SMP is a control strategy used by regulatory authorities to implement the U.S. Environmental Protection Agency (EPA) *Interim Air Quality Policy on Wildland and Prescribed Fires* (Interim Policy) and the Regional Haze Rule. The purpose of an SMP is to mitigate nuisance smoke and public safety hazards, prevent National Ambient Air Quality Standard (NAAQS) violations, protect public health, and address visibility impacts in Class I areas.

The majority of the information contained in this document was derived from guidance documents discussed in the appendix. It should be noted that these documents focused on the protection of NAAQS and nuisances. This document addresses these two issues and visibility as well.

The elements identified in this document (Section II) are organized according to the basic components of a certifiable SMP as described in the Interim Policy. This organization was used to maintain consistency with past work completed on this subject matter. The elements listed should not be considered inclusive or exhaustive, but should be considered when regulatory authorities or other organizations develop basic SMPs. Each element is discussed along with its regulatory framework, recommendations, and examples. The examples were taken from the EC/R Wildland Smoke Management Program Survey (2001). Some examples may represent more than basic element and should be taken in context with the recommendations.

This document addresses wildland fire only and does not address agricultural burning. Basic SMPs for agricultural lands (excluding rangelands) will be addressed by the FEJF's Basic Smoke Management Program Task Team in a later document. In addition, enhanced SMPs, as described in Section 51.309 of the Regional Haze Rule, are being addressed by the FEJF Enhanced Smoke Management Program Task Team.

The Regional Haze Rule explicitly recognizes the authority of tribes to implement the provisions of the rule, as provided by the Clean Air Act § 301(d) and the Tribal Authority Rule (40 CFR 49.1-.11). All SMP writers should keep the principles of tribal jurisdiction in mind, and be aware of possible implications this may have for Regional Haze Rule compliance strategies within their state. Those provisions create the following framework:

¹ Wildland – An area where development is generally limited to roads, railroads, power lines, and widely scattered structures. The land is not cultivated (i.e., the soil is disturbed less frequently than once in 10 years), is not fallow, and is not in the USDA Conservation Reserve Program. The land may be neglected altogether or managed for such purposes as wood or forage production, wildlife, recreation, wetlands, or protective plant cover. Silvicultural land and rangelands, woodlots, and private timberlands are included as wildland for the purpose of this report (WRAP Work Plan, 1999).

- Absent special circumstances, reservation lands are not subject to state jurisdiction.
- Federally recognized tribes may apply for and receive delegation of federal authority to implement Clean Air Act programs (including visibility regulation), or "reasonably severable" elements of such programs.
- Where a tribe does not seek delegation through a Tribal Implementation Plan, EPA, as necessary and appropriate, will promulgate federal implementation plans within reasonable timeframes to protect air quality in Indian country (64 FR 35759).

II. ELEMENTS OF A WILDLAND BASIC SMOKE MANAGEMENT PROGRAM

For the readers' ease, this section has been organized so that all information pertinent to each element is contained in the element's subsection. This will allow the reader to find necessary information without having to cross-reference other subsections. Under each element, there is a discussion of the element's regulatory framework, objectives, recommendations, and examples.

A. Authorization to Burn

1. Regulatory Framework

EPA Interim Air Quality Policy on Wildland and Prescribed Fires

The Interim Policy states that an SMP should include a process for authorizing or granting approval to manage fires for resource benefits within a region, state, or on tribal lands, and identify a central authority responsible for implementing the program. It further states that the central authority's criteria for authorizing fires should be based on existing air quality and the ability of the airshed to disperse emissions (e.g., meteorological conditions) from all burning activities on the day of the burn.

EPA's Prescribed Burning Background Document and Technical Information Document for Best Available Control Measures

This guidance document suggests the regulatory authority know the capacity of the atmosphere on any given day to determine if there is good dispersion to allow a prescribed burn. With this known, a procedural framework can be established for authorization to burn. The framework would be structured where: 1) the burners can notify the regulatory authority of their wish to burn (burn request), 2) the regulatory authority can determine whether the proposed burn can be approved (review the burn request), and 3) the regulatory authority can identify which burns will be allowed on a given day (approve or disapprove the burn request).

2. Objectives

The objective of providing a process for authorizing burns is to:

- Provide a means for a regulatory authority to approve fires based on air quality and meteorological conditions.

3. Elements

Legal Authority to Authorize a Burn

Recommendation: The regulatory authority should establish a means or system to authorize a prescribed burn. The information concerning all approved burns needs to be made available for emissions tracking and inventory purposes.

Examples:

a. Agreements

- A written or verbal agreement can be reached between agencies or entities to address smoke management issues. This agreement does not necessarily have to be associated with a SMP or written in the format of a formal memorandum of understanding (MOU). These agreements may be intra-state agreements (agencies and entities within a single state), inter-state agreements (agreements between states), or state-tribe agreements.

b. Memoranda of Understanding

- An MOU is a written agreement between a regulatory authority and the entities planning to burn. Participation is typically voluntary. Like less formal agreements, MOUs may be intra-state agreements (agencies and entities within a single state), inter-state agreements (agreements between states), or state-tribe agreements. An MOU does not carry the weight of a regulation, ordinance, or SMP approved through the State (or Tribal) Implementation Plan (SIP) process; and therefore, it is considered to be an element of a basic SMP. If the MOU were incorporated into the SIP with enforcement provisions, it would most likely be an element of an enhanced SMP.

c. Regulations/Ordinances (state, tribal, or local)

- With some SMPs, the SMP elements are adopted or referenced into state regulations or local ordinances, and approved through the SIP or a Tribal Implementation Plan process.

d. Wildland Fire and Prescribed Fire Smoke Management Program

- Some regulatory authorities establish a wildland fire and prescribed fire smoke management program. This type of program can be managed by a single entity or a combination of entities such as a state(s), tribe(s), air pollution district(s), land owner/manager(s), local air pollution agency(ies), or local government agency(ies). The program may be certified by EPA or approved through a SIP or Tribal Implementation Plan.

Instrument or Tool Used to Evaluate a Burn

Recommendation: The level of effort or extent of authorization should be based upon the air quality impact (public health, NAAQS, visibility, and nuisance) prescribed burning may have on an area. It is recommended that the regulatory authority work with the land owners/managers to develop criteria for what level of authorization should be required (based on acreage, emissions, potential impact, etc.)

Examples:

a. Application for Permit to Burn or Other Approval Processes

An application for a permit to burn is submitted by a land owner/manager to the regulatory authority to request to burn. The request is typically made within two weeks of burn. The application can also be a supplement to an annual burning plan submission. The requirement for submitting an application could be based on the size of the burn (acres, fuel tonnage, or potential emissions of the planned burn). Application content varies, but could include:

- Name of agency
- Contact person and phone number
- Location of burn
- Type or purpose of burn
- Size of burn (i.e. acres, fuel tonnage, potential emissions)
- Duration of burn
- Notification requirements to other land owner/managers, local governments, or fire departments
- Evaluation of alternatives to burning
- Identification of smoke sensitive areas (e.g., Class I areas, nonattainment areas, highways, airports, schools, hospitals, schools, cities, religions areas/shrines)
- Dispersion model (e.g., SASEM) to evaluate impacts to smoke sensitive areas and Class I areas and to compare to the NAAQS for particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM₁₀)
- Identification of an on-site certified prescribed fire burner
- Identification of the certified prescribed burner who certified the burn

b. Authorization of a Burn Day

When a regulatory authority approves a requested burn, they authorize the burn day. The approval is typically given within 24 hours of the requested burn. This process allows for the regulatory authority to approve, conditionally approve, or deny the burn permit application. Approval is typically based upon criteria such as:

- Meteorological conditions (e.g., wind speed, mixing height, ceiling, dispersion)
- Proximity to sensitive areas (i.e. Class I areas, nonattainment areas, population centers)
- Size of the burn
- Specific no burn days (e.g., out of season burn periods or times when public events are occurring nearby)
- Existing air quality
- Air quality episodes
- Air quality alerts
- The presence of residual smoke from previous burns
- Consultation with the governments of potentially affected tribes to determine whether tribal cultural resources would be adversely affected

c. Weather Forecast

National Weather Service or a regulatory authority staff meteorologist would issue a prescription forecast identifying weather conditions the day of the burn or the day before the burn. The prescription involves certifying that weather conditions are favorable for good dispersion based upon mixing height, surface/upper air wind speeds, stability, ceiling heights, etc.

d. Annual Burning Plan

Land owner/managers would submit an annual list of planned burns to the regulatory authority. The requirement to submit such a plan can be based on the size of the planned burn (acres, fuel tonnage, or potential emissions). Annual burning plans would typically be submitted three months prior to the burn season to allow the regulatory authority to plan for the upcoming burn season.

Criteria to Approve a Burn

Recommendation: Regulatory authorities should coordinate when burning is close to jurisdictional boundaries.

