

ALASKA ENHANCED SMOKE MANAGEMENT PLAN

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1. EXECUTIVE SUMMARY

The Alaska Department of Environmental Conservation (DEC) in coordination with the Alaska Wildland Fire Coordinating Group (AWFCG) has led the development of Alaska's Enhanced Smoke Management Plan (ESMP). The ESMP and accompanying volume of appendices has been adopted by DEC and participating Wildland owners and managers through a Memorandum of Understanding (MOU).

The ESMP helps fulfill Alaska's responsibilities for protection of air quality and human health under federal and state law and reflects the Clean Air Act requirement to improve regional haze in Alaska's Class I areas. The Regional Haze Rule requires that visibility at Class I areas be returned to natural background conditions by 2064. As Alaska develops its State Implementation Plan (SIP) for regional haze, plan updates may be necessary to address additional fire tracking and emission management needs based upon policies and guidelines developed by the Western Regional Air Partnership. The updated ESMP will be incorporated into Alaska's regional haze SIP. DEC welcomes the participation of AWFCG agencies and the public in the process to improve the document.

Under state regulation all agencies, corporations and individuals that burn areas larger than forty acres of land a year, whether slash or *in situ*, require a controlled burn approval application and written approval from DEC. The ESMP outlines the process and identifies issues that need to be addressed by DEC and land management agencies or private landowners / corporations to help ensure that prescribed fire (e.g. controlled burn) activities minimize smoke and air quality problems. Adoption of this document enables the State to certify to the U.S. Environmental Protection Agency (EPA) that we are implementing a smoke management plan which addresses elements of the EPA's Interim Air Quality Policy on Wildland and Prescribed Fire, April 23, 1998 (EPA's Interim Policy). If states do not certify that a basic smoke management plan is being implemented, EPA will not provide special consideration to particulate matter health standard violations attributed to fires managed for resource benefits. According to EPA's policy, a state adopted ESMP enables EPA to use its discretion in deciding to reclassify an area as non-attainment when fires cause or contribute to particulate matter air quality violations. If EPA does reclassify an area, then states need to review the adequacy of their ESMP to make appropriate improvements in cooperation with Wildland owners/managers.

The ESMP provides accurate and reliable guidance and direction to and from not only the fire authorities who use prescribed fire as a resource management tool, but also to the private landowners and/or corporations who conduct land clearing burns. This ESMP describes and clarifies the relationship between fire authorities and DEC. These agencies must work together effectively to combine planned burning, resource management and development with smoke, public health and Class I area visibility goals.

The ESMP Appendices provide additional assistance for interagency sharing of information, the applicability and availability of current smoke management techniques, monitoring protocol, public education strategies, and emission reduction techniques. The ESMP Appendices include up-to-date techniques and tools (e.g. monitoring equipment, modeling, emission factors) available through the Western Regional Air Partnership (WRAP) and member organizations tasked with assisting states, tribes and land managers with smoke management.

Alaska's ESMP will be evaluated annually by the AWFCG and interested parties and revised at least every 5 years in accordance with EPA's Interim Policy on Wildland and Prescribed fires. The ESMP companion appendices will be updated as new information becomes available, but not more often than once a year.

2. GUIDELINES, MEMBERSHIP CRITERIA, AND RESPONSIBILITIES

2-1. Alaska Wildland Fire Coordinating Group (AWFCG)

The AWFCG (Appendix A), formed in 1994 through the consolidation of the Alaska Multi-Agency Coordinating Group and the Alaska Interagency Fire Management Council, provides a forum that fosters cooperation, coordination and communication for Wildland fire and for planning and implementing interagency fire management statewide. The AWFCG membership includes State, Federal and Native land management agencies/owners that have fire management responsibilities for the lands they manage/own.

One of the objectives of the AWFCG is to provide a forum for anticipating smoke intrusions, resolving on-going smoke management issues, and improving smoke management techniques. Another objective is to ensure that prescribed fire, as a tool to reduce risk and/or future smoke emissions, is considered by DEC when promulgating policy, procedures and regulations.

The AWFCG established committees and workgroups to address specific issues. Since smoke management is a critical and continuous issue in statewide fire management, the AWFCG established the Smoke Management / Air Quality Committee. The purpose of the committee is to address the AWFCG smoke management objectives and assist DEC with the development and revision of the Alaska Enhanced Smoke Management Plan (ESMP) for Prescribed Fire and propagation of policies, procedures and regulations related to smoke management. AWFCG members may provide representatives to serve on the Smoke Management / Air Quality Committee. Participation is not mandatory.

The DEC representative serves as Committee Chair. Each agency/organization representative is the point of contact for communicating information between the Smoke Management / Air Quality Committee and their agency/organization. The agency/organization representatives are responsible for assisting agency/organization personnel with pre-season permit applications and post-season reporting. The Smoke Management / Air Quality Committee was established through a charter with the AFWCG.

Committee members will:

- Represent an AWFCG member.
- Have the authority to speak for their agency or organization on fire and smoke management issues.
- Promote good smoke management practices, alternative methods to burning and emission reduction techniques.
- Disseminate smoke management information to agency/organization personnel, thereby keeping employees informed of the requirements and procedures of the ESMP.

- Attend Smoke Management / Air Quality Committee meetings as scheduled and assist with accomplishing committee objectives/assignments.

The responsibilities of the Smoke Management / Air Quality Committee include assisting in development of the ESMP and annually reviewing the effectiveness of the plan. In addition, the Regional Haze Rule requires five year progress reports to EPA describing how well the Enhanced Smoke Management Plan is being implemented as needed to meet reasonable further progress requirements.

The following elements of the ESMP will be reviewed during annual evaluations:

- Implementation
- Burn activity summaries
- Smoke complaint summaries
- Compliance and enforcement
- Progress towards goals including visibility improvement/impact reduction
- Scientific and technological advancements
- Sections needing clarification and improvement
- Recommendation for revisions

Changes to DEC's open burning regulations (DEC 18 AAC 50) may occur if DEC deems it necessary. All changes to state regulations must follow standard procedure, including public comment periods. Regulatory changes that affect prescribed burning in the state will be done in coordination with the AWFCG members and any other affected parties. It will be up to DEC to ensure that stakeholders are informed of any anticipated changes. The current DEC Open Burning Policy and Guidelines is contained in Appendix B. Changes to the ESMP MOU document can only be made after contacting each signatory in writing.

2-2. Responsible Authority for the Burn

The Responsible Authority is the individual who is primarily responsible for a Controlled Burn for Resource Management (prescribed burn) or Controlled Burn for Land Clearing and ensures the conditions of the permit are met. Prescribed and land clearing burns require written DEC approval before starting the burn if the intent is to burn, or clear and burn 40 acres or more during a year. The Responsible Authority submits the finalized Prescribed Burn or Land Clearing application to DEC. This person may also collect, review, and distribute any pre- and post-burn information to DEC. The Responsible Authority should be identified in the prescribed burn or land clearing burn approval application. The Responsible Authority is often the one who conducts public meetings and has the greatest ability to interact with the public and local authorities on prescribed burning activities in their area.

To obtain valid Controlled Burning for Resource Management and Controlled Burning for Land Clearing Approvals from DEC prior to each permitted ignition, the Responsible Authority must submit a controlled burn approval application to DEC containing the 15 elements listed in Section 3 of this document. Controlled burning for Resource Management and Controlled Burning for Land Clearing approval applications must include a section on smoke management contingencies that discuss actions to be taken in the event of smoke intrusions. The controlled burn approval for resource management (prescribed burns) or land clearing burns received from DEC will contain conditions to be met by the Responsible Authority. The Responsible Authority

must call and notify the DEC by telephone by noon the business day prior to any planned burn, Monday through Friday between 8:00 a.m. and 4:30 p.m. excluding State holidays. Call the number listed in the Open Burn Approval Letter.

The person calling must provide the following information:

1. Controlled Burn Approval number;
2. Authorized Agency Name;
3. Burn Location;
4. Burn Date(s);
5. Contact Name During Burn;
6. Contact Telephone Number;
7. Description of proposed Test Burn (prescribed and land clearing only);
8. Estimated Duration of Active Firing (ignition) Phase (prescribed burning only);
9. Estimated Duration of the Smoldering Phase (prescribed burning only);
10. Description of Pre-Burn Public Notices - when, in what publications, radio, etc.;
11. Consideration of weather forecast and air quality advisories in area of burn - Did contact person check the weather forecast for stagnant air conditions? Did contact person confirm there are no Air Quality Advisories in area of burn?

DEC staff will verify the burn approval is current and send an email message with the eleven elements to the appropriate DEC controlled burn application personnel and air monitoring personnel.

The final responsibility for ensuring the conditions of the burn approval permit are met rests with the Responsible Authority. On the burn day, the Responsible Authority must check restriction/no restriction information from the DEC Air Quality Air Advisory web site:

http://www.dec.state.ak.us/air/am/aq_sr.htm.

<http://dec.alaska.gov/Applications/Air/airtoolsweb/Advisories> (updated 1FEB13). The Responsible Authority should curtail burning if, in their opinion, they are not getting adequate smoke dispersion or if local weather factors are such that smoke problems could result. The Responsible Authority communicates any potential or existing smoke problems to the DEC Meteorologist at, 907-269-7676 (primary); or call 907-269-6249, (secondary), and handles local coordination, local problem-solving and local communication within the area affected by smoke intrusions. The Responsible Authority may request monitoring assistance, if necessary. DEC will work with the Responsible Authority to provide monitoring assistance, if requested (see "Emergency Monitoring Policy," Section 5-3).

2-3. DEC Smoke Management Program

The purpose of the Enhanced Smoke Management Plan (ESMP) is to provide a clear and equitable regulatory basis for smoke management in Alaska. DEC is responsible for protecting the health and welfare of Alaskans from the impacts of smoke from fire as well as protecting visibility according to federal Regional Haze Rules. The ESMP assists DEC in meeting these requirements. In order to ensure the ESMP is successful the DEC is responsible for the following:

- Development and implementation of the ESMP;

- Reviewing controlled burn for resource management and controlled burn for land clearing approval applications and issuing controlled burn approvals;
- Ensuring controlled burn approval applications comply with state air quality regulations (18 AAC 50.065) and ESMP guidelines;
- Collecting, reviewing, tracking, and summarizing statewide pre- and post-burn data for annual ESMP emission inventory reports to be distributed to AWFCG, EPA, and the Western Regional Air Partnership (WRAP). This activity will require annual assistance from the Alaska Interagency Coordination Center at the end of the fire season. General information will be compiled from the AICC website at <http://fire.ak.blm.gov/>. Specific information required for compiling an electronic version for the annual emission inventory report can be obtained by calling AICC at (907) 356-5671;
- Ensuring that field oversight and enforcement is conducted and is uniformly applied;
- Coordinating with the Smoke Management Committee members to establish and facilitate support for smoke management techniques and mitigation strategies within the program;
- Ensuring that the ESMP is understood and communicated to all land management agencies and the AWFCG; and
- Facilitating Smoke Management Committee meetings to evaluate the program effectiveness, review policies, discuss new smoke management methods, and help solve agency smoke management issues.

The DEC staff will notify health authorities, news media, the public-at-large, land management agencies and all other appropriate agencies when unacceptable limits of smoke accumulation are approached or exceeded. DEC staff will restrict implementation of controlled burn approval for resource management and controlled burn for land clearing permits in specific areas, request burn suppression actions, or request burn bans/restrictions when meteorological and/or existing air quality conditions so warrant (i.e., if weather forecasters predict undesirable wind conditions and smoke drifting into sensitive areas).

3. OPERATIONS AND AUTHORIZATION TO BURN

3-1. Smoke Management

This section is designed to give guidance on preparing smoke management information for the controlled burn for resource management and controlled burn for land clearing approval applications. Consideration of smoke management is a critical component of every controlled burn approval application. This is important for meeting public health, welfare and Class I area visibility goals as well as coordinating smoke management that may affect other burning in the area. These goals are discussed further in Section 5-1.

Evaluating potential dispersion of smoke emissions from a project is the single most important component of an effective ESMP. Land managers/owners may use a variety of evaluation methods for small projects that will not impact any sensitive features or where potential impacts are easily monitored and mitigated. For large projects, state-of-the-art tools exist to evaluate potential impacts.

DEC evaluates the controlled burn for resource management and controlled burn for land clearing approval applications for the potential of the project to contribute to unacceptable smoke impacts or particulate levels on smoke sensitive features. DEC is responsible for evaluating the cumulative impacts of multiple projects and authorizing only as many projects as the airshed can handle. If during the controlled burn approval process several individual projects request ignition at close time intervals, attempts will be made to ensure the agencies and/or landowners involved coordinate ignition times to minimize smoke impact.

When scheduling a burn and ignition time, the Responsible Authority must consider existing air quality, meteorological, and environmental conditions to evaluate smoke dispersion. The potential effects of multiple burn days, multiple ignitions and residual smoke must be evaluated prior to ignition or any new ignition.

Controlled burns (prescribed burns and land clearing burns) and ignition of controlled burns will only be conducted when favorable dispersion conditions exist. The Responsible Authority should obtain wind forecasts from the National Weather Service (NWS) forecasters for wind speed and direction estimates for the burn, an estimate of mixing heights, and residual smoke behavior on the night following the burn. The NWS forecast for smoke dispersion will generally integrate all pertinent weather information such as the timing of expected weather changes that may affect smoke dispersion. Your prescribed burn approval conditions may require a pre-burn meteorological conference (METCON) between your fire weather team and DEC's meteorologist prior to ignition.

After ignition, if meteorological conditions change and smoke impacts sensitive features, technologically feasible and economically and environmentally reasonable actions must be taken to mitigate impacts.

Smoke Management Techniques.

Below are some examples of smoke management techniques the Responsible Authority should consider to minimize emissions and smoke impacts:

- Use of ventilation factors, up-to-date weather data, weather forecasts
- Appropriate modeling with accurate weather data and emission factors
- Scheduling burns to use weather fronts bringing rain/snow to assist with minimizing air quality impacts when appropriate
- Burning when fuel moistures are low enough to prevent excessive smoldering
- Reference historic (e.g. over the last 10 years) emissions from burns in the area
- Emission projections based on sound data/science
- Identification of smoke sensitive features/receptors, and burning at times when wind direction and dispersion will mitigate impacts to sensitive features
- Visual observations
- Monitoring
- Test burns (small piles or representative areas)

3.2 Elements of Controlled Burn for Resource Management and Controlled Burn for Land Clearing Approval Application

Prior to each planned burn that requires DEC's approval (land management agency or landowner / corporation intends to burn, or clear and burn 40 acres or more during a calendar year), the Responsible Authority will submit their controlled burn approval application for controlled burning for resource management or controlled burning for land clearing (Appendix C) to DEC. Each controlled burn approval (Appendix C) will expire on December 31st of the year it was issued. Each agency or landowner may use its own established format instead of the DEC application, but each controlled burn approval application submittal must contain the following information for each planned ignition/burn unit:

1. Indicate the location, duration, and inclusive dates considered for the burn:

Provide a legal description or latitude and longitude of the location to be burned and the expected duration of both single events and the entire burning project. Minor changes or additional information for the burn plan can be discussed at the time of DEC notification by phone. At a minimum, the applicant is required to call DEC by noon at least one working day prior to ignition. Call the number listed in the Open Burn Approval Letter.

2. Identify the location of all sensitive features that might be impacted by smoke:

The Responsible Authority should identify on a map all Sensitive Features which include population centers such as communities, cities, towns, hospitals, health clinics, nursing homes, schools (in session), camp grounds, numbered Alaska highways and roads, airports, Prevention of Significant Deterioration Class I Areas, where smoke and air pollutants can adversely affect public health, safety, and welfare.

3. Indicate how the public will be informed prior to, during, and after the burning:

The best way to avoid complaints is to make sure everyone around the burn area knows when the burn will occur so they can take steps to avoid the smoke. The Responsible Authority's local contact phone number should be publicized so the public can contact you. The public must be notified at least three days prior to the anticipated burn through the local news media or the local Post Office.

4. Indicate how you will coordinate with other concerned agencies, including the Responsible Authorities of sensitive features:

Indicate how you will notify all concerned agencies, including authorities in control of sensitive features identified in Item 2 (such as the FAA, State Troopers, military, fire department, adjacent land managers, etc.) who are potentially affected by impaired visibility or adverse smoke impacts, prior to ignition. Include a list of telephone numbers or email addresses of agencies that must be contacted prior to ignition.

The Department of Natural Resources, Division of Forestry (DOF) also issues burn permits; contact DOF to determine what requirements apply.

5. Indicate the source of the weather forecast and how it will be used to prevent smoke impacts:

Identify how the local and spot weather forecast will be obtained (e.g. through the NWS) prior to ignition of the controlled burn. Parameters that should be obtained are the predicted visibility, dispersion conditions, wind direction, and wind speed.

6. Indicate how weather changes will be monitored and what will be done to reduce or mitigate smoke impacts if unfavorable weather should occur after ignition:

Indicate how the weather will be monitored throughout the controlled burn. Identify what you will do if a wind shift or other weather change begins to create an adverse smoke impact on sensitive features identified in Item 2. For example, if an inversion is expected to occur during the night, active ignitions could be ceased.

If any safety hazard is present as a result of smoke, or if requested by the authority of a sensitive feature, you must take technologically feasible and economically and environmentally reasonable steps to mitigate smoke impacts.

7. Indicate what will be done to validate predicted smoke dispersion:

Indicate how you will predict smoke dispersion. If a recommended method (test fire, small piles or areas etc.) fails to indicate that acceptable smoke dispersion will occur, no fires will be ignited.

8. Indicate proposed techniques to be used to enhance the active fire phase and reduce the smoldering phase:

Consider employing emission reduction techniques (Appendix D) to enhance the active fire phase and reduce smoldering, and indicate what is feasible to accomplish the burn objectives.

9. Indicate how authorities in control of sensitive features will be contacted if visibility decreases:

Provide a contingency plan (Appendix E) for smoke intrusion into populated areas, Class I areas, or other smoke sensitive features as notified in Item 2. Authorities having control over sensitive features identified in Item 2 must be notified if visibility is expected to be decreased to less than three miles for an hour. Indicate how you will notify authorities of sensitive features if this occurs. If any safety hazard is present, or if requested by the authority of a sensitive feature, you must mitigate impacts through steps that are technologically feasible and economically and environmentally reasonable. Contingency or emergency monitoring may be needed to measure and detect smoke intrusions on sensitive features.

10. Identify alternative disposal options for material being controlled burned:

An evaluation of alternatives to controlled burning (Appendix F) must demonstrate that controlled burning is the only technologically feasible and economically and environmentally reasonable alternative. Identify other alternative disposal options for material burned or why burning is the selected alternative (e.g. marketing timber with a

lumber company) and why the alternatives were not used; or list any alternatives to burning that have been done to the burn units prior to ignition.

11. Indicate how you will coordinate with air quality authorities having jurisdiction:

At a minimum, notify DEC by telephone by noon one business day prior to ignition. Call the number listed in the Open Burn Approval Letter. Include the 11 items in Section 2.2. If a multiple day burn is planned, the responsible authority need only call before the first ignition day. A call to DEC after a multiple day burn is completed is requested. If the burn is not conducted, please notify DEC within 24 hours to schedule a new burn date.

12. Indicate the type of vegetation to be burned, pre-burn and post-burn fuel loading estimates and ignition technique to be used.

Pre-burn fuel loading represents the amount of fuel present at the burn location (to be consumed) and should be expressed as the weight of fuel per unit area in tons per acre. The post-burn loading estimate represents the fuel remaining after the burn. The ignition technique should describe the method (e.g. hand ignition – drip torch, helitorch) and technique (e.g. strip head fire, backing fire, etc.)

13. For prescribed fires, indicate whether the fire is considered “anthropogenic” or “natural”. Note: Land clearing burns will be considered “anthropogenic.”

The WRAP document, “Policy for Categorizing Fire Emissions” explains what is considered a natural source of fire and what is considered a human-caused source. This document is available at: <http://www.wrapair.org/forums/fejf/docs.html>

14. Provide the approximate emissions expected for each burn and method used to estimate. Note: Emission estimates for Land Clearing Burns will be calculated by DEC.

Emissions can be estimated by multiplying the amount of fuel consumed (usually expressed in tons), by an emission factor expressed in pounds per ton of fuel. Emission factors can be found on EPA’s website at <http://www.epa.gov/ttn/chief/ap42/ch13/>. Other emission factors or methods may also be used, including, but not limited to: CONSUME, FEPS, FOFEM, PFEP, and SASEM (Appendix D).

15. Air monitoring to be conducted.

Identify how the burn may affect / potentially impact air quality at smoke sensitive features, and how the visibility in Class I areas will be monitored (Appendix G). If the burn will not adversely affect visibility in a Class I area, state that there is low potential of the burn impacting visibility in a Class I area and that monitoring will not be conducted.

Items one through eleven are required in an open burning application under existing DEC regulation (Appendix B); items twelve through fifteen are elements that are necessary for managing smoke and developing and tracking emission inventories for regional haze.

3-3. Post-burn Reporting.

After each burn, the Responsible Authority will submit a post burn report to the DEC within 90 days. The Responsible Authority must maintain a copy of the application and post burn report. A post-burn report must include the following information:

- **Authorized agency and approval number.**
- **Date of burn(s).** Actual dates of the burn (ignition, active burning, and smoldering phases).
- **Burn location.** Latitude and longitude of center of burn area, along with map showing burned area.
- **Area of burn.** The entire burn unit less any unburned inclusions (Estimate in acres).
- **Fuel type(s).** The fuel type optimally represents the predominant fuel or cover type consumed in the fire (e.g. Sitka spruce). Specify CFDR/NFFL and descriptive model.
- **Pre-burn fuel loading information.**
- **Fuel consumption.** The amount of fuel actually consumed expressed in tons/acre (pre-burn fuel loading data is acceptable if actual numbers can not be determined).
- **Predominant configuration of the fuel burned,** e.g., pile, windrow, broadcast, underburn.
- **Emission reduction techniques used.** Describe any burning techniques applied that reduced the actual amount of emissions, for example, changing ignition timing to allow for more efficient combustion.
- **Type of Burn.** “Anthropogenic” or “natural” classification (see glossary/Appendix). All controlled burns for land clearing are considered human-caused or anthropogenic.
- **Verification of weather forecasts and air quality advisory status** for the event date(s).
- **Description of public notifications made.**
- **Public complaints (if any).**

4. BURN RESTRICTIONS DUE TO AIR QUALITY CONCERNS

When DEC issues burning restrictions based on air quality concerns in any part of the state, all AWFCG members will be notified as soon as possible. If there is residual smoke in the area, it is the responsibility of the Responsible Authorities to contact DEC and check the DEC Air Advisory web site (http://www.dec.state.ak.us/air/am/aq_sr.htm) {updated 1FEB13}

(<http://dec.alaska.gov/Applications/Air/airtoolsweb/Advisories>) prior to a scheduled burn to determine if a restriction is pending or in effect. Local government agencies and the Division of Forestry also need to be contacted to verify there are no open burning restrictions.

DEC Burn Restrictions can be issued as follows:

- Statewide;
- By airshed(s);
- By proximity to smoke sensitive feature;
- By DEC authority (18 AAC 50.245); or
- Any combination of the above.

Any restrictions will be based on local observations and available monitoring and meteorological data. Generally, restrictions due to poor air quality are in effect for 24 hours, although 3 day and weekend forecasts will be made. DEC encourages Responsible Authorities to restrict conducting prescribed burn projects on holiday weekends near sensitive areas or areas with high recreation use. The Responsible Authority should contact DEC if they wish to burn during holidays so that adequate contingencies are in place to manage any smoke intrusions.

The final responsibility for smoke management in the locality of the prescribed burn rests with the Responsible Authority who is conducting the burning. The Responsible Authorities are expected to mitigate smoke by choosing optimal times and weather conditions that meet the needs of the prescribed burn and also minimizes smoke intrusions if, in their opinion, they are not getting adequate smoke dispersion, or if local weather factors or topographical features are such that smoke problems could result. Conversely, if local weather conditions appear to be more favorable for burning than what was forecast, Responsible Authorities should contact DEC to discuss options.

Prescribed burn ignitions should not occur if:

- An Air Quality Advisory is in place for areas that could be impacted by the burn;
- Air quality is deteriorating and is expected to continue to deteriorate;
- There is a high probability that a significant amount of smoke will intrude into "sensitive features";
- The burn will not comply with the Alaska State Implementation Plan (SIP) or the federal Clean Air Act regarding visibility protection of Class I federal areas (Appendix H);
- Any state or federal air quality standards, regulations, laws, or rules would be violated; or
- Air quality is deteriorating and is expected to continue to deteriorate which may result in an Air Quality Episode (Appendix I) being declared in the next 24-hour period. Additional ignitions will be denied until conditions improve in the area.

5. AIR QUALITY MONITORING.

5-1. Visibility and Regional Haze Goals.

All states must develop programs to make "reasonable progress" toward meeting the visibility goals in designated Class I areas as part of their air quality State Implementation Plans (SIPs). Alaska has four Class I areas: Denali National Park & Preserve, Tuxedni Wilderness Area, Simeonof Wilderness Area, and Bering Sea Wilderness Area (Appendix H). The DEC has the primary responsibility for SIP development and is currently in the process of determining Alaska's rate of progress toward meeting visibility goals.

5-2. Ambient Air Monitoring.

"Ambient air monitoring" within the context of the ESMP refers to air quality monitoring conducted as a consequence of wildfire activity or in support of prescribed fire activities. All monitoring should be performed with DEC approved air monitoring samplers using standard operating procedures for monitor operation, data collection and QA/QC. Samplers should be placed outside of the fire zone in a location which is representative of a smoke sensitive area, such as a hospital or health clinic.

Monitor site placement depends on the meteorology (primarily wind direction), area topography and the relationship of the smoke/airshed to the populated area. Monitoring may require the deployment of several samplers. Example: a land management agency is planning a large prescribed burn in fuels within the management area. The closest community is fifteen miles away. Weather forecasts indicate that the winds could blow toward the town; therefore, a monitor should be placed in or near the community.

In all monitoring site-placement, the focus is protection of public health. The DEC Monitoring and Quality Assurance Program may be requested to work with the Responsible Authority to identify appropriate monitoring sites. Time and materials fee or a reimbursement agreement with DEC will be necessary.

5-3. Smoke Monitoring Policy.

The DEC is willing to work with land managers or land owners to assess smoke impacts and protect public health through ambient air monitoring assistance. While DEC does not have funding to support prescribed fire activity, the air monitoring section does have trained staff who could be mobilized to support a fire event by evaluating smoke impacts or monitoring air quality for prescribed burns. Funding agreements will be necessary for DEC to support monitoring.

Emergency response air monitoring support from DEC has been utilized once before on the Carla Lake Fire. With newer and more portable real-time monitors, the ability to monitor smoke impacts has become easier and more accurate.

6. AIR QUALITY COMPLAINT PROCEDURES.

6-1. General Procedures

There may be occasional intrusions of smoke into smoke sensitive areas. The Responsible Authority and the DEC are responsible for complaint processing and smoke-intrusion reporting. Documentation of such occurrences will improve future prevention measures and properly inform responsible officials and the public.

The nature of the complaint will determine what procedure is to be followed to address the complainant. Every attempt should be made to resolve the complaint at the lowest possible level. Any agency or landowner receiving complaints should handle the initial situation if they are knowledgeable of the ESMP or the specific burn and should learn as much information about the burn as possible in order for proper follow-up to take place.

Complaints can come in several forms. Historically, complaints have been received from the public at large where the basis for the complaint is an objection to seeing smoke, smelling smoke, and health concerns because of smoke. Local explanation of the program and resolution of the caller's concerns will often solve the problem. If an AWFCG member receives the call they should explain the purpose and basis for the ESMP in order to inform the caller that a control program is in place in Alaska.

The following information needs to be collected in order for the organization / landowner to take proper and necessary follow up actions. Information to be collected includes:

- Name and phone number of the caller
- Location of the burn (include best estimate of burn location / direction of smoke)
- Time of day
- Any other comments that will aid in the follow up process (e.g. people see and / or smell smoke, etc.)

The Responsible Authority should forward any complaints received to DEC with their post-burn report or when requested by DEC. If another AWFCG member receives a smoke complaint, it will be forwarded to the appropriate agency representative (usually the Responsible Authority or DEC) as soon as possible. If a smoke complaint on a land clearing burn is received by an AWFCG member, the complaint will be forwarded to DEC as soon as possible. DEC will immediately forward complaints it receives to the Responsible Authority for resolution if the complaint information suggests a prescribed burn is conducted during a restricted period or if smoke dispersion is less than adequate for the burn.

DEC will log all complaints received into the DEC Complaint Automated Tracking System (CATS). For each complaint received by the Responsible Authority and DEC, pertinent data will be recorded along with the final resolution or actions taken to address the complaint. This information may be valuable for contacting community residents prior to future planned burns.

6-2. Public Notification and Exposure Reduction

If smoke impacts develop and it becomes necessary to issue air quality notices (e.g. advisories, alerts, warnings, or emergencies), DEC and the Responsible Authority will cooperatively determine a course of action. According to 18 AAC 50.245, the DEC will, in its discretion, declare an air episode (Appendix I) and prescribe and publicize protective actions when the concentration of an air contaminant in the ambient air has reached, or is likely in the immediate future to reach, any of the concentrations established by the National Ambient Air Quality Standards (NAAQS). The concentrations are $150 \mu\text{g}/\text{m}^3$ of particulate, PM_{10} (24-hour average).

Air Episodes for PM_{10}	
Episode Level	PM_{10} Level
Advisory	No monitored data available; qualitative based on smoke impact observations and meteorological conditions.
Alert	$150 \mu\text{g}/\text{m}^3$
Warning	$350 \mu\text{g}/\text{m}^3$
Emergency	$420+ \mu\text{g}/\text{m}^3$

Federal standards for $\text{PM}_{2.5}$ are in place; however, Alaska has not yet adopted these standards in regulation. The federal 24-hour health standard for $\text{PM}_{2.5}$ is $35 \mu\text{g}/\text{m}^3$. Prior to Alaska regulations being finalized, the $\text{PM}_{2.5}$ levels delineated in the Air Quality Index Chart (below) will be used for public notification and exposure reduction. The chart lists the levels proposed by EPA and cautionary statements for each level. This chart will be updated when Alaska's $\text{PM}_{2.5}$ regulations are final.

AQI Index Value	AQI Categories	AQI Cautionary Statements	24 Hour Particulate Level ($\mu\text{g}/\text{m}^3$)
0 - 50	Good	None	0 - 15.4
51 - 100	Moderate	Unusually sensitive people should consider reducing prolonged or heavy exertion.	15.5 - 35.4
101 - 150	Unhealthy for Sensitive Groups	People with respiratory or heart disease, the elderly and children should limit prolonged exertion.	35.5 - 55.4

151 - 200	Unhealthy	People with respiratory or heart disease, the elderly and children should avoid prolonged exertion; everyone else should limit prolonged exertion.	55.5 - 150.4
201 - 300	Very Unhealthy	People with respiratory or heart disease, the elderly and children should avoid any outdoor activity; everyone else should avoid prolonged exertion.	150.5 – 250.4
Over 300	Hazardous	Everyone should avoid any outdoor exertion; people with respiratory or heart disease, the elderly and children should remain indoors.	over 250.5

The DEC will follow the AQI levels and will call air quality advisories when levels reach the AQI category of ‘Unhealthy for Sensitive Groups;’ ; i.e., when levels exceed or are expected to exceed the NAAQS for PM_{2.5}. If the DEC declares an advisory, the DEC will request voluntary emission restrictions from any permitted activity that might impact the area subject to the advisory, and publicize actions to be taken to protect public health (18 AAC 50.245, Eff. 1/18/96, Register 141).

Air quality general advisories (Appendix I) include broad educational-type statements which advise people about the potential for smoke impacts in the area. The general advisory provides recommendations for persons with respiratory illnesses or heart disease, and suggests ways to limit exposure. “Advisory” status does not involve any required action on the part of the public or the burn agency. Advisories may be issued without monitoring data. When general advisories are issued by DEC, all AWFCG members will be notified.

For PM₁₀, alert, warning, and emergency episode levels each have corresponding 24-hour average particulate concentration levels and have required action statements that suggest ways that the general public and sensitive individuals can limit their exposure. These notices will be based on real-time ambient monitoring, in combination with weather forecasts. Alerts will not be issued based solely on visual estimations of smoke impacts, nor on suspected smoke impacts. The cooperating agencies / land owners will agree on trigger levels, communication strategies and contingency measures before the burn project is ignited.

If smoke intrusions are causing unacceptable area-wide impacts, including nuisance smoke, ignitions of any new controlled burns that could impact the area will be denied by DEC through air advisory postings. Air quality advisories are appropriate for situations where the potential for multiple-day smoke impacts exists. The WESTAR (Western States Air Resources) Council produced a document (the 1995 Wildland Emergency Action Plan Implementation Guideline) that outlined an emergency action plan for implementation in urban areas where significant smoke impact from wildfires affected sensitive population groups.

The Responsible Authority should consult with DEC regarding appropriate short-term fire management response to abate verified impacts to smoke sensitive areas. Management responses should be implemented that will mitigate adverse impacts to public health using technologically feasible and environmentally and economically reasonable actions.

7. PUBLIC EDUCATION

Public education and outreach prior to burn ignition greatly decreases public complaints and often significantly decreases potential public health impacts attributed to smoke intrusion. Every effort should be made by the Responsible Authority to involve the potentially affected community in an early and on-going discourse on the use of prescribed fires in their area.

Public outreach often helps avoid conflicts which might not otherwise be identified, such as igniting burns during scheduled athletic events, or during annual hunting/fishing opening dates, holidays or other special events.

Public education guidance should be cooperatively developed and/or distributed by the AWFCG for use by Responsible Authorities. Such guidance would discuss options available for adequate public education, including public meetings, public service announcements, news articles, and public comment periods. The FireWise campaign (<http://www.firewise.org/>) and the FireWise Alaska handbook (<http://forestry.alaska.gov/pdfs/06Firewise.pdf>) have been successful public education processes, and could easily be used as a pattern or as a vehicle to promote public education on prescribed burning objectives at a local/airshed level where appropriate. In addition, the National Wildland Fire Coordinating Group (NWFCG) and the EPA Wildland Fire and Air Quality Workgroup have both developed useful educational packages.

Other Public Education Suggestions:

- Seek out appropriate forums to provide written information about rules and regulations, and answer questions.
- Initiate contacts with local news media to generate feature stories about the prescribed fire program and burn regulations.
- Include appropriate information about prescribed and land clearing burns in displays used at public gatherings, such as fairs.
- Provide press releases and public service announcements when needed.
- Coordinate with other agencies' public affairs offices to combine information about burning when appropriate.
- Develop brochures and other printed materials for distribution to appropriate sources and recipients.

8. FEES AND PROGRAM FUNDING.

Fees for a Controlled Burn for Resource Management and Controlled Burn for Land Clearing Approvals are posted in Alaska Administrative Code 18AAC50.400(1). Open burning regulations are located at 18AAC50.065. The ESMP is a required portion of the SIP, which outlines emission control strategies Alaska must address in accordance with the Clean Air Act and Regional Haze Rules.

9. ENFORCEMENT.

The implementation of the ESMP is usually done through regulation or through a Memorandum of Understanding between stakeholders. As the number, total acreage or complexity of prescribed fires increases, the State of Alaska may find its ESMP needs to be revised to ensure protection of the National Ambient Air Quality Standards and to meet regional haze visibility goals.

Regulations currently exist that prohibit burning in a manner that adversely impacts public health or the environment (18 AAC 50.065, 50.110 and 50.245). Adherence to State of Alaska regulations is mandatory. It is the responsibility of DEC to enforce the regulations. Additional regulations may be promulgated if the State determines that present regulations are inadequate for protecting public health.

Unacceptable smoke impacts that occur because the Responsible Authority was negligent or failed to follow the open burning regulations may result in enforcement action. Should an agency or land owner fail to follow procedures, requirements or restrictions issued under the open burning regulation, it may be considered grounds for revocation of the burn permit.

A mechanism similar to the program used to enforce air quality regulations for industrial sources will be used to enforce Wildland burning regulations or agreements. Such a program will provide:

- A process for notifying land managers of the unacceptable impacts.
- An opportunity for the land managers to respond to allegations of unacceptable impacts.
- The ability for DEC to take regulatory action, including cooperative agreements which may require ESMP revisions.
- An appeal process.

In addition, the ESMP program will be reevaluated if a Responsible Authority follows ESMP guidelines, but resultant smoke still violates the NAAQS or produces significant complaints.

10. LIST OF ACRONYMS, ABBREVIATIONS and DEFINITIONS

µg/m³:	micrograms per cubic meter
AAC:	Alaska Administrative Code
AQ:	Air quality
AICC:	Alaska Interagency Coordination Center
AWFCG:	Alaska Wildland Fire Coordinating Group
CAA:	Clean Air Act
CFR:	Code of Federal Regulations
DEC:	Alaska Department of Environmental Conservation
ESMP:	Enhanced Smoke Management Plan (includes Regional Haze requirements)
NAAQS:	National Ambient Air Quality Standards
PM:	Particulate matter
SIP:	State Implementation Plan
WESTAR:	Western States Air Resources Council
WRAP:	Western Regional Air Partnership

Agricultural Burn – also known as Controlled Burning for Land Clearing – open burning of woody debris material by farmers and developers. Approval is required from DEC if the intent is to clear and burn 40 acres or more per year.

Airshed is a geographical area where atmospheric characteristics are similar (e.g. mixing height and transport winds). (i)

Air Quality Advisory refers to a period where an air episode may warrant public notification. Air quality **advisories** are general, educational-type statements which advise the general public about the potential for smoke impacts and suggest ways to limit exposure. “Advisory” status does not involve any required action on the part of the public or the burn agency and often does not have monitoring data associated with it, though it may refer to weather forecasts.

Air quality alert, warning or emergency status refers to a period where an air episode is declared, as stated in 18 AAC 50.245. Valid air quality monitoring data and weather forecasts should be used to document air quality status and duration. Regardless of the source of the emissions, air episodes involve required actions on the part of the public (such as avoiding outdoor exercise) or land managers (such as avoiding additional emissions for the area).

Alternatives (or “burning alternatives”) refer to mechanical, biological or chemical treatment methods of fuel reduction that do not include burning, such as chipping, grinding, logging, mechanical/hand thinning with removal, etc.

Ambient air is that portion of the atmosphere, external to buildings, to which the general public has access.

Ambient air monitoring in this document refers to air quality monitoring done in support of prescribed fire activities or in response to Wildland fire activities.

Anthropogenic emissions are produced by human activities. (ii)

Approval or controlled burn approval (or “permit”) refers to the DEC written approval that is required if material from land clearing operations for prescribed fire for agricultural, development, hazard fuel reduction, and forest or habitat management if the area burned, or the material collected to be burned, is 40 acres or greater per year. (18 AAC 50.065(g))

AP-42 Handbook is the EPA’s Compilation of Air Pollutant Emission Factors for stationary point, area, and mobile sources. An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. Emission factors are then used to estimate the magnitude of a source’s pollutant emissions.(iii)

Burn plan is a strategic plan for managing a specific fire project to meet specific resource management objects. The plan includes the project objective, fire prescription (including smoke management components), personnel, organization, equipment, etc. It is used to apply for a DEC Controlled Burn Approval. (iv)

Burn restriction (see “Restriction”).

Class I Area refers to an area set aside under the Clean Air Act (CAA) Section 162 to receive the most stringent protection from air quality degradation. This classification protects air quality in international parks, national parks greater than 6,000 acres in size, and national wildernesses greater than 5,000 acres in size, that were in existence on August 7, 1977 and any additions to those areas.

Clean Air Act (CAA) means 42 U.S.C. 7401 – 7671q, as amended through November 15, 1990. (18 AAC 50.990(17)).

Controlled Burn Approval application is the permit application required by DEC as part of the controlled burn approval process.

Controlled Burning for Land Clearing – see “Agricultural Burn”

Controlled Burning for Resource Management – see “Prescribed Burn”

Emission Factors are typically based on the EPA’s AP-42 Handbook. Emission units are stated as “pounds of emission produced per ton of fuel consumed.” An emission factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant. Emission factors are not yet available for accurately predicting emissions from burns in fuels such as Sitka spruce forests, tundra or deep duff layers commonly found in Alaska. Efforts are being made by the USDA Forest Service, Pacific Northwest Experiment Station to conduct research that will lead to more accurate estimations of emissions factors for Alaska. (iii)

Enhanced Smoke Management Plan (ESMP) is the agreement and program plan developed and agreed upon by the AWFCG. The purposes of ESMPs are to mitigate the nuisance and

public health/safety hazards (e.g., on roadways and at airports, and at smoke sensitive features) posed by smoke intrusions into populated areas, to prevent deterioration of air quality and NAAQS violations; and to address visibility impacts in mandatory Class I Federal areas in accordance with the regional haze rules. (iii)

Fuel includes combustible vegetative matter such as grass, tundra, trees, shrubs, limbs, duff, and stumps.(iii)

Fuel loading is the amount of fuel present expressed quantitatively in terms of weight of fuel per unit area. This may be available fuel (consumable fuel) or total fuel and is usually dry weight. (ii)

Fuel type is an identifiable association of fuel elements of distinctive species, form, size, arrangement, or other characteristics that will cause a predictable rate of spread or resistance to control under specified weather conditions. (ii)

Inversion refers to a layer of air in which the temperature increases with height. The effect of various types of inversions is to greatly retard the dispersal of smoke. (vii)

Land manager/owner is the responsible Line Officer for the Federal agencies or designated individual in Federal, State, and private organizations who is authorized to make decisions concerning the management of specified land areas. (vi)

Member representative (or **Representative member** or **AQ Member**) means the individual who represents his or her organizational entity (agency or company) and is responsible for collecting and submitting pertinent agency burn information to the DEC Coordinator and AWFCG from their representative agency or company. They attend the annual meetings of the AWFCG.

Mixing height is measured from the surface upward, the height to which relatively vigorous mixing occurs in the atmosphere due to turbulence and diffusion. (viii)

National Ambient Air Quality Standards (NAAQS) are the standards established by the EPA for maximum acceptable concentrations of pollutants in the ambient air to protect public health with an adequate margin of safety, and to protect public welfare from any known or anticipated adverse effects of such pollutants (e.g. visibility impairment, materials damage, etc.) in the ambient air. (iii)

Natural background condition is an estimate of the visibility conditions at each Federal Class I area that would exist in the absence of human-caused impairment. (ix)

Non-attainment areas are areas that exceed the National Ambient Air Quality Standards (NAAQS) for certain "criteria pollutants" established by EPA or the States. Criteria pollutants have specific standards and exist for ozone, carbon monoxide, oxides of sulfur, oxides of nitrogen, lead, and particulate matter. (i)

Nuisance smoke is the amount of smoke in the ambient air at concentrations below the NAAQS which interfere with a right or privilege common to members of the public, including the use or

enjoyment of public or private resources. Nuisance smoke is regulated by Alaska regulation 18 AAC 50.110, "Air Pollution Prohibited: 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." (iv)

Open burning means the burning of a material that results in the products of combustion being emitted directly into the ambient air without passing through a contaminant outlet. (18 AAC 50.990(59)) Open burning includes prescribed fire (Controlled Burning for Resource Management) and Controlled Burning for Land Clearing (agricultural burning). The terms are used interchangeably in this document.

Particulate matter (PM) refers to any airborne material, except uncombined water, which exists as a solid or liquid at standard conditions (e.g., dust, smoke, mist, fumes or smog). (iii)

PM₁₀ refers to particles with an aerodynamic diameter less than or equal to 10 micrometers. Emissions of PM₁₀ are significant from fugitive dust, power plants, commercial boilers, metallurgical industries, mineral industries, forest and residential fires, and motor vehicles. (iii)

PM_{2.5} refers to particles with an aerodynamic diameter less than or equal to 2.5 micrometers. A measure of fine particles of particulate matter that comes from fuel combustion, agricultural burning, woodstoves, etc. (iii)

Prescribed fire is any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist. In a federal action National Environmental Policy Act requirements must be met prior to ignition. (vi) Prescribed fire is a type of open burning. The terms are used interchangeably in this document.

Prescription is a written statement defining the objectives to be attained and may include, but is not limited to, temperature, humidity, wind direction, wind speed, fuel moisture, soil moisture, and fire behavior characteristics under which a fire will be allowed to burn. A prescription is generally expressed as acceptable ranges of the prescription elements. The extent of the geographic area to be burned may also be a prescriptive element.

Regional haze is defined in 40 CFR 51.301 and generally refers to concentrations of fine particles in the atmosphere extending up to hundreds of miles across a region and promoting noticeably hazy conditions, wide-spread visibility impairment, especially in mandatory Class I Federal areas where visibility is an important value. (iii)

Responsible Authority (Burn Boss, Fire Management Officer, land manager, etc.) is the individual who collects, reviews, and disseminates pre- and post- burn information to the DEC staff in the form of the Burn Application and Post-burn Report. This person is tasked with the responsibility of ensuring compliance with the approved burn permit, daily operations, coordinating burn information, providing smoke forecasting and air quality restrictions for their burns. This person(s) may also facilitate local area meetings to evaluate program effectiveness, and solve local issues related to their agency's burn plans. The Responsible Authority often has line authority and is the primary person with whom DEC will interact prior to, during, and after a burn. The Responsible Authority should be identified in the Burn Application that is submitted to DEC. (i)

Restriction to burning occurs when an air quality episode is declared which covers the area of concern. Restrictions to burning are generally issued for a twenty-four hour period but may be for a longer period. The alert may be based on an assessment that inadequate air ventilation is available which would inhibit the dispersal of pollutants, such as inversions and low wind speeds. Regardless of the source of the emissions, public notifications will be issued when smoke is impacting the area. Persons with controlled burn approvals must curtail their fire if their portion of the airshed is becoming overloaded or local weather factors would create smoke problems, even though no other restrictions have been imposed, i.e. wind moving directly into sensitive areas, inversions, etc.

Smoke dispersion refers to the processes within the atmosphere which mix and transport smoke away from the source. This depends on three atmospheric characteristics: atmospheric stability, mixing height, and transport winds. (vii)

Smoke intrusion refers to smoke from a prescribed fire entering a designated area at unacceptable levels. (vii)

Smoke sensitive features are population centers, such as towns and villages, camp grounds and trails, hospitals, health clinics, nursing homes, schools (in session), numbered Alaska highways and roads, airports, Federal Class I Areas, etc., where smoke and air pollutants can adversely affect public health, safety and welfare. (iv)

Smolder means to burn and smoke without flame. (18 AAC 50.990(81))

State Implementation Plan (SIP) is a CAA Section 110 required document in which States adopt emission reduction measures necessary to attain and maintain NAAQS and meet other requirements of the Act (such as regional haze). (iii)

Transport winds is a term that refers to the wind speed and direction at the final height of smoke plume rise. (vii)

Violation of the PM NAAQS refers to 40 CFR Part 50, last revised in 2006. The daily PM₁₀ standard is violated when the 24-hour concentrations exceeds 150 µg/m³ at any monitor within an area more than one time per year. The annual PM₁₀ standard has been revoked.

The NAAQS levels for PM_{2.5} are set at a daily concentration less than or equal to 35 µg/m³ and an annual mean concentration of less than or equal to 15 µg/m³. The daily standard is violated when the 98th percentile of the distribution of the 24-hour concentrations for a period of one year (averaged over three calendar years) exceeds 35 µg/m³ at any monitor within an area. The annual standard is violated when the annual arithmetic mean of the 24-hour concentrations from a network of one or more population-oriented monitors (averaged over three calendar years) exceeds 15 µg/m³. Compliance with the annual PM_{2.5} NAAQS is based on population-oriented monitors because the health information, upon which the standard is based, relates area-wide health statistics to area-wide air quality as measured by one or more monitors. (iii)

Visibility protection refers to Section 169A of the federal Clean Air Act (CAA) which establishes a national visibility goal to ". . . prevent any future, and remedy any existing, impairment of visibility in mandatory Class I areas." Alaska has four federal Class I areas that are national parks or wilderness areas (Appendix H). (iii)

Western Regional Air Partnership (WRAP) is a voluntary organization comprised of western governors, tribal leaders and federal agencies, and is charged "to identify regional or common air management issues, develop and implement strategies to address these issues, and formulate and advance western regional policy positions on air quality. (x)

Western States Air Resources Council (WESTAR) is an organization which consists of fifteen states including Alaska. WESTAR was formed to promote the exchange of information between the States, serve as a forum for western regional air quality issues of common concern and share resources for the common benefit of the member states.

Wildland is an area where development is generally limited to roads, railroads, power lines, and widely scattered structures. The land may be neglected altogether or managed for such purposes as wood or forage production, wildlife, recreation, wetlands or protective plant cover. (iv)

Wildland fire is any non-structure fire, other than prescribed fire, that occurs in the Wildland.(xi)

REFERENCES

- i EPA Interim Air Quality Policy on Wildland and Prescribed Fires
- ii Smoke Management Guide for Prescribed and Wildland Fire, 2001 Edition. National Wildfire Coordinating Group, Fire Use Working Team. 226pp.
- iii Idaho/Montana smoke mgmt operating guide/SMP
- iv NWFCG Wildland Fire Policy 1998.
- v Regional Haze Rules, 40 CFR Part 51, 1999.
- vi Alaska Wildland Fire Management Plan 1998.
- vii Washington state SMP
- viii National Wildfire Coordinating Group. 1996. Glossary of Wildland fire terminology. PMS 205. Boise, ID: National Wildfire Coordinating Group, National Interagency Fire Center. 162 p.
- ix Policy for Categorizing Fire Emissions. November, 2001. Natural Background Task Team, Fire Emissions Joint Forum, Western Regional Air Partnership. Available: <http://www.wrapair.org/forums/fejf/documents/nbtt/FirePolicy.pdf>
- x WRAP Charter, Purpose, p.1.
- xi USDI and USDA Forest Service. 1998. Wildland and prescribed fire management policy-implementation procedures reference guide. National Interagency Fire Center, Boise, ID. 81pp.