Report to the Colorado Air Quality Control Commission

Recommendations Regarding Colorado's Smoke Management Program

Colorado Department of
Public Health and Environment
Air Pollution Control Division

February 10, 2011

STATE OF COLORADO

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Colorado Department
of Public Health
and Environment

February 10, 2011

Barbara Roberts, Chair
Colorado Air Quality Control Commission
4300 Cherry Creek Drive South
Denver, CO 80246

Dear Commissioner Roberts:

On behalf of the Colorado Air Pollution Control Division, I would like to present our report regarding the Division's Smoke Management Program. The document, and the accompanying findings and recommendations, represent the combined expertise of Division staff and a wide variety of interested stakeholders. The report is responsive to HB09-1199.

Smoke management and prescribed fire issues are complex and can impact public health, public welfare, forest health, wildfire risk, watershed risk, and Class I visibility. As such, developing this report regarding responsible and appropriate means to support and increase where possible the use of prescribed fire, requires willingness to explore tradeoffs and seek and implement collaborative incremental solutions over time.

The recommendations outlined in the accompanying report will require continued investment and attention to the Division's Smoke Management Program as well as the relationships with its regulated community. I believe we will be rewarded with better overall protection for Colorado's residents and natural resources.

I want to thank the many participants who helped shape this report and the time and expertise they provided.

Sincerely,

Paul Tourangeau
Director, Colorado Air Pollution Control Division

Acknowledgements

Special thanks to the group that contributed input, comments, valuable time, and a collaborative approach during three workgroup sessions in 2010 to review and strive to reach consensus on earlier versions of the Air Division's draft report:

- Lesli Allison (Banded Peak Ranch)
- Mike Babler (The Nature Conservancy)
- Doug Bjorlo (Larimer County Dept. of Health and Environment)
- Andy Bundshuh (USDI National Park Service)
- Laurel Dygowski (EPA Region 8)
- Dan Hendershott (Summit County Environmental Health)
- Vaughn Jones (Colorado State Forest Service)
- Jane Lopez (Colorado State Forest Service)
- Todd Richardson (USDI Bureau of Land Management)
- Darwin Schultz (USDI Fish and Wildlife Service)
- Jeff Sorkin (USDA Forest Service)
- Natalia Swalnick (American Lung Association)
- Peter Wolf (DOD, US Army, Fort Carson)

The group was facilitated by Todd Bryan, Keystone Institute.

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Introduction

In 2009, the Colorado General Assembly passed and Governor Ritter signed HB09-1199. This law includes a section requiring the Colorado Air Pollution Control Division (Air Division) to "evaluate existing prescribed fire permit program rules and implementation so as to support, and increase where possible, appropriate responsible use of prescribed fire consistent with [C.R.S.] section 25-7-106 (7) and (8)." The entire text of the relevant part of HB09-1199 is included in Attachment 1. The pertinent sections of Colorado Revised Statute (CRS) referred to above are included in Attachment 2.

HB09-1199 additionally instructs the Air Division to:

- confer with appropriate stakeholders in the development of its report;
- consider the balance between air quality and public health standards and goals with the important benefits of prescribed fire as an important land management tool; and
- deliver a report to include recommendations to the Colorado Air Quality Control Commission by June 30, 2010.

The HB09-1199 study process was extended due to delayed confirmation of fiscal authorization under the law to proceed. This was resolved with an Executive Order on October 27, 2009. The Air Division then developed a draft implementation plan that went through Colorado Department of Public Health and Environment internal review. During February 2010, the Air Division finalized its draft implementation plan for the evaluation study and sought stakeholder and public comment. The amended implementation plan was revised based on input, and is contained in Attachment 3.

The initial report was developed in March 2010 by Air Division staff and released in draft form on April 8, 2010. The Air Division met with an invited confer-group of stakeholder representatives in work sessions on May 12 and 13 and September 1, 2010 to receive input, comment and suggested revisions. The draft report was revised to reflect the confer-group's agreements. On September 7, 2010 the report was released for a 60-day public comment period that closed on November 19, 2010. Public meetings were held in Denver on October 19 and Grand Junction on October 20, 2010 to receive and respond to written and oral public comment. The attendance list from the confer-group meetings and public meetings are in Attachment 4. Written public comment received by the Air Division is contained in Attachment 5. The report was then finalized by the Air Division and delivered to the Colorado Air Quality Control Commission on February 10, 2011.