Examples:

a. Notification

Land owner/managers should coordinate their planned burns not only with the regulatory authority but also with local fire control agencies and other local land management agencies. To do this, these entities should be notified of the plan to burn. This notification could include:

- Submitting an application to the regulatory authority prior to the burn and receiving a written or verbal approval to burn
- Contacting the regulatory authority prior to or the day of the proposed burn to determine if it is an approved burn day

- Notifying other agencies such as local fire departments, land owner/manager agencies, tribes, or affected entities

b. Approval to Burn

There are many ways a land owner/manager can receive approval to burn, including:

- Contacting a hot-line for approved burn days on the proposed date of burn
- Contacting the regulatory authority by phone and receiving approval
- Receiving written approval for a submitted burn permit application from the regulatory authority
- Obtaining an approved permit to burn from the regulatory authority
- Receiving approval of an annual burning plan. The proposed burn would need to be identified in the burn plan. Even if the proposed burn is identified in the burn plan, an approved burn permit may also be required for the proposed burn.

c. Desirable Meteorological Conditions

Meteorological conditions would need to be favorable for the day of the proposed burn. This could be determined by having pre-determined criteria for good air dispersion for the area of concern, contacting the National Weather service for a fire prescription forecast, collecting on-site meteorological data, or conducting a small test burn to verify good smoke dispersion.

d. Visibility Impairment to Highways, Roads, and Airports and Impacts to Class I Areas

The land owner/manager wishing to burn should evaluate smoke impacts to highways, public roads, airports, Class I areas, and other sensitive areas and verify the burn will not cause visibility impairment to these areas. This could be accomplished by air dispersion modeling, ambient air monitoring, or visual observation. The land owner/manager would then use this information to justify the size and location of burn. If at any time the burning causes or may tend to cause smoke to blow onto or across a road or highway, it is the responsibility of the person initiating the burn to notify the appropriate authority of the situation and implement emergency plans.

e. Air Quality Episode or Adverse Impact to NAAQS

The regulatory authority should identify whether an air quality episode/alert was occurring and identify no burn days, as appropriate. The regulatory authority could also evaluate current air quality monitoring data to determine if the airshed is close to violating ambient air quality standards or public tolerances, and cannot withstand further impacts from the proposed burn. This could be accomplished by modeling (e.g., using SASEM) to determine impacts to smoke sensitive or populated areas. This could also be achieved by conducting continuous emission monitoring in smoke sensitive or populated areas.

f. Residual Smoke

The regulatory authority would evaluate residual smoke from previous days' burns and determine if the proposed burn would adversely impact ambient air quality standards or visibility. This determination would be based upon existing air quality monitoring data, visual observations, prescribed burns from previous days burning out of prescription, impacts from wildland fires out of control, and weather conditions.

g. Special Considerations for Tribes

When defining criteria to approve burns, tribes may wish to include additional items such as allowing burns for religious practices on certain days, regardless of meteorological conditions, or exempting tribal religious burning from regulation altogether.

B. Minimizing Air Pollution Emissions

1. Regulatory Framework

EPA Interim Air Quality Policy on Wildland and Prescribed Fires

The Interim Policy states an SMP should encourage land owners/managers to consider alternative treatments to fulfill land management objectives. Private land owners may need assistance from regulatory authorities to identify economically feasible alternative treatments. When fire is selected as the preferred method of fulfilling land management objectives, then emission reduction techniques, which primarily reduce the amount of fuel consumed and/or increase combustion efficiency, can be used. However, unless excluded fuels are removed or decompose, they will be consumed in subsequent fires.

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.

EPA's Prescribed Burning Background Document and Technical Information Document for Best Available Control Measures

The Background Document closely mirrors the Interim Policy and states that alternatives to burning should be encouraged when resource management objectives can still be met. When fire is used, emission reduction techniques should be used to limit emissions. Emission reduction techniques should be based on reducing the fuel load, minimizing the fuel burned, maximizing the flaming phase, and reducing residual smoke. Some of the techniques that may be used to reduce emissions include fuel load utilization, air curtain destructors, acreage limitations, fee structures, timing of ignition, and dispersion. In addition, additional emission reduction techniques in and near nonattainment areas may be necessary. Procedures for evaluating new techniques should also be in place.

2. Objectives

The objective of this element is to encourage the use of emission reduction techniques and alternatives to burning to minimize air pollution emissions.

3. Elements

Burner Qualifications

Recommendation: It is recommended that regulatory authorities consider a minimum level of qualification for individuals conducting or approving burns. This will help ensure that techniques for minimizing air pollutant emissions are evaluated.

The Interim Policy states that "Persons responsible for managing greater than de minimis fires should be adequately trained in fire and smoke management," (page 19). Prescribed fire managers should be trained in fire use and behavior, weather, and smoke management. Training may include basic management techniques (smoke impact and emission reduction) and meteorology (smoke dispersion), such as is provided in the National Wildfire Coordinating Group (NWCG) smoke management techniques course (RX410). Training should also include basic fire suppression techniques as is provided in NWCG basic firefighter courses (S-130, S-190). Wildland owners/managers and authorizing agencies can work together to establish minimum training standards or burner certification programs.

Examples of training standards/programs required in some SMPs include:

- All burns be conducted by personnel trained in prescribed fire and smoke management techniques to the minimum level required by the regulatory authority.
- Prescribed fire managers must have smoke management training obtained through either 1) completion of a NWCG or federal/state land manager-equivalent course dedicated to smoke management or 2) attendance at an approved smoke management workshop.
- Signatories must establish a process to implement training seminars and other institutional opportunities for burners to gain the necessary skills in smoke management techniques.
- Certification to become a certified prescribed burn manager at a minimum is accomplished by: 1) satisfactory completion of a prescribed fire course and direct experience in three prescribed burns prior to taking the course or 2) satisfactory completion of the Inter-Agency Basic Prescribed Fire Course and direct experience in three prescribed burns before or after the completion of the course. Some land management organizations may have more stringent qualifications for this position.
- Prescribed burning must be conducted by a certified prescribed burner in accordance with the burn prescription. A land owner/manager may conduct a prescribed burn without being a certified prescribed burner if the land owner is burning a tract of forest land of 50 acres or less and follows the prescription prepared by a certified prescribed burner.
- Land owners/managers agree to conduct all burning in compliance with the appropriate permit or burn plan, and all applicable laws and ordinances.

Alternatives to Burning and Their Incentives

Recommendation: It is recommended that alternatives to burning be evaluated on all burns. These evaluations should be based upon all available alternatives that are economically feasible to implement and that minimize other environmental impacts while meeting land management objectives.

Almost all SMPs encourage or require some type of burning alternatives to be considered or used. Programs using Best Available Control Measures (BACM) encourage other methods of disposal where possible. Many programs require that burn plans document that all alternatives, utilization of residue, fuel reduction measures, and low emission-producing burning methods have been evaluated and utilized and that burning is the last solution. If there are practical

alternatives, many SMPs will not allow burning unless all of the reasonable alternatives have been used, and the only material and areas to be burned are those that must be burned to achieve the land owner/manager's objectives. It is the burner's responsibility to demonstrate why alternatives are not reasonable. In making such determinations, it should be remembered that a practical alternative method of disposal does not have to be as convenient or as cost effective as open burning. Some programs like the Backyard Forest Stewardship program in New Mexico use creative techniques to encourage landowners to use alternatives to burning in reducing hazardous fuels around their homes.

Examples:

- Incentives to not burn may be monetary, such as charging fees for emissions produced or lowering fees for reductions in emissions produced. Incentives may also be quantitative. By reducing emissions through alternatives, additional burns may be allowed. Regulatory "incentives" may only allow land owners/managers to burn the amount the regulatory authority has allowed.
- Alternatives to burning may include recycling and using wood and forest products to reduce the volume of material requiring consumption; hauling the debris offsite (e.g., to a landfill composting yard); chipping, shredding, mulching, or power-plant burning (e.g., co-generation); utilizing residue; and natural abatement.

Emission Reduction and Impact Techniques

Recommendation: Emission/impact reduction techniques should be included on all burns. These techniques should be economical to implement and minimize other environmental impacts.

Emission reduction techniques are tools used by the prescribed burner to reduce the emissions produced by not consuming fuel or employing methods that ensure optimum emission factors. Emission reduction techniques will vary by region, and have been well documented in numerous other publications.

Examples:

- Emissions can be reduced by reducing the fuel load to be burned. This can be accomplished by not treating, yarding, or consolidating non-merchantable material; providing public firewood access before the burn; finding use for more of the wood before the burn; using chemicals; burning when non-target fuels have a high fuel moisture; using alternative mechanical treatments, and rapid mop-up.
- Burners should strive for the most efficient combustion possible. Vegetation should be dry and in a condition that will minimize the smoke emitted during combustion. When pile burning, material should be burned in dirt-free, cured, and dry piles. Piled material should be covered if possible. Fires should be ignited so as to burn as rapidly as possible and material to be burned should be arranged so that it will burn with a minimum of

smoke and stacked in such a manner as to insure efficient combustion. Promoting fuel configurations that create an adequate air to fuel ratio will also reduce emissions, as does burning in ways that shifts the proportion of the burn from the smoldering phase to the flaming phase. Minimizing duff consumption and smoldering through fuel moisture considerations will reduce emissions as well. Burners should also burn only those fuels essential to meet resource management objectives and burn piles when other burns are not feasible, such as in snow or rain.

Impact Reduction

Recommendation: Regulatory authorities should implement regulations that state that a person may not cause or permit any emission that is injurious to human health or welfare, animal or plant life, or property, or that would unreasonably interfere with the enjoyment of life or property or intrude into any smoke sensitive area. Regulatory authorities may need to implement setback requirements for tribes' sacred sites.

Examples:

- To better ensure and enforce impact reductions, many regulatory authorities have included the following language in permits, burn plans, or rules promulgated: “A person shall not cause or permit any emission that is injurious to human health or welfare, animal or plant life, or property, or that would unreasonably interfere with the enjoyment of life or property or intrude into any smoke sensitive area.”
- Most SMPs do not allow materials that generate hazardous air pollutants that have the potential to cause serious health problems or impacts to be burned. Oils, railroad ties, coated electrical wire, rubber, tires, tar paper, asphalt shingles, and wood products treated with inorganic arsenicals, pentachlorophenol, or cresols are only some of the materials prohibited by many SMPs. Heavy oils, asphalt material, or items containing natural or synthetic rubber are also often not allowed to be used to ignite or excel the material to be burned or to promote the burning of such material.
- Many rules prohibit open burning when the regulatory authority declares an air quality advisory due to inadequate air ventilation.
- Many SMPs include procedures for addressing cross-jurisdictional smoke impacts by coordinating with neighboring air districts, regions, states, or tribes.
- SMPs may often prioritize burns that can minimize smoke impacts.
- The hours between ignition of piles/units may be specified in a SMP. Mop-up may be required after a certain number of hours of ignition and ignition times may be limited.
- Some regulatory authorities provide information to the public on the adverse impacts of using green or wet wood as fuel.
- Regulatory authorities often obtain meteorological information for the burn day, specifically wind speed, wind direction, and ceiling level, for the start of the burn and forecasted for the duration of the burn. The release of pilot balloons at the burn site can be used to verify wind speed, direction, or stability. Some regulatory authorities also establish burn site or area-representative remote automated weather stations (RAWS), or their equivalent, to have telemetry that allows retrieval on a real-time basis by the

regulatory authority. Some regulatory authorities also conduct a test burn on a small portion of the project area prior to project implementation.

- Some regulatory authorities use a map to depict the potential impact of the smoke. The map shows smoke-sensitive areas, the daytime and nighttime smoke paths, the down-drainage flow for an area of 15 miles from the burn site, and modeling of smoke impacts for burns greater than 250 acres per day (or greater than 50 acres per day, if the burn is within 15 miles of a Class I Area, a PM or carbon monoxide [CO] non-attainment area, or other smoke sensitive area).
- Many SMPs include some or all of the following requirements to address impact reduction:
 - Burners must implement the available best management practices (BMP) for emission reductions for specific burns.
 - No burning should take place before sunrise. No additional materials or fuel should be ignited or added to a fire after two hours before sunset.
 - Wind velocity must be five miles per hour or greater when the wind direction at the site would cause smoke to drift toward a populated area.
 - Limit the tonnage or the number of piles to be burned on a given day or volume or acreage of material burned on any given day and/or at any specified site.
 - For range improvement burning, if economically and technically feasible, the brush should be felled, crushed, or uprooted with mechanical equipment; desiccated with herbicides; or dead at least six months prior to the burn.
 - Only the amount that can reasonably be expected to completely burn within 24 hours should be ignited in any one day. Material to be burned must be ignited as rapidly as practicable.
 - Identify alternative management responses to be taken upon becoming aware that a fire is out of the air quality prescription; identify appropriate, short-term fire management responses to abate smoke impacts; and implement management responses that will mitigate adverse impacts.
 - Wildfire burning is prohibited December through March. Essential winter burning may be conducted only when good or excellent smoke dispersion conditions are forecasted and emissions will not create an impact.
 - No burning may be conducted during an air stagnation advisory, alert, an air pollution episode, or if the regulatory authority determines that weather conditions are unfavorable for safe burning.
 - Prevailing winds at the time of burning must be away from any sensitive area.
 - Burners must use opportunities to spread smoke impacts over a broader time period and geographic area.
 - Burners must use fans, crane piling, mass ignition, and accelerated mop-up to reduce the amount of visible smoke produced during burning.
 - Burn sites must be under constant physical supervision of a skilled person who has the means and skills available to quickly extinguish the fire.
 - Pile/windrow burning must be set back 300 feet from any occupied building except the landowner's buildings.

Impact Reduction Contingency Plans

Recommendation: Land owner/managers should have specific contingency plans that will be implemented if smoke impacts occur or meteorological conditions deviate from the desired condition.

Most programs require some type of contingency plan if the protection to public health and safety is compromised.

Examples of items in contingency plans are listed below.

- If a regulatory authority issues an air quality advisory or determines improper dispersion of pollutants or unacceptable limits of smoke accumulation, or when meteorological conditions warrant, some regulatory authorities require that the burn be extinguished immediately, emissions be halted (except as needed to maintain control of the fire), all new ignitions in the area be suspended, mop-up begin within a certain number of hours, mop-up be complete within a certain number hours, and other actions be taken to protect public health.
- If emission levels threaten public health or safety, many SMPs allow burns in progress two hours to reduce emissions to a level that no longer threatens public health or safety.
- Some SMPs require that burn plans contain specific contingency actions that will be taken if smoke impacts occur or meteorological conditions deviate from those specified in the plan. An equipment list must be on-scene or readily available to implement the contingency actions.
- If at any time the burning causes or may tend to cause smoke to blow onto or across a road or highway, many SMPs require that the person initiating the burn notify the appropriate authority of the situation and implement emergency plans.
- Many SMPs include thresholds or trigger levels for when contingency actions are initiated.
- Regulatory authorities often include procedures for documenting the smoke event.

Monitoring Smoke Impacts

Recommendation: Regulatory authorities should require that real and potential smoke impacts be monitored while emissions are produced.

Examples:

- Most regulatory authorities require monitoring of real and potential smoke impacts.
- Some SMPs require smoke monitoring on projects over 250 acres per day, those that would produce emissions over multiple days, and those near smoke-sensitive areas. The land owner/manager must list the method/location of visual monitoring and the interval between dispersal monitoring observations in the smoke management plan.
- Surveillance procedures to monitor prescribed burns using visual assessments and air quality samples are required by some SMPs. Suggested actions include use of a portable

smoke and weather monitoring module and the use of aircraft to observe meteorological conditions and fire behavior.

- If pollutant levels are anticipated to create a significant threat to human health or safety, some regulators require the land owner/manager to monitor and/or model pollutants in or near population centers impacted by smoke generated from a particular prescribed fire.
- Many regulatory authorities monitor nuisance complaints by the public, post personnel on vulnerable roadways to look for visibility impairment, and initiate safety measures for motorists.
- Restrictions are imposed by some regulatory authorities to maintain PM₁₀ levels below 50 ug/m³ and require that all outdoor burning be curtailed if ambient particulate levels reach 80 ug/m³, based on an eight-hour average.
- For small fires and fires that are remote enough to result in no noticeable impact on the public, some SMPs only require visual monitoring of the direction of the plume and monitoring of nuisance complaints by the public.
- Many SMPs require that land owner/managers conduct intermittent monitoring for at least three days, or until the fire is extinguished, to ensure the smoke is not causing an impact.

Emission Reduction Tracking and Documentation

Recommendation: Regulatory authorities should require documentation of emission reduction techniques and estimates of their resulting emission reductions.

Most SMPs track emissions, but very few document the amount of reduced emissions when alternatives and emission reduction techniques are used. Many use burn plans or some type of annual reporting to track emissions, and, when recorded, to document the amount of reduced emissions. This data is usually used as part of the evaluation of the program and its effectiveness.

Examples:

To track emission reductions, some SMPs:

- Require each land owner/manager to submit an annual report generally describing the emissions reductions for each project for the previous year as a result of using BMPs.
- Require mandatory reporting of completed burns, a summary of emissions created by each fire, emissions calculations, and the annual total of emissions produced compared to the targets.
- Establish emission reduction goals, such as reducing burning emissions by 20 percent within five years and by 50 percent within 10 years, based on a calculated emissions baseline.

To document emission reductions and use of alternatives, some SMPs:

- Develop a database to qualitatively track emission reductions.
- Evaluate the effectiveness of actions taken to minimize and reduce impacts to populated and other sensitive areas prior to the next scheduled and approved prescribed burn in the impacted area.
- Require that burners include a description of the emission reduction techniques used for a specific burn in the annual fire activity report submitted.
- Use emission levels to establish yearly emission level goals.
- Use emission data to create year-end statistical summaries to demonstrate techniques used and their levels of success.

C. Smoke Management Components Of Burn Plans

1. Regulatory Framework

EPA Interim Air Quality Policy on Wildland and Prescribed Fires

The Interim Policy states burn plans should include (page 19):

- Location and description of the area to be burned
- Personnel responsible for managing fire
- Type of vegetation to be burned
- Area (acres) to be burned
- Amount of fuel to be consumed (tons per acre)
- Fire prescription including smoke management components
- Criteria the fire manager will use for making burn/no burn decisions
- Safety and contingency plans addressing smoke intrusions

The Interim Policy further states the smoke management components of burn plans should include (pages 20-22):

- Actions to minimize fire emissions
- Methods to evaluate smoke dispersion
- Public notification and exposure reduction procedures
- Air quality monitoring procedures

The Interim Policy also lists the following short-term contingency actions that should be included in burn plans (pages 21-22):

- Notifying the affected public (especially sensitive populations) of elevated pollutant concentrations
- Suggesting actions to be taken by sensitive persons to minimize their exposure (e.g., remain indoors, avoid vigorous activity and exposure to tobacco smoke and other respiratory irritants)
- Providing clean-air facilities for sensitive persons
- Halting ignitions of any new open burning that could impact the same area
- Analyzing the fire situation and identifying alternative management responses upon becoming aware that a fire is out of the air quality prescription for the air quality criteria (federal land management agencies perform a Wildland Fire Situation Analysis)
- Consulting state/tribal air quality managers regarding appropriate short-term fire management response to abate verified impacts
- Implementing management responses that will mitigate the adverse impacts to public health
- Reporting the steps taken to mitigate adverse impacts to the public and appropriate state/tribal agencies after they have been completed

According to the Interim Policy, burn plans should include "project objective, fire prescription (including smoke management components), personnel, organization, equipment, etc." (page 34). Federal land management agencies generally require written burn plans as a matter of policy. The Interim Policy strongly recommends written burn plans be required for greater than de minimis fires, especially for publicly owned lands, but acknowledges that states may or may not require written plans for private land owner/managers. It also encourages federal agencies to include smoke management components in all burn plans, regardless of the existence of a state SMP (pages 9 and 28).

EPA's Prescribed Burning Background Document and Technical Information Document for Best Available Control Measures/ NWCG's Prescribed Fire Smoke Management Guide and Prescribed Fire Plan Guide

The NWCG's *Prescribed Fire Smoke Management Guide* (1985) does not address burn plans. The NWCG's *Prescribed Fire Plan Guide* (1986) contains examples of burn plans and supplements, as well as 24 recommended elements of a burn plan. One of those elements is smoke management: "Identify potential smoke impact areas and smoke management strategies of avoidance, emission reduction and/or dispersal to minimize any adverse impact on the environment, including human health and welfare. Also note compliance procedures and local regulations." A major goal of the 1986 guide is to encourage the use of a prescribed fire plan on each project.

Chapter 4 of EPA's *Prescribed Burning Background Document* (1992) describes details of burn planning, authorization, and administration. While Chapter 4 does not address burn plans specifically, it does address what should be included in burn applications for small and large burns.

Wildland and Prescribed Fire Management Policy: Implementation Procedures Reference Guide

The *Wildland and Prescribed Fire Management Policy: Implementation Procedures Reference Guide* (1998) establishes standardized procedures for wildland fire management. A Stage I Wildland Fire Implementation Plan (WFIP) is the initial assessment of a new fire start. Within two hours of discovery, a decision is made to manage the fire for resource benefits or suppress. One of the factors that can be considered is the risk to air quality. Once the decision is made to manage the fire for resource benefits, regular assessments are made until the fire is completely extinguished or a status change occurs. One of the factors that is considered is the risk to air quality. Once the decision is made to manage the fire for resource benefit, a Stage II WFIP (short-term implementation actions) is developed and air quality values to be protected are identified and planned for. When fire behavior, complexity, relative risk, and potential length of burning activity is high, a Stage III WFIP (long term implementation actions) is developed that also looks at potential increases in acres burned and the effect on air quality. Monitoring standards and trigger points that determine specific actions to minimize impacts of smoke are determined. Throughout this process, periodical reassessments (usually daily) are made to assess continued management of this fire for resource benefit.

2. Objectives

The objective of this element is to establish consistent smoke management information in burn plans in order to:

- Ensure adequate documentation for smoke intrusions
- Ensure adequate public and agency notification procedures
- Assist with compliance assurance and SMP evaluation
- Assist public and agency review processes

3. Elements

This section focuses on examples of what is needed in a burn plan to address the four smoke management components described in the Interim Policy: actions to minimize fire emissions, methods to evaluate smoke dispersion, public notification and exposure reduction procedures, and air quality monitoring procedures. For actions to minimize fire emissions see “Minimizing Air Pollution Emissions.” Burn information, such as location, size, and fuels, are covered under "Authorization to Burn."

Recommendation: Federal land managers should include smoke management components in burn plans as described in the Interim Policy. Regulatory authorities should assist private landowners in preparing smoke management components of burn plans for large fires that have the potential to impact smoke sensitive areas.

Evaluate Smoke Dispersion

Recommendation: Burn plans should include methods for evaluating smoke dispersion impacts to smoke sensitive areas.

Smoke dispersion needs to be evaluated for impacts to all identified nearby smoke sensitive areas. The level of smoke dispersion evaluation in the burn plan should be based on the potential for smoke impacts. For multi-day fires, fires close to smoke sensitive areas, and larger fires, smoke dispersion models should be used to demonstrate that NAAQS will not be exceeded in smoke sensitive areas and that visibility impacts will be minimized in Class I areas. Dispersion modeling may also be needed during the burn to validate modeling results.

Examples:

- Identify the direction and distance to smoke sensitive areas
- Only burn when the wind is blowing away from smoke sensitive areas
- Use smoke dispersion modeling
- Use *A Guide to Prescribed Fire in Southern Forests* procedures
- Use a wind prescription
- Define category days for burning
- Evaluate down-drainage smoke drift
- Use on-site meteorological data for high smoke risk or large fires

Public Notification and Exposure Reduction Procedures

Recommendation: Burn plans should include a notification process that is responsive to potential or actual smoke impacts. Burn plans should also include documentation procedures and contingency actions to be taken during smoke intrusions.

Authorities and the potentially affected public need to be notified of planned burns several days prior to ignition. The information should include contacts for more information, health impacts of smoke, and actions to take to minimize smoke exposure. The level of notification should be increased based upon potential or actual smoke impacts. Thresholds or trigger levels, such as the smoke risk rating system used in Colorado, can be established when increased notification is needed. Land owners/managers should consult with states on selection of appropriate management response to reduce smoke impacts during smoke intrusions.

If fire causes or significantly contributes to a NAAQS violation, the regulatory authority must provide adequate documentation in order for EPA to exercise its discretion to not redesignate an area as nonattainment. The EPA will require the regulatory authority and land owner/managers to review the effectiveness of the certified SMP to prevent future violations. After three violations, however, EPA will require the SMP to be made part of the SIP and federally enforceable. It is critical that the regulatory authority has enough information from the land owner/manager to document the smoke intrusion event. The types of information that will be needed include daily burned acres and plume trajectories, prescription and weather parameters, photos, public notification, and mitigation actions taken.

Examples: (also see examples in "Public Education and Awareness" section of this document):

a. Print and Electronic Media

- Web sites
- Newspapers
- Community bulletin boards

b. Broadcast Media

- Radio
- Television

c. Direct Contact

- Community meetings for large planned fires
- On-site interpreters and signing
- Emergency signing
- Flag persons on roadways
- Complaint and information hotlines
- Agency notification
- Direct mailings
- Responding to public complaints
- Press conferences and releases

Examples of the messages that could be made available to the public through the above media include:

- Real-time air quality data
- Burn information (real-time, annual, and daily planned)
- Burn restrictions
- Health advisories
- Actions for sensitive persons to minimize exposure
- Potential or actual smoke intrusions
- Location of clean-air facilities

Air Quality Monitoring

Recommendation: State ambient air quality monitoring networks and on-site visual observations should be used to monitor smoke impacts. In addition, land owners/managers and the regulatory authority should establish site-specific air monitoring networks or practices.

A burn plan needs to identify how smoke impacts will be monitored. In most cases, monitoring will include state/local air monitoring system (SLAMS) networks and on-site or aircraft visual observations of the smoke plume. Real-time ambient air quality monitoring instruments are the most useful for smoke management purposes (TEOMs, nephelometers, etc.). SLAMS networks are generally located in high population areas to monitor for NAAQS compliance, and must follow federal reference or equivalent methods. Public complaints will also assist in monitoring

smoke impacts. Visual observations can be used to approximate particle concentrations when ambient air quality monitoring data are not available. For best results, a relationship between visual observations and particulate concentrations should be developed for each geographic area. Monitoring may also include additional meteorological data beyond what is already provided through the National Weather Service and other meteorological monitoring networks (RAWS, SLAMS, etc.). On-site meteorological data on federal projects are needed for requesting spot weather forecasts from the National Weather Service.

For large fires, multiple-day fires, or fires near sensitive areas, additional monitoring protocols may need to be established between the land owners/managers and the regulatory authority. Additional special purpose monitoring for fire projects would probably make use of less expensive, portable monitoring equipment that would not necessarily be used for NAAQS compliance. Rather, the monitoring would be used primarily to monitor and initiate mitigation of smoke impacts. The regulatory authority may need to assist some private landowners with any additional monitoring requirements.

Examples:

- Smoke plume measurements (on-site, aircraft)
- Basic meteorological data (pilot balloons for wind and temperature profiles, on-site weather observations)
- RAWS meteorological data
- Test fires
- Visual observation protocols
- Thresholds during inversions
- Emergency episode rule alert levels
- Wind prescriptions as described in California's Northeast District SMP
- Impact severity levels as described in Oregon's SMP
- Population level thresholds
- Ventilation index categories
- Portable air quality monitors
- Monitoring protocols
- Complaint tracking and response
- Satellite imagery
- Special monitoring and modeling when burns pose significant smoke impacts
- Monitoring burn prescription
- Posting personnel in smoke sensitive areas
- Random on-site audits
- Smoke intrusion notification and documentation

D. Public Education and Awareness

1. Regulatory Framework

EPA Interim Air Quality Policy on Wildland and Prescribed Fires

The Interim Policy states a public education and awareness program should include (page 22):

- Criteria for issuing health advisories
- Procedures of notifying affected populations of planned fires
- Use and importance of fire for ecosystem management
- Public health and safety implications
- Smoke management program goals
- Pre-fire health advisories press releases
- Post-fire results press releases

The Interim Policy provides a list of elements that should be included in an environmental impact analysis for project and regional planning on federal lands (pages 13-14). According to the Interim Policy, an environmental impact analysis 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 and 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, authorizations to burn, conformity, etc.)
- Identify sensitive receptors
- Include descriptions 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

EPA's Prescribed Burning Background Document and Technical Information Document for Best Available Control Measures/ NWCG's Prescribed Fire Smoke Management Guide and Prescribed Fire Plan Guide

The NWCG guides (*Prescribed Fire Smoke Management Guide* and *Prescribed Fire Plan Guide*) contain some information on notification but do not address public education.

Chapter 6 of EPA's *Prescribed Burning Background Document* describes details of public education and awareness programs. The Background Document acknowledges two goals: inform the general public of what is being done to address smoke from prescribed burning and

inform the burner of the smoke management program requirements and available emission reduction techniques. The Background Document also acknowledges the need for and aggressiveness of a public education and awareness program will vary from state to state and is left to the discretion of each state. The design should take into account attitudes, resources, demographics, and site-specific factors.

2. Objectives

The objectives of the public education and awareness element are to:

- Educate the general public on fire use, health effects of smoke, and SMPs
- Educate air quality managers on fire use
- Educate burners on SMPs and rules
- Provide for public involvement in planning and the regulatory development process
- Notify the public of planned burns
- Notify the public of health advisories and actions to reduce exposure
- Notify agencies of smoke intrusions
- Be responsive to public complaints

3. Elements

General Public Education Programs

Recommendation: Where appropriate, land owners/managers and regulatory authorities should implement educational programs that are as aggressive as possible. The level of effort should be based on the special needs of each area.

General educational programs should include information on the benefits of fire as a management tool, SMP and burn rule requirements, and health affects of smoke. The value of educational programs is often overlooked and underestimated. Education programs can be the key to protecting air quality and achieving land management goals. A more informed public will be better prepared and more understanding in the unfortunate event of smoke intrusions. At a minimum, have printed materials made available to the public via web, newspaper inserts, or direct mailing. In addition, in areas where there is a history of smoke complaints or smoke intrusions, expanded your outreach to include broadcast (television and radio) and direct contact (community meetings, curricula, speaker's bureau) media. States can build upon public outreach materials already available (EC/R, 1999). The NWCG Wildland Fire Education Working Team on-line bibliography has many educational materials on smoke management:

<http://www.nwcg.gov>.

Informing the Burn Community

Recommendation: Regulatory authorities should provide training to the land owners/managers regarding SMPs, and any other permit or rule requirements.

It is the regulatory authority's responsibility to inform the burn community of any smoke management program, permit, or rule requirements. The public process used in the development of these requirements contributes to this end but, once the requirements are adopted, there needs to be ongoing outreach to ensure implementation and compliance. At a minimum, state/local/tribal SMP and rule requirements should be made readily available to land owners/managers. Most regulatory authority personnel participate in training offered by federal land managers. In order to reach others in the burn community who do not have formal training programs (state, tribal, and private land owners/managers), other outreach methods, such as brochures, press releases, or on-site training, can also be used.

Public Involvement in Planning Process

Recommendation: Land owners/managers and regulatory authorities should adopt policies to use aggressive outreach methods to solicit early and effective public involvement in the planning and regulatory development process.

Formal public review is required when state air agencies develop rules and SIPs. The Interim Policy allows states the discretion to adopt voluntary or mandatory SMPs. If a state chooses to adopt a mandatory SMP as part of its SIP, then a public review process would be required. In either case, the Interim Policy directs the state to collaborate with land owner/managers and the public in the development of the SMP. Collaboration should start very early in the process. Relying on EPA's Federal Register notice of the draft SMP submittal for public and agency participation is not acceptable. This will usually result in a major revision of the draft SMP or an ineffective SMP once adopted.

Public review is also required in the National Environmental Policy Act (NEPA) process when federal agencies disclose the environmental impacts of proposed plans and projects. Soliciting public and agency participation in the NEPA process should also begin very early. The federal land manager should not rely solely on the local newspaper and Federal Register notices to notify the public and agencies of proposed plans and projects. It is through this process that the federal land manager discloses how air quality is addressed beyond the regulatory requirements. This is important since compliance with all regulatory requirements does not ensure that the public is aware of the impacts of a burn or when a burn will occur.

Examples of the messages, audiences, and appropriate media for communicating those messages include:

a. Target Audiences

- Potentially affected public (smoke impacts)
- Burners
- Government agencies
- General public
- Smoke sensitive groups
- Special interest groups (industry, environmental, etc.)
- Political entities
- Local decision makers (mayor, city council, legislators, etc.)
- Small landowners/managers
- Communities

b. Public Educational Messages

- Public health
 - Health and visibility effects of smoke
 - Actions to reduce smoke exposure
- Fire
 - Smoke emission/impact reduction techniques
 - Reduce fire risk and return fire to ecosystem
 - Fire and mechanical treatments are appropriate land management tools
 - Environmental and economic benefits of fire and mechanical treatments
 - Success stories
 - Fire safety

c. Media Categories

- Print and electronic media
 - Web sites
 - Newspapers
 - Community bulletin boards
- Broadcast Media
 - Radio
 - Television
- Direct Contact
 - Community meetings for large planned fires
 - SMP and rule development meetings
 - Annual SMP review meetings
 - On-site interpreters and signing
 - Field trips
 - Complaint and information hotlines
 - Direct mailings
 - Press releases and conferences
 - Phone or on-site surveys
 - Displays, slide shows, videos
 - Education curricula

- Speakers' bureaus
 - Schools
 - Local committees
 - Civic organizations
- Land owner/manager training
 - NWCG Smoke Management Techniques (RX410)
 - NWCG Basic Fire Fighter Training (S-130, S-190)
 - Smoke dispersion model training
 - Certification programs
 - On-site training
 - Special qualifications for large burns or burning near sensitive areas
 - Correspondence courses
 - Agency training standards

d. Educational Material

- Health advisories
- Real-time air quality data
- Potential or actual smoke intrusions
- Burn information (real-time and planned)
- Burn restrictions
- Burn permits
- Special outreach materials
 - Frequently asked questions (FAQs) fliers
 - Fact sheets
 - Brochures/flyers
 - Posters
 - Letters
 - Citizen's guides
 - BMP handbook
 - Information with permit
 - Public Service Announcements
- SMPs, rules, MOUs
- NEPA documents

E. Surveillance And Enforcement

1. Regulatory Framework

EPA Interim Air Quality Policy on Wildland and Prescribed Fires

In EPA's Interim Policy it states the SMP should include procedures to ensure that wildland owners/managers will comply with the requirements of the SMP. Fire managers must follow a burn plan, including fire prescription and smoke management components, or explain any deviation from the plan. Memoranda of understanding may be used to specify the responsibilities of each state/tribal agency in implementing the SMP.

EPA's Prescribed Burning Background Document and Technical Information Document for Best Available Control Measures/ NWCG's Prescribed Fire Smoke Management Guide and Prescribed Fire Plan Guide

These guidance documents state that there are two perspectives taken when looking at surveillance and enforcement. The state air quality agency's job is to protect the NAAQS and public health. The burner's main concerns will be to meet landowner objectives and assure safety of the personnel conducting the burn and the property of others. It emphasizes that surveillance and monitoring are tasks that need to be taken by both entities to avoid enforcement actions. It also stresses that enforcement of the smoke management plan is vital to its success. Many of the surveillance and monitoring techniques identified in the "Examples" section have been employed by several of the smoke management plans reviewed and can be carried over to be effective tools as visibility is incorporated into the plans.

2. Objectives

The objective of surveillance and enforcement is to ensure compliance with the burn plans, regulations, and standards designed to comply with the NAAQS and protect visibility at Class I areas.

3. Elements

Standards, Trigger Levels, Alerts, Requirements for Enforcement

Recommendation: The regulatory authority should clearly establish criteria that state when surveillance and enforcement should be conducted. It is recommended that the criteria be established in statutory rules.

Examples:

a. NAAQS

Various scenarios of the PM₁₀ NAAQS are used to establish further requirements or trigger levels for enforcement:

- One regulatory authority uses the NAAQS (modeled or monitored – continuous emission monitoring [CEM]) as the trigger level for enforcement. Another uses one third (50 ug/m³) of the PM₁₀ NAAQS as the trigger level as a protective measure.
- One regulatory authority uses 80 ug/m³ on an eight-hour average as the trigger level.
- Another regulatory authority may suspend burning (call a burn ban) when ambient conditions reach NAAQS levels for PM or ozone.

b. Alert System

- Some areas have set up a three-stage alert system (alert, warning, and emergency). The stages are based upon varying levels of hourly PM₁₀ concentrations. During the alert stage, fires would still be allowed, but as air pollution increased, a burn ban would be implemented.

c. BACM

- Some regulatory authorities have incorporated BACM requirements in regulations or the SMP.

d. Certified Burn Prescription Plan on Site

- Some regulatory authorities require the burn plan be located on site and that a trained/certified prescribed fire specialist certify the burn plan.

e. Authorization to Burn Posted on Site

- Some regulatory authorities require that the authorization to burn be posted on site.

f. Nuisance Levels or Complaints

- Some types of SMPs specify nuisance levels or base enforcement actions on complaints received.

Types of Monitoring and Surveillance

Recommendation: Surveillance and enforcement should be tailored to achieving compliance with applicable rules and laws.

Examples:

a. Complaint Monitoring

- In many areas, a fire inspector is dispatched to investigate complaints at the time they are reported.
- Many agencies will track complaints after a burn and take action on future burns to address complaints.

b. Inspection and Observation of Plume

- Some regulatory authorities conduct pre-inspections of the material or area to be burned. Depending on resources, this is done randomly on some sites, or on all burns.
- Many regulatory authorities conduct inspections during the burn. This is done through on-site visits, aircraft observations to monitor plumes, or off-site observations of visibility impairments.
- Some regulatory authorities have an inspector on call 24-hours a day to conduct inspections for planned burns.
- Some SMPs require hourly plume observations by the burner to continually observe plume movement.
- Other SMPs require the burner to submit a smoke intrusion report. This is similar to the hourly plume observations, but is only conducted when the plume is impacting people.

c. Ambient Air Monitoring

- Some SMPs include requirements for the burner to conduct ambient monitoring from a CEM or manual monitor. This data is collected to evaluate smoke impacts during or after a burn.
- Regulatory authorities may use existing CEM to track emission levels (PM₁₀, PM_{2.5}, or ozone) during burns.
- If a model analysis indicates that the NAAQS will be exceeded, then some SMPs require the burner to conduct PM monitoring (CEM or manual monitoring).
- Some regulatory authorities require CEM for sensitive areas (Class I areas) or high population areas.
- Some regulatory authorities base the requirement for monitoring based upon the size of the fire (small fires - visual monitoring, large fires - PM₁₀ monitoring). One state listed 250 acres as the trigger level. Another state indicated that multiple day burns would require monitoring.
- One regulatory authority requires CO monitoring seasonally, from October to March.

d. Modeling

- One regulatory authority requires modeling (SASEM) of burns greater than 250 acres in size, or 50 acres in size within 15 miles of a Class I area or other sensitive areas.
- Another regulatory authority requires modeling to ensure NAAQS are not exceeded.
- Some regulatory authorities state that if the model indicates that PM NAAQS may be exceeded, then it requires PM monitoring.
- The model of choice or referenced the most frequently was SASEM.

e. Meteorological Monitoring Requirements

- Most regulatory authorities require at least some meteorological monitoring, such as monitoring wind speed, wind direction, upper air conditions, and stagnant meteorological conditions.
- Many regulatory authorities use pilot balloons to verify wind speed, direction, or stability.
- Other regulatory authorities use remote automated weather stations for meteorological monitoring.
- Some regulatory authorities require burners to conduct smoke plume measurements using a format supplied by authority.
- Some regulatory authorities require burners to monitor burns to remain within the prescription of the burn plan or permit.
- Some regulatory authorities require a "test fire" to ensure good dispersion
- One regulatory authority requires the burner to develop a wind prescription for burns as well as monitoring weather during burn to ensure prescription occurs.

f. Inventories

- Several regulatory authorities require emission inventories for burns. Most require this in the annual burning plan submission.

Enforcement Actions and Penalties

Recommendation: Enforcement and penalties should be focused on repeat violators and instances of NAAQS exceedances (or significant contributions to NAAQS exceedances) or established visibility criteria exceedances/violations. The regulatory authority should work with the land owners/managers to develop criteria for what level of NAAQS and/or visibility monitoring is needed based on acreage, emissions, potential impacts, etc.

Examples:

- One regulatory authority issues a warning letter for the first violation. For a second violation, the burner is issued a Notice of Violation (NOV). A NOV could be issued for

a violation of a burn plan, permit, or rule, or non-compliance with an issued NOV or consent order.

- Several regulatory authorities required the burner to extinguish the burn, cease to burn, or suppress the fire if the burner has not received a permit or authorization to burn, or if the burner violated the burn plan, permit, or rules.
- Some regulatory authorities specify that a violation of an MOU is grounds for revocation of membership in the SMP. One state also requires that signatories of an MOU self report violations.
- Most regulatory authorities have a \$10,000 a day penalty for air quality violations.
- Most local regulatory authorities have a misdemeanor penalty ranging from \$100 to \$1000 a day per violation with a mix of administrative, civil, and criminal charges.
- Some regulatory authorities revoke permits or suspend future burns until all enforcement issues are resolved.
- One regulatory authority issues a five-day moratorium on future burns when a NOV occurs.
- Several regulatory authorities' penalties included the cost of suppressing the fire.
- Some regulatory authorities place the burner liable for damages of an escaped fire and charge the cost of suppressing the fire. Others place the liability on the burner only when the fire was unauthorized. One regulatory authority charges for the cost of the investigation and time spent on enforcement action.
- One state charges \$10,000 for commercial NOVs, \$100 for public NOVs, and \$15,000 for the violation of an existing NOV.
- Two regulatory authorities include levels of severity when determining penalties. For example, an act that is willful, intentional, or malicious is considered a felony violation, while an act that is careless or negligent is a misdemeanor violation.

F. Program Evaluation and Reporting

1. Regulatory Framework

EPA Interim Air Quality Policy on Wildland and Prescribed Fires

The Interim Policy provides the primary guidance for SMP evaluation and reporting.

Program Evaluation (page 23):

The SMP should provide for periodic program evaluations by all stakeholders based on observed smoke intrusions, nuisance complaints, and monitored air quality impacts. Post burn reports should be required for escaped fires or fires exceeding their air quality prescription or causing smoke impacts to sensitive receptors. Rules and regulations should be reviewed every three to five years including review of planned acres over next five years, authorization for other open burning, and need for SMP changes.

Accountability (page 25):

States/tribes should flag monitored values influenced by fires when submitting the data to EPA's Atmospheric Information Retrieval System. They must also document the basis for flagging the data. Supporting information could include the location of fires relative to the monitor, meteorological data such as wind speed and direction, filter analyses indicating heavy carbon deposits, the sample date (collected during the fire season), and the absence of other carbon sources during that period, among other things. The documentation should address the possible influence of other carbon sources such as wood-fired boilers, residential wood combustion, and wildfires. The type and amount of documentation should be sufficient to demonstrate that fires managed for resource benefits caused flagged values to be above the level of the annual NAAQS. The documentation should be made available to the public for review. This can be accomplished through newspaper announcements, periodic air quality reports, and public meetings.

Data on Wildland and Prescribed Fires (page 29):

A National Interagency Fire Statistics Information Project has been initiated to develop an easily accessible system for storing a set of commonly agreed upon fire data. Post-burn data on future wildland and prescribed fires will be stored in this database. The database will be accessible by air quality managers to estimate past, current, and future emission trends from this source category.

The EPA encourages federal land management agencies to help develop the fire statistics database and report fire data to the system. Air quality managers will request this information in regions where most wildland and prescribed fires occur on federal lands. Air quality managers could request similar fire data for wildland and prescribed fires on state, private, and tribal

wildlands, as well as information on other types of open burning, to complete their emission inventories.

2. Objectives

The objectives of program evaluation and reporting are to ensure:

- SMP effectiveness for meeting air quality and land management goals
- Consistent data reporting
- Adequate data collection for emission inventories

3. Elements

Reporting

Recommendation: SMPs should require annual reports for areas with high levels of burning. The annual reports should serve as a "report card" and include summaries of burn activity, burn restrictions, air quality data, significant smoke intrusions, and complaints. Land owners/managers should provide adequate fire information to regulatory authorities so they may develop accurate annual statewide emission inventories.

States are required to develop statewide annual emission inventories every three years (EPA Consolidated Emissions Reporting Rule [proposed], 40 CFR Part 51). Minimum data requirements should include enough information to develop an annual emissions inventory at the county level for the state. At a minimum, emissions should be categorized by wildfire and managed fire since these two types of fire are addressed under separate EPA policies. WRAP may identify additional categories to track natural background emissions. It may be more efficient to only report emissions for fires above an established de minimis level. The land owners/managers can provide the emissions data through annual summaries, permit applications, and post-burn reports. Additional reporting is necessary to document smoke intrusion events, especially when exceedences of the NAAQS are recorded, in order to flag the data as due to fire impacts. Additional reporting may also be required for nonattainment area SIP development purposes.

Examples:

- Annual SMP reports
- Data for emission inventories
- No data for de minimis fires
- Burn plans
- Permitted data
- Post-burn reports
- Annual fire activity reports with emission estimates
- Daily emission reports
- Automated web site for daily burn data

- Air quality data
- Emission reduction estimates
- Air quality impacts summaries
- Smoke intrusion summaries
- Complaint summaries
- Burn restrictions correlated to air quality data
- Use of alternatives
- Use of emission reduction techniques

Periodic Evaluation

Recommendation: Each element of the SMP should be evaluated as often as needed, but at least once every three to five years.

The SMP should be evaluated as needed but at least once every three to five years. An evaluation should request input from all participants, and consider new research and monitoring information. Each component of the SMP should be evaluated for whether it was implemented, if there was compliance and enforcement, if air quality and burn objectives were met, and what areas need improvement. Annual reports are highly recommended for areas with high levels of burning. The annual reports should serve as "report cards" and include summaries of burn activity, burn restrictions, air quality data, significant smoke intrusions, and complaints.

Evaluations of public complaints and/or circumstances of significant smoke impacts to sensitive areas should be critically analyzed. The evaluation should include a review of the projected level of burning planned for the next five years. Any program changes should be officially documented at the time of review if not done already. If there has been a NAAQS violation due to fire impacts, states and land owners/managers must make appropriate improvements to the SMP to mitigate future air quality impacts.

One of the GCVTC recommendations includes ensuring that federal, state, tribal, and private prescribed fire programs incorporate smoke effects in planning and application. Regulatory authorities may want to conduct random checks, both on-site and of planning documents, to verify smoke effects are being addressed.

Examples:

- Conduct annual stakeholder meetings
- Check SMP, rule, MOU revisions
- Update maps, web sites, contact lists annually
- Check NAAQS exceedances or violations
- Follow-up on nuisance complaints
- Create and regularly check a complaint log
- Check complaint responses
- Monitor smoke and visibility impacts to smoke sensitive areas
- Monitor significant smoke intrusions

- Monitor opportunities for essential burning
- Monitor consecutive days of smoke impacts to smoke sensitive areas
- Check compliance with the SMP, rules, MOUs, conformity, Interim Policy, Regional Haze Rule, and the Clean Air Act
- Track enforcement actions
- Conduct random compliance inspections
- Track NEPA documents that address smoke effects
- Continually strive for interstate coordination
- Monitor public health protection
- Track emission reduction goals and whether they have been met
- Track smoke management prescriptions
- Conduct regular training programs
- Continually strive for agency coordination
- Conduct public outreach and notification
- Allow for public input and involvement
- Conduct and track mitigation actions
- Research and use alternatives and pre-fire fuel treatments
- Validate smoke dispersion models

G. Optional Air Quality Protection

1. Regulatory Framework

EPA Interim Air Quality Policy on Wildland and Prescribed Fires

The Interim Policy provides the primary guidance for optional air quality protection. It allows states to adopt additional smoke management requirements as needed. Special protection zones can be established around wildland/interface areas, nonattainment areas, or mandatory Class I areas. Special protection may be needed for burns with a high potential for smoke impacts (multi-day or seasonal) or when air quality levels are already high. Performance standards triggering additional requirements such as timing or emission limits, air quality monitoring, or improved dispersion conditions may be established.

2. Objectives

The objective of this element is to encourage regulatory authorities to consider additional protection around smoke sensitive areas, and to develop performance standards and emission goals.

3. Elements

Smoke sensitive areas include Class I areas, scenic and/or important views, transportation facilities such as roads and airports, populations centers, developments, hospitals, schools, daycare centers, nursing homes, shopping centers, chicken farms, public events, campgrounds and trails inhabited by significant numbers of people, and other locations that may be sensitive to smoke impacts for health, safety, and/or aesthetic reasons.

Recommendation: Regulatory authorities and land owners/managers should continually look for and investigate optional techniques, strategies, programs, and alternatives to better protect air quality and reduce visibility impacts.

Special Protection Zones and Additional Requirements

Recommendation: Consideration should be made to establish special protection zones around smoke sensitive areas to provide additional air quality protection requirements. Tribal religious areas should be considered for special protection.

In all cases, SMPs are designed to protect public health, NAAQS standards, and smoke sensitive areas. There are many variations between SMPs and areas in which they are implemented. A sensitive area in the west may be a Class I area; while in the south it might be a chicken farm. Some special protection zones have different requirements within zones based on proximity to sensitive areas.

Examples:

- Smoke-sensitive areas are often delineated on burns plan depicting the potential impact of the smoke for 15 miles from the burn site. Additional public notifications may be required within the impacted area.
- Modeling smoke impacts for burns greater than 50 acres per day, if the burn is within 15 miles of smoke-sensitive areas, is often required in burn plans.
- Regulatory authorities often require that the smoke management component of the burn plan suggest actions to be taken by sensitive persons to minimize their exposure and provide clean-air facilities (if available) for sensitive persons. Burners are often required to notify sensitive populations of elevated pollutant concentrations.
- Some states define special protection zones as impact zones. Impact zones are any areas of the state that are determined to be a smoke sensitive. All nonattainment areas are included in impact zones.
- Some SMPs only allow prescribed burning in a special protection zone when smoke will have no measurable impacts.

Performance Standards

Recommendation: Performance standards should be established that trigger additional requirements for issues such as visibility impacts, emissions, complaints, and public nuisance.

Examples:

- In many SMPs, performance standards are designed to maintain state and federal ambient air quality standards, avoid public health impacts and nuisances, minimize visibility impacts from smoke in smoke sensitive areas (such as important and scenic views including those in Class I areas), and maintain and improve a system to inventory emissions from prescribed fires and wildfires.
- Some regulatory authorities require that all projects be completed without significant smoke intrusions. Public complaints are often used to evaluate performance.
- Some regulatory authorities require burners to comply with the best available control technology that has been established in the permit.
- Burners are often encouraged to consider and use alternative treatments when they are ecologically beneficial, technologically feasible, and economically reasonable.
- Many SMPs develop and implement an interagency system among land management agencies to monitor and inventory emissions from prescribed fires and wildfires.
- Some SMPs require regulatory authorities and burners to cooperate in developing, exchanging, and presenting training for employees to promote their understanding of smoke management, fire ecology, and regulatory requirements.
- Many SMPs encourage regulatory authorities to establish and maintain communication and information exchange among authorities with responsibilities for smoke management on prescribed fires.
- Some SMPs require burners to prevent smoke, resulting from burning on forest lands, from being carried to or accumulating in designated areas and other areas sensitive to

smoke; to provide maximum opportunity of essential forest land burning; and to protect public health. They also encourage the reduction of emissions.

- Many SMPs include specific emission reduction goals.

Additional Smoke Management Requirements if Performance Standards Have Been Exceeded

Recommendation: Regulatory authorities should establish procedures for when performance standards are exceeded.

Examples:

- When performance standards have not been met, some regulatory authorities require the burner to submit a written incident report. The incident report includes specifics as to what happened, contributing factors, and recommendations for prevention of similar incidents in the future.
- If a smoke incident occurs, the regulatory authority may evaluate the incident to determine whether program changes are warranted.
- Some SMPs require on-site inspections after a violation has occurred and require additional restrictions (e.g., greater setbacks, imposition of specific wind directions) be imposed for future burns.
- Some SMPs state that if any MOU signatory fails to follow any procedures, requirements, or restrictions issued under the SMP, it is considered grounds for revocation of the permit and membership in the SMP, and/or a fine can be imposed by a judge. Penalties of up to \$10,000 per day per violation may be assessed.

III. WILDLAND FIRE REFERENCES

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EPA, 1996. EPA Natural Events Policy. May, 1996. (<http://www.epa.gov/ttn/oarpg/t1pgm.html>).

EPA, 1998. The EPA Interim Air Quality Policy on Wildland and Prescribed Fires (<http://www.epa.gov/ttn/oarpg/t1pgm.html>) and associated White Papers (http://www.westar.org/projects_fp.html):

- a. Background on the Role of Fire
- b. What Wildland Fire Conditions Minimize Emissions and Hazardous Air Pollutants and Can Land Management Goals Still Be Met?
- c. Air Monitoring for Wildland Fire Operations
- d. Emissions Inventories for SIP Development
- e. Estimating Natural Emissions from Wildland and Prescribed Fire

EPA, 1999. Regional Haze Regulations Final Rule. July 1, 1999, Federal Register, 64 FR 35714. (<http://www.epa.gov/oar/vis/index.html>).

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WESTAR, 1992. WESTAR Wildfire Emergency Action Plan Guidance Document. June 1992.

WESTAR, 1999. WESTAR Agricultural Burning Survey. May 1999.

WRAP, 1999. WRAP Work Plan. 11/19/99. (<http://www.wrapair.org>)

APPENDIX: PRIMARY GUIDING DOCUMENTS

The following provides a summary for each of the primary guiding documents that were used to develop the recommendations for basic SMPs. The documents are listed in chronological order.

- EPA Prescribed Burning Background Document and Technical Information Document for Best Available Control Measures (450/2-92-003), NWCG Prescribed Fire Smoke Management Guide (1985), and NWCG Prescribed Fire Plan Guide (1986)
- EPA Natural Events Policy (May, 1996)
- EPA Interim Air Quality Policy on Wildland and Prescribed Fires (Interim Policy) (1998)
- WRAP Work Plan (1999)
- EPA Regional Haze Rule (1999)
- E/CR Wildland Smoke Management Program Survey (2001)

EPA's Prescribed Burning Background Document and Technical Information Document for Best Available Control Measures; NWCG's Prescribed Fire Smoke Management Guide and Prescribed Fire Plan Guide

Section 190 of the Clean Air Act as amended in 1990 required Reasonably Available Control Measures (RACM) for moderate PM₁₀ nonattainment areas and BACM for serious PM₁₀ nonattainment areas. The EPA issued technical guidance for RACM and BACM in 1992. While the guidance applies specifically to PM₁₀ nonattainment areas, in application it assists in the reduction of emissions from smoke in all areas.

EPA issued RACM technical guidance for prescribed fires through two Federal Register notices (57 FR 13541, April 16, 1992; 57 FR 18070, April 28, 1992). RACM are emission reduction measures that are considered reasonable considering technological feasibility and costs of control. In the notices, EPA directed regulatory authorities to utilize SMPs as described in the NWCG's *Prescribed Fire Smoke Management Guide* (1985) and *Prescribed Fire Plan Guide* (1986). The SMP would apply to moderate PM₁₀ nonattainment areas (and surrounding areas) where prescribed burning can or does contribute to PM₁₀ NAAQS violations. The NWCG 1985 guide is currently under revision and may become EPA's new revised BACM guidance.

In the Federal Register notice, EPA specifically directed states to develop SMPs that include:

- Smoke dispersion evaluations
- Burn planning, authorization, and administration
- Requirements to ensure burner qualifications
- Public education and awareness
- Surveillance and enforcement
- Emission inventories and emission efforts
- Regulatory authority oversight

The NWCG *Prescribed Fire Smoke Management Guide* includes three smoke management objectives: identify and avoid smoke-sensitive areas, reduce emissions, and disperse and dilute

smoke before it reaches smoke-sensitive areas. The main air quality regulatory goal is to prevent violations of the NAAQS and reduce the number of nuisance complaints from open burning. The guide describes advanced SMPs; smoke characteristics and emissions; and smoke management techniques, monitoring, and dispersion prediction. The NWCG *Prescribed Fire Plan Guide* is a collection of burn plan forms used by federal agencies.

EPA issued BACM guidance through Federal Register notices (57 FR 31477, July 16, 1992; 59 FR 49705, November 3, 1992; 59 FR 41998, August 16, 1994) and *Prescribed Burning Background Document and Technical Information Document for Prescribed Burning Best Available Control Measures* (1992). BACM apply to PM₁₀ serious nonattainment areas. BACM are defined as the maximum degree of emission reduction of PM₁₀ and PM₁₀ precursors taking into account energy, environmental, and economic impacts.

EPA's Natural Events Policy

In 1996, EPA developed the *Natural Events Policy* to address exceedances/violations caused by wildfires, high winds, and volcanoes. This document does not go into detail on smoke management plans nor does it address prescribed burning, but it was the guiding document in the development of EPA's Interim Policy because it is used to address PM exceedances and violations. EPA's Interim Policy was developed to address prescribed wildland fires.

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

EPA released the *Interim Air Quality Policy on Wildland and Prescribed Fires* in May 1998.² The objectives of the Interim Policy are to allow fire to maintain healthy wildland ecosystems and protect public health and welfare by mitigating the impacts on air quality (primarily PM₁₀ and PM_{2.5} NAAQS) and visibility. The Interim Policy was prepared with the help of a workgroup of stakeholders including federal and state land managers, state and local air quality managers, and tribal and environmental interests. It was also reviewed by the Federal Advisory Committee Act Subcommittee for Ozone, Particulate Matter, and Regional Haze Implementation.

The Interim Policy provides incentive for regulatory authorities to develop SMPs when fire emissions significantly contribute to air quality and visibility impacts. The Interim Policy establishes the basic components of an SMP:

- Authorization to burn
- Minimizing air pollutant emissions
- Smoke management components of burn plans
- Public education and awareness
- Surveillance and enforcement

² The Interim Policy does not address wildfire or burning at residential, commercial, or industrial sites. Wildfires are covered under EPA's *Natural Events Policy* (May 1996). The Natural Events Policy does not cover wildland or prescribed fires that, upon escape, are re-designated as wildfires.

- Program evaluation and reporting
- Optional air quality protection

It is recommended that states/tribes develop an SMP if 1) citizens increasingly complain of smoke intrusions, 2) the trend of monitored air quality values is increasing 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 Class I areas.

The Interim Policy directs state/tribal air quality managers, land owners/managers, and the public to collaborate in the development and implementation of SMPs. Developing an SMP can be voluntary or mandatory at the regulatory authority's discretion. A regulatory authority may certify to EPA in a letter that a basic SMP (as described in the Interim Policy) has been adopted and implemented. If a NAAQS violation is caused, or significantly contributed to, by wildland or prescribed fire emissions, under a certified state SMP, EPA has the discretion to not designate the area as nonattainment. If the area is already nonattainment, EPA has the discretion to not require a mandatory SMP. The EPA will require the regulatory authority to review the already-prepared voluntary SMP and make appropriate improvements. After three violations, however, EPA will require the regulatory authority to strengthen the SMP and make it part of the SIP. While a voluntary SMP could continue to be voluntary in the SIP, one option to strengthen the SMP would be to make it mandatory.

The EPA may revise the Interim Policy because a final Regional Haze Rule has now been issued. In addition, EPA is working with the USDA on recommendations for an equitable policy for agricultural burning. Draft recommendations were published in the Federal Register on September 18, 2000.

WRAP Work Plan

The objectives of a basic SMP, as identified in the Work Plan, are to ensure:

- No health-based NAAQS are exceeded
- Nuisance smoke is mitigated
- Smoke impacts on visibility are minimized in Class I areas and meet GCVTC recommendations

Basic SMP recommendations will cover prescribed fire, prescribed natural fire, and agricultural burning. *Wildland Fire: Elements of a Basic Smoke Management Program* addresses the first two. A separate document will address agricultural burning. At a minimum, a basic SMP should follow the guidelines set by the Interim Policy. States and tribes can use the recommendations to develop or revise their SMPs.

The WRAP Work Plan specifies that basic SMPs should, at a minimum, have the following elements:

- A requirement for annual burning plans
- A requirement for de minimis fire size to be included in burn plans
- A requirement that burn plans include acres to be burned, location, contacts, distance from smoke sensitive areas, and safety and contingency plans
- A requirement for burn accomplishment reports
- A tracking and archiving system
- Smoke dispersion evaluation guidelines
- A smoke effects monitoring system
- Training and education requirements for personnel
- Public education guidelines
- A schedule to evaluate and periodically update the SMP

To distinguish basic from enhanced SMPs, the WRAP Work Plan states that enhanced SMPs should have the same elements of basic SMPs, with the addition of the following elements at a minimum:

- An emissions tracking system for visibility impairing pollutants
- Accountable annual emissions goals
- Alternative management practices and accounting systems for non-burning activities
- Emissions reduction strategies
- Visibility impact monitoring
- Modeling to aid in reduction of visibility impacts in Class I areas
- Local and regional coordination of fire activity

All of the elements of the basic SMP will be elements of enhanced SMP; therefore, a natural progression exists in the development of the basic SMP to enhanced SMP. Another significant difference between the two programs will be the level of effort toward the elements that are found in each program. For example, surveillance and monitoring will be required in both programs. In the basic SMP, the level of effort for this element may include only a site inspection and visual monitoring of the smoke plume. In the enhanced SMP, the level of effort may include a conducting a site inspection, having a burn plan on site, having a certified burner conduct the burn, and conducting continuous emission monitoring.

EPA's Regional Haze Rule

Background

The Regional Haze Rule was proposed in 1997, signed on Earth Day, 1999, and promulgated on July 1, 1999.

The Federal Clean Air Act amendments of 1977 required the EPA to establish requirements for meeting the national visibility goal to prevent any future and remedy any existing human-caused visibility impairment in the nation's 156 Class I areas. In 1980, the EPA promulgated phase I visibility requirements that address reasonably attributable visibility impairment or "plume

blight." The Regional Haze Rule promulgates phase II visibility requirements that address regional haze visibility impairment.

Unlike the phase I visibility requirements which only applied to states with Class I areas, the Regional Haze Rule applies to all states. Each state must develop State Implementation Plans, in coordination with other states and federal land managers, to address regional haze visibility impairment in any Class I area (within and/or outside the state).

There are two main sections of the Regional Haze Rule: Parts 51.308 and 51.309. While all states can follow Part 51.308, only the GCVTC transport region states (Arizona, California, Colorado, Idaho, Nevada, New Mexico, Oregon, Utah, Wyoming) have the option to follow Part 51.309. Following Part 51.309 will carry GCVTC transport region states up to 2018.

Part 51.308: States must set reasonable progress goals for visibility improvement that will achieve natural conditions in all Class I areas by 2064 (or later if slower progress is found to be reasonable). The first SIP revisions are due between 2004 and 2008 (later dates will apply if states commit to regional planning). Periodic reviews would be due every five years and comprehensive reviews every 10 years. Strategies must include Best Available Retrofit Technology (BART) for major stationary sources built between 1962-1977, or an alternative market trading program.

Part 51.309: This part specifically addresses visibility impairment in the 16 Class I areas on the Colorado Plateau. WRAP submitted an annex for the Regional Haze Rule to EPA as required by Part 51.309 on September 29, 2001 that: (1) set stationary source SO₂ emission milestones for 2003, 2008, 2013, and 2018; and (2) documented a backstop market trading program. The first SIP revisions are due December 31, 2003 and periodic reviews are due every five years thereafter until 2018. SIPs must include specific provisions for Clean Air Corridors, stationary sources, mobile sources, fire programs, road dust, and pollution prevention. The option for additional Class I area (other than the 16 Colorado Plateau Class I areas) SIPs differs little from Part 51.308 except that the first SIP revisions are due no later than December 31, 2008 (rather than anywhere between 2004 and 2008) and BART implementation may not be required.

Fire-Related Provisions of the Regional Haze Rule

Regional Haze Rule Preamble

Part 51.308: States must address fire emission contribution to "man-made" and natural background conditions. States can consider some portion of prescribed fire as "natural" in determining natural background for a Class I area. Fire emissions can be substantial over short-term periods but are a minor contributor to long-term averages. Where smoke is found to be an important contributor to regional haze, smoke management programs should be key components of regional haze planning and strategies. States may want to consider the strategies for fire as laid out in Part 51.309 (emissions tracking, emission goals, smoke management programs, alternatives).

Part 51.309: The Preamble summarizes the fire provisions included in Part 51.309 (reproduced below). "Most importantly, the rule requires the establishment of enhanced smoke management programs for fire ... based on criteria of efficiency, economics, law, emission reduction opportunities, land management objectives, and reduction of visibility impacts." The EPA believes the rule allows states to develop smoke management programs that minimize visibility impacts but also fully recognize the ecological role of fire.

Part 51.308

Part 51.308(d)(3)(v)(E) provides the only specific fire-related provisions:

(d)(3) Long-term strategy for regional haze.

(v) The State must consider, at a minimum, the following factors in developing its long-term strategy:

(E) Smoke management techniques for agricultural and forestry management purposes including plans as currently exist within the State for these purposes;

Part 51.309

Parts 51.309(b)(4) and (d)(6) provide very specific fire-related provisions:

(b) Definitions. For the purposes of this section:

(4) Fire means wildfire, wildland fire (including prescribed natural fire), prescribed fire, and agricultural burning conducted and occurring on Federal, State, and private wildlands and farmlands.

(d) Requirements of the first implementation plan for states electing to adopt all of the recommendations of the Commission Report.

(6) Programs related to fire. The plan must provide for:

(i) Documentation that all Federal, State, and private prescribed fire programs within the State evaluate and address the degree visibility impairment from smoke in their planning and application. In addition the plan must include smoke management programs that include all necessary components including, but not limited to, actions to minimize emissions, evaluation of smoke dispersion, alternatives to fire, public notification, air quality monitoring, surveillance and enforcement, and program evaluation.

(ii) A statewide inventory and emissions tracking system (spatial and temporal) of VOC, NO_x, elemental and organic carbon, and fine particle emissions from fire. In reporting and tracking emissions from fire from within the State, States may use information from regional data-gathering and tracking initiatives.

(iii) Identification and removal wherever feasible of any administrative barriers to the use of alternatives to burning in Federal, State, and private prescribed fire programs within the State.

(iv) Enhanced smoke management programs for fire that consider visibility effects, not only health and nuisance objectives, and that are based on the criteria of efficiency, economics, law,

emission reduction opportunities, land management objectives, and reduction of visibility impact.

(v) Establishment of annual emission goals for fire, excluding wildfire, that will minimize emission increases from fire to the maximum extent feasible and that are established in cooperation with States, tribes, Federal land management agencies, and private entities.

E/CR Wildland Smoke Management Program Survey

The WRAP's Fire Emissions Joint Forum contracted with EC/R Incorporated, Chapel Hill, North Carolina, to conduct a wildland smoke management program survey in the United States. The contractor submitted a questionnaire to state/local agencies in the western U.S. and some other areas. The contractor compiled the information and submitted the final product to the Western Governors Association through the Fire Emissions Joint Forum. The survey was very useful for this task since it contained the latest elements used by regulatory authorities in their smoke management programs.