Executive Summary

The Air Division has evaluated and reviewed its smoke management program in light of increasing the support and use of prescribed fire in Colorado in balance with existing state statute and public health, welfare and visibility mandates.[1]

Program Context. After providing a history of Colorado's Smoke Management Program (SMP), this report examines several contextual circumstances of the program. The Air Division finds that federal and state air pollutant standards and programs to protect public health do serve to limit the use of prescribed fire and smoke emissions, and that these standards and programs are likely to be tightened over time. The relative lack of national guidance, rules and regulations about SMPs provide opportunities for states to mold programs to fit their local situations, but also have led to a lack of national consistency and resources for the development and support of such programs. Colorado's SMP conforms to the few national and regional program standards that have been developed for smoke management programs. The Division concludes that Colorado-specific smoke regulations and their implementation are one element among many issues, constraints, and opportunities that both limit and support the use of prescribed fire. There are many elements outside the SMP's control that are part of the context within which it operates.

Recommendation:

- In order to increase awareness of the larger context within which Colorado's SMP operates and how the context may affect opportunities to use prescribed fire, the Air Division recommends that it communicate regularly about such issues to the regulated community and other interested stakeholders to include:
    - possible changes to air quality standards as well as other EPA actions and potential implications,
    - implementation of state and/or local air pollution control strategies that may affect prescribed fire,
    - any pertinent activities at the regional level, and
    - relevant state or local initiatives.

  Communication vehicles are to include the SMP's newsletter and semi-annual stakeholder meetings.

Regulation No. 9. The Air Division's evaluation of Colorado Air Quality Control Commission Regulation No. 9 governing the SMP finds that the Regulation is a reasonable, workable framework for its current and evolving program, and therefore does not need to be fundamentally revised for in order to support and increase where possible the appropriate and responsible use of prescribed fire. The existing regulations provide appropriate considerations for smoke permitting within which land managers can conduct needed prescribed fires in a responsible manner.

A 2009 interagency workgroup (2009 Workgroup) of primary SMP users identified no

[1] See CRS 25-7-111, and 25-7-106(7) and (8).

major issues with Regulation No. 9. The Workgroup did not fully complete its work and did not include representation of all stakeholders. Nevertheless, it did find some issues with interpretation, implementation, and enforcement of Regulation No. 9, identified recommendations relating to those implementation issues, and made recommendations for future discussions.

Recommendations:

- No specific substantive or structural revisions to Regulation No. 9 are recommended as being necessary to support the increased appropriate use of prescribed fire while protecting air quality and public health.
- The Air Division will propose clarifying edits and, where feasible, more explicit definitions of some terms to the Regulation in the near future.

Implementation of Regulation No. 9 – Permit Conditions. It is via the use of appropriate permit conditions that the Air Division brings forward the elements of national air quality standards, state laws, and Regulation No. 9 that it must consider during permitting. In the 2009 Workgroup mentioned above, numerous permit conditions were discussed and, in some cases, recommendations developed. Since that time, the Air Division has acted on many of the specific recommendations, although a number are still in progress. Also during the 2009 Workgroup, the represented agencies' stated belief, subject to additional review and analysis, was "that most of the specific conditions by themselves are not overly restrictive of burn projects" but that multiple layers of permit conditions can be limiting to a burner. The Air Division has subsequently examined its permit conditions in that light. While several may apply to a given project, it has not found that their intent overlaps. Rather, each is responsive to separate regulatory considerations that generally require Air Division staff to minimize emissions, protect public health, protect public welfare, and protect Class I visibility.

Recommendation:

- While no specific near-term revisions to permit terms are identified at this time, the Air Division recommends continuing review of the individual permit conditions and their interactions. Adjustments over time will be considered to support the increased appropriate use of prescribed fire while protecting air quality and public health.

Implementation of Regulation No. 9 – Communication, Transparency, and Clarification. Connected with discussions about the permit conditions themselves, are considerations that include providing information to permittees about what is required, what are the bases for any particular requirements, what are the processes for attaining an approved permit with conditions, how are the conditions determined, and so on. If there are misunderstandings between the Air Division and the regulated prescribed fire community this will serve to interfere with the use of fire to some degree. Improving communication and transparency may reduce misunderstandings, and should lead to some increase in the responsible and appropriate use of prescribed fire in Colorado.

Recommendations:

- Continued regularly scheduled meetings with stakeholders and regular Air Division newsletters regarding SMP topics,
- development of an SMP Manual,
- continued effort to develop an on-line permit application and activity reporting system, and
- simplification of the SMP, especially how it is presented and organized for permit applicants.

Additional resources and funding could be necessary to make meaningful and timely progress on certain of these recommendations.

Implementation of Regulation No. 9 -- Colorado's SMP is Currently and Appropriately "Experience-Based" in Structure. Therefore, Change Is Based on Field Observations of the Smoke Outcomes of Fire and Weight of Evidence. Over the 20 years of the Colorado SMP's existence, thousands of permits have been written and burn projects have been, with a few exceptions, completed without unacceptable smoke impacts. Because currently the existing numeric computer-modeling systems that predict PM2.5 concentrations and visibility impacts provide widely varying results, the SMP has shifted away from relying on these models for permitting decisions. The result is an "experience-based" program that is based on the burning that has occurred and has had acceptable results considering the weight of evidence over time. Science will continue to evolve and both the Air Division and stakeholders want to take advantage of relevant scientific information, including numeric computer models, as available.

Yet important questions remain, and those questions offer the best opportunity for responsible increases in the level of prescribed fire. For example, under what

circumstances do the smoke and pollutants from burns permitted under the current SMP experience-based program exceed or not exceed the air pollutant public health standards and other air quality thresholds such as visibility impacts for Class I areas? Is the current SMP too stringent in some respects or 'about right' with its permit conditions for any particular burn and its associated smoke? Quantitative data to inform these questions are limited. The number of official Air Division particulate monitors in Colorado is small given the locations of all possible burns and the movement of smoke in the State. Use of such fixed monitors for credible impact assessments is challenging. Additionally, it has not been the practice of states or of land managers, for various good reasons, to use portable monitors and digital images in a systematic manner to learn about prescribed fire smoke impacts.

The Air Division's SMP permit database indicates that on relatively few burn days do property owners or land managers complete even 50% of permitted acres or piles. Constraints on burners (i.e., weather, staffing, resources, as well as Air Division regulations) limit opportunities to fully complete projects. Yet, many land managers believe that any accommodation by the Air Division will lead to an environment wherein they will be able to burn more efficiently.

Recommendations:

- The Air Division recommends continued and increased commitment to measuring and documenting smoke in the field at various receptor locations.
- The Air Division recommends promoting a collaborative effort to proactively develop a more robust monitoring program that is developed in concert with interested stakeholders as well as cooperating academic institutions.
    - It is recognized that the community of people and agencies who burn must take primary responsibility either themselves to staff substantially increased smoke documentation and/or to fund the Air Division for more activity in this area.
    - Opportunities for interagency cooperation are being explored, including sharing of equipment and resources.
- It is recommended that an adaptive management strategy continue to be used, in which policy, modeling, measurements, feedback, and other experience continue in a cycle to inform change over time. It will be important to continue to talk about how operationally to develop and make continued progress within this overall program direction (termed "hybrid program" in the body of this report).
- The Air Division will continue to evaluate numerical modeling options in conjunction with interested stakeholders.

The View Forward. The findings, recommendations for change, and programmatic directions described in this report together offer a responsible path forward. The appropriate increased use of prescribed fire in Colorado can occur, but will continue to be balanced with the matrix of requirements that take into account statute and regulatory law that apply to smoke from prescribed fires, public health and welfare air quality standards, and Class I visibility protection rules.

The challenges should not be minimized. Most land managers experience considerable pressure to increase prescribed burning and lower wildfire risk. There is a sense of urgency to responsibly and significantly increase the use of prescribed fire. At the same time, the questions raised by the Air Division remain: how to accommodate this without affecting public health and consistent with federal and state laws. Increased prescribed fire use, consistent with current understanding of its many benefits, will likely increase smoke levels and the public's exposure to smoke. This could increase complaints and concerns about health and welfare impacts.

During both the 2009 Workgroup and throughout the current evaluation study driven by the mandates of HB09-1199, the Air Division's view is that no simple, single action or 'quick fix' emerged as the solution to "support, and increase where possible, appropriate responsible use of prescribed fire consistent with section 25-7-106 (7) and (8)." Instead the picture that emerges is that a steady, incremental, evidence-driven approach continues to offer the best path forward. This evolving path will require fire and regulatory community collaboration, and in certain instances additional resources.

Summary of Recommendations:

- Program Context:
    - Communicate regularly to the regulated community and other interested stakeholders about items outside the SMP's control but are part of the context within which it operates. Such contextual items (e.g., potential changes in national public health standards) may affect the use of prescribed fire. Utilize the Air Division's SMP newsletter and semi-annual stakeholder meetings as means of communication.
- Regulation No. 9:
    - No specific substantive or structural revisions to Regulation No. 9 are recommended as being necessary to support the increased appropriate use of prescribed fire while protecting air quality and public health.
    - The Air Division will propose clarifying edits and, where feasible, more explicit definitions of some terms to the Regulation in the near future.
- Implementation – Permit Conditions:
    - While no specific near-term revisions to permit terms are identified at this time, the Air Division recommends continuing review of the individual permit conditions and their interactions. Adjustments over time will be considered to support the increased appropriate use of prescribed fire while protecting air quality and public health.
- Implementation – Communication, Transparency and Clarification:
    - The Air Division recommends
        - continued regularly scheduled meetings and newsletters,
        - development of a SMP Manual,
        - continued effort to develop an on-line permit application and activity reporting system, and
        - simplification of the SMP, especially how it is presented and organized for permit applicants.
- Implementation -- Colorado's SMP is Currently and Appropriately "Experience-

Based" in Structure. Therefore Change Is Based on Field Observations of the Smoke Outcomes of Fire and Weight of Evidence:[2]

- The Air Division recommends
  - continued and increased commitment to measuring and documenting smoke in the field at various receptor locations to develop a more robust monitoring capability combined with data analysis to use the information to feedback into the program;
  - where necessary to effect program improvement, additional resources beyond those currently available to the SMP in order to make meaningful and timely progress to better understand the impacts of prescribed fire on the public;
  - that an adaptive management strategy continue to be used, in which policy, modeling, measurements, feedback, and other experience and evidence continue in a cycle to inform change over time. It will be important to continue to talk about how operationally to develop and make continued progress within this overall program direction (termed "hybrid program" in the body of this report); and
  - continued evaluation of computer modeling options in conjunction with interested stakeholders.

[2] The Air Division believes the recommendations in the section aimed at continued shared learning about smoke impacts collectively offer the best opportunity for program evolution that will "support, and increase where possible, appropriate responsible use of prescribed fire" as per HB09-1199.

Background and Context

This background section addresses in more detail some of the history as well as legislation and regulatory law that most directly affects and sets sideboards for Colorado's smoke management program.

Colorado's Smoke Management Program

Colorado's smoke management program (SMP) began in 1990. Given the absence of either a large-scale timber industry with associated slash burning or very widespread agricultural burning, the detailed regulation of smoke in Colorado evolved in response to federal land managers increasing the use of wildland prescribed fire during the late-1980s. Another important driver during this time was the U.S. Environmental Protection Agency's (EPA) visibility protection regulations for Class I areas requiring that States address smoke from prescribed fires.[3]

At that time there was little in Colorado Air Quality Control Commission (Air Commission) regulatory law about smoke management, although open burning without a permit was prohibited.[4] To add operational details to the basic requirements contained in Air Commission regulation, a Memorandum of Understanding (MOU) was developed and signed in 1990 by managers of fire on public lands and the Air Division. In addition to the requirements already in law, additional elements of the MOU included: detailed permit forms, smoke management requirements, procedures to help ensure protection of public health and welfare, explicit consideration of visibility protection, and emission inventory and reporting requirements.

As the use of wildland prescribed fire grew during the next decade, the Colorado General Assembly added language to State statute in 2001 declaring:

> The general assembly further finds, determines, and declares that emissions from grassland and forest fires have substantial episodic impacts on ambient air quality throughout the state and are a major source of visibility impairment over which this state has jurisdiction but has not yet developed a comprehensive program to reduce such impairment.[5]

The statutory language also explicitly required the Air Commission to formalize the SMP beyond the MOU and other minimal regulatory law:

> The commission is specifically authorized and directed to develop a program to apply and enforce every relevant provision of the state implementation plan and every relevant emission control strategy to minimize emissions… The program developed by the commission under

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[3] *40 CFR Part 51.306(e)(5) Long-term strategy requirements for reasonably attributable visibility impairment*.

[4] Agricultural open burning is exempted from the requirement to obtain an open burning permit (Air Commission Regulation No. 1.II.C.2.e and Regulation No. 9.III.B.5).

[5] CRS 25-7-106(7)(c).

> this subsection (7) shall include, but not be limited to, the imposition of any fees necessary to administer the program… and the imposition of penalties pursuant to section 25-7-122.[6]

The Air Commission responded with the development of Regulation No. 9 ("Open Burning, Prescribed Fire, and Permitting") adopted as law at a public hearing in January 2002.[7]

Over the next few years, Colorado's SMP further developed the elements of a typical operational air quality smoke management program including:

- permits with appropriate conditions,
- compliance assistance as well as enforcement,
- activity and emission inventory tracking,
- communications and outreach including stakeholder meetings and newsletters,
- site inspections to burn projects and visits to field offices,
- a comprehensive web presence,[8] and
- fees to support the program.

On the next page are two graphics illustrating how prescribed fire permits are distributed by agency or entity and geographically. Between 350 and 450 permits are issued each year.

2009 Workgroup Meetings and Report

In 2009 the Air Division met in a professionally-facilitated workgroup with representatives of approximately 80% of its permittees and of overall permitted acres and piles to review the SMP and address misunderstandings. This 2009 Workgroup process is an important foundation for the current report.

The intent of the series of meetings of this 2009 Workgroup[9] was to:

- facilitate a framework for collaborative approaches in addressing fire, smoke, and related air issues in Colorado;
- better understand each other's needs, goals, pressures, and missions; and
- evaluate the current Colorado smoke management program in the context of the extent to which important elements of the SMP are appropriately supportive of the responsible use of prescribed fire.

Because this process occurred recently[10] and had similar objectives, the current evaluation study draws considerably from the group's report and its other written records.

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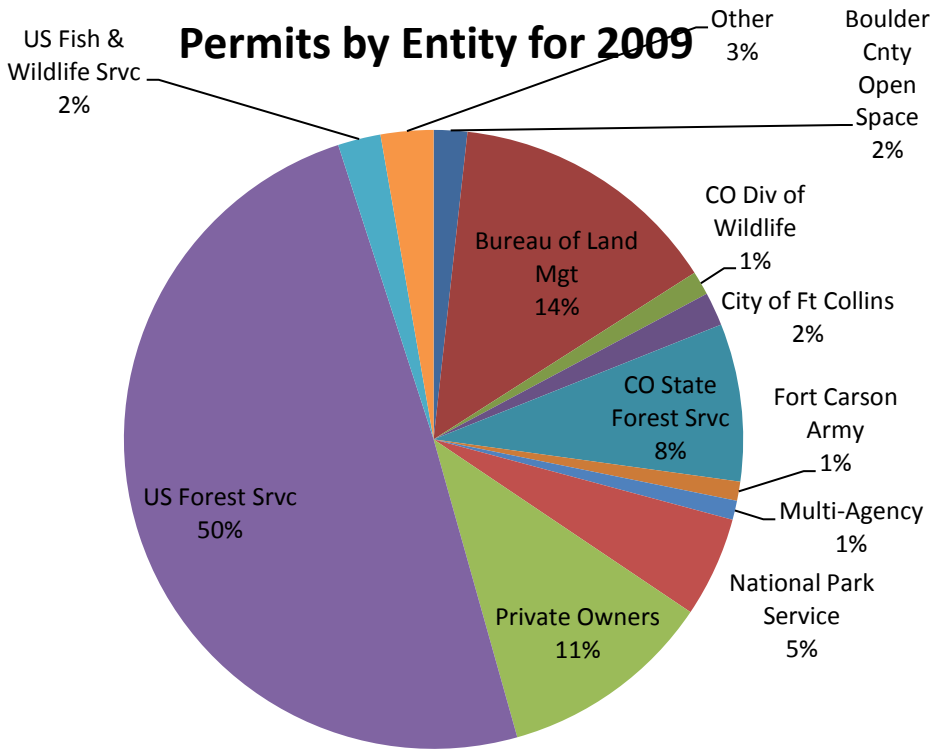
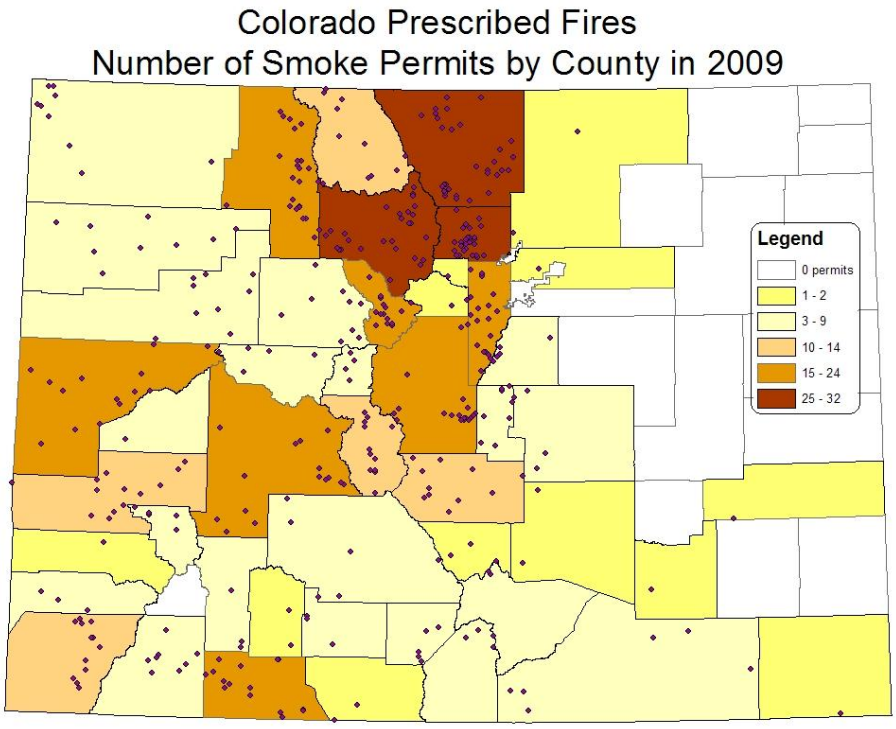
[6] CRS 25-7-106(7)(a).
[7] Regulation No. 9 is found at http://www.cdphe.state.co.us/regulations/airregs/
[8] Colorado's SMP homepage is at: http://www.cdphe.state.co.us/ap/smoke/
[9] Workgroup members included representatives of: USDA Forest Service, USDI National Park Service, USDI Bureau of Land Management, and the Colorado State Forest Service.
[10] The Colorado Smoke Management Plan Interagency Review, March – June 2009 Final Report of Findings and Recommendations (2009 Final Report) is at: http://www.cdphe.state.co.us/ap/smoke/Docs/SmokeWorkgroupReport.pdf


Permits by Entity for 2009
US Fish & Wildlife Srvc 2%
Other 3%
Boulder Cnty Open Space 2%
CO Div of Wildlife 1%
City of Ft Collins 2%
Fort Carson Army 1%
Multi-Agency 1%
National Park Service 5%
Private Owners 11%
US Forest Srvc 50%
CO State Forest Srvc 8%
Bureau of Land Mgt 14%


Colorado Prescribed Fires
Number of Smoke Permits by County in 2009
Legend
0 permits
1 - 2
3 - 9
10 - 14
15 - 24
25 - 32

Findings and Recommendations

I. Program Context and Tradeoffs

The HB09-1199 evaluation report's focus is on the Colorado SMP's rules and implementation with recommendations for change that may lead to an increase in the responsible and appropriate use of prescribed fire. Colorado's SMP and the use of prescribed fire within the state occur in a larger context that contains elements that are out of the control of the SMP and its governing regulations. Therefore, this first set of findings and recommendations looks at several elements of a bigger picture that may affect the use of prescribed fire.

Findings

Limited Smoke Management Program Guidance from EPA

The federal Clean Air Act is silent about SMPs. The Act does not specifically address wildland smoke because it predated the current understanding of the ecological role of fire. As a result, there are no explicit federal statutory requirements for SMPs and therefore little, if any, relevant EPA regulatory law. EPA has devoted almost no resources nationally to the support of state SMPs including in the areas of smoke monitoring, regulatory development, and smoke modeling.

While EPA has no regulations specific to smoke management programs, its Interim Air Quality Policy of Wildland and Prescribed Fires[11] does provide a suggested framework. EPA staff has worked over the last few years to revise this 1998 policy, but at present a final policy is still in progress. To provide additional detail for SMPs in the West, a 2002 regional effort further defined elements for an "enhanced" smoke management program.[12] Utilizing the limited guidance, the Air Division has ensured that Colorado's smoke management program meets the standards in regional and national policy documents:

- The SMP includes elements of the western regional policy that are necessary for an "enhanced" smoke management program.
- It is consistent with the basic framework of procedures and requirements for SMPs under EPA's Interim Policy.

The resulting situation nationally is that each state with a smoke management program has evolved responses to its unique context. As one example, among smoke programs concentrated in western states, population density appears to correlate closely to the level of smoke program stricture. States with widely scattered homes and few large cities can be less restrictive than states like Colorado whose burning may occur upwind of major metropolitan areas, near ski resorts, or in mountain valley subdivisions. The lack of national-level dictates also means that as a state's situation changes, the State's SMP can adapt, change and evolve without needing federal approval. The exception to this

[11] Interim Air Quality Policy of Wildland and Prescribed Fires, April 23, 1998. It is available on the Colorado SMP's web page http://www.cdphe.state.co.us/ap/smoke/BigPicture.html

[12] Western Regional Air Partnership Policy on Enhanced Smoke Management Programs for Visibility, November 12, 2002; http://www.wrapair.org/forums/fejf/docs.html

flexibility is anything that states have committed to do regarding smoke management within federally enforceable State Implementation Plans (SIPs).

Limited National Guidance About Difficult Tradeoffs

In part due to the absence of smoke management program requirements in the Clean Air Act, there has been no substantial national resolution or even debate about difficult tradeoffs that face States and Tribes with smoke management programs.

As an example, the 2009 Workgroup Final Report's first finding begins:

> There is an overarching concern about the long term tradeoffs between air quality protection and efforts to mitigate unwanted wildfire. The emissions from wildfire may exceed air quality standards to such a degree that it may be prudent to allow greater levels of [prescribed] burning now to prevent unmitigated wildfires in the future. (p. 5)

Essentially this statement argues that there is a tradeoff between short-term immediate public health impacts and larger public health impacts in the longer term. One could argue that the Air Division should accept short-term public health impacts in the interests of avoiding potentially worse outcomes later. In this scenario, there would likely be many times the amount of prescribed fire in Colorado with the increased smoke potentially resulting in additional public health impacts and possible health standard exceedances. The argument is that the impacts would be less on average over time than if the public is exposed to inevitable uncontrolled wildfire emissions in significant concentrations.

However, without an explicit legal framework in which these policy and resulting operational tradeoffs can legitimately be made, the Air Division must follow current law. National statute and regulatory law are silent about these difficult trade-offs between federal mandates to treat fuels and federal and state mandates to protect public health and welfare. As far as the Air Division is aware, a legislative proposal to seriously address the topic has never been placed before the U.S. Congress.

NAAQS - PM2.5 Standard Is a Constraint

The Air Division believes that for prescribed fire, the most relevant constraining element of current federal and state laws is the health-based fine particulate (PM2.5) National Ambient Air Quality Standard (NAAQS).

The PM2.5 NAAQS is 35 $\mu g/m^3$ over 24-hours. The Air Division does not issue permits if it believes resulting smoke may reasonably be anticipated to cause smoke levels over this NAAQS[13] in a public area or at a home. Each smoke permit must be written 'as if' an official PM2.5 monitor were at the nearest occupied residence.

Smoke impacts are often episodic and difficult to estimate. As an example of the implications regarding the potential further constraining affect of the particulate matter NAAQS, in 2008 Air Division staff observed a one-hour concentration of approximately 1200 $\mu g/m^3$ in a mountain subdivision immediately adjacent to a prescribed fire.[14] If one divides this value by 24 hours and assumes the other 23 hours of the day were pollution-free, this one-hour spike could implicate a 24-hour value in exceedance of the standard. Photographs of morning smoke following some of the largest prescribed burns in the state in recent years reflect similar potential conditions. One of the Air Division's emphases in writing permits is to limit the situations that lead to episodes of high concentration particulate emissions.

Even with this intention, however there is uncertainty around the extent to which prescribed burns under permits written by the Air Division and resulting smoke experienced by the public relate to the actual NAAQS for PM.

Why is this the case? With little exception, this is true for all state SMPs nationwide.

- For most situations computer models cannot predict well enough the impacts of these types of sources in complex terrain and are therefore little used in mountainous areas.
- There are few official PM monitors relative to all the locations where burns occur and where smoke moves.
- There is very little smoke monitoring with portable instruments at the closest

[13] If a monitored exceedance of the PM NAAQS were to occur on an official instrument, agencies have the opportunity to apply to EPA for the data to be disregarded if the agency can demonstrate the event (e.g., prescribed fire) was not reasonably preventable or controllable and meets criteria set by EPA (Exceptional Events Rule, 72 FR 13560, March 2007).

[14] This observation occurred on a portable instrument <u>not</u> certified by EPA as capable of making sufficiently accurate measurements to be considered a reference monitor for PM2.5. The Air Division uses this portable instrument periodically as an indicator of smoke levels and air quality.

receptors including nearby homes and public areas.

The monitoring topic is addressed in much more depth in section V because it offers a path forward.

Ozone Alerts and EPA's Ozone NAAQS Proposal Are Increasingly Constraining
Ozone alerts currently are a constraint on the use of prescribed fire in limited areas of the Northern Front Range. The Air Division believes it is likely that the geographic scope of ozone alerts will increase in future years and therefore affect more prescribed burns in the future.

The Air Division calls ozone alerts in Front Range counties when its forecasters believe ozone levels are or will be high in relation to the NAAQS. On alert days, no open burning is currently allowed in the ozone non-attainment area. This limits opportunities to undertake some permitted burn projects. Regulation No. 9.IV.C.1 states that permits are "not valid during periods of publically announced air pollution emergencies or alerts in the area of the proposed burn." The Air Division and other agencies are conducting more ozone monitoring on the Western Slope of Colorado. It is likely that ozone alert forecast areas will be expanded as well.

EPA announced in January 2010[15] a proposal to reconsider the ozone NAAQS and reestablish it at a lower level. A lower threshold would increase the likelihood of an exceedance and therefore the frequency and geographic extent of ozone alerts. Because the NAAQS is a threshold rather than a continuum, and several areas of Colorado are already fairly close to ozone non-attainment under the current ozone standard, a small change in the standard could have a notable effect on the context and implementation of prescribed fire permits.

Recommendations

Ozone
At the Air Division's semi-annual SMP stakeholder meeting, it will host a briefing and discussion concerning how ozone issues have progressed and impacts on the use of prescribed fire, and provide a forum for consideration of options. If necessary, a follow-up work group may be convened.

Awareness of the Big Picture
As work focuses on Colorado's SMP over time, awareness of the larger picture in which the program operates will remain helpful. Regulation No. 9 and its implementation are only a part of the issues, constraints, and opportunities regarding the use of prescribed fire. To increase awareness, the Air Division recommends that it communicate regularly about such items to the regulated community and other interested stakeholders at its semi-annual stakeholder meetings and via newsletter items to include:

- possible changes to air quality standards as well as other EPA actions and potential implications,
- implementation of state and/or local air pollution control strategies that may affect

[15] Federal Register, Vol. 75, No. 11, January 19, 2010.

prescribed fire,

- any pertinent activities at the regional level, and
- relevant state or local initiatives.

Public Education on the Role of Fire

Over time, public support for and understanding the natural role of fire is a critical if indirect input to State smoke policy and ultimately to SMP practices. The Air Division plans over time to implement the spring 2009 Workgroup's recommendation to:

> [E]xplore with upper managers the development of a shared education role between the state and the land managers in addressing fire and smoke and air quality issues with political entities, regulatory agencies and the public. The education effort should explain the natural role of fire on the landscape and the inevitability of future wildfire events in fire adapted ecosystems. This message needs to be carefully crafted to ensure APCD's mission to protect public health is preserved.[16]

II. Regulation No. 9

The Air Commission adopted Regulation No. 9, "Open Burning, Prescribed Fire, Permitting," in 2002.[17] The Regulation provides the Air Division's SMP with objectives (e.g., protect public health and welfare) as well as considerations to weigh before deciding on the particulars of a permit (e.g., the Air Division shall consider meteorological conditions under which the burn is proposed). As such, the Regulation is

[16] Colorado Smoke Plan Interagency Review, March – June, 2009, Final Report of Findings and Recommendations, p. 5.

[17] Regulation No. 9 is found at http://www.cdphe.state.co.us/regulations/airregs/

the framework within which the SMP operates. If the Regulation is found to be inappropriately constraining of the use of open burning including prescribed fire, changes to the Regulation also may provide opportunities to support a responsible increase in prescribed fire.

Findings

Regulation No. 9 Is a Recent Regulation and a Reasonable Framework for Prescribed Fire.

Regulation No. 9 was proposed during late-2001 and adopted at a public hearing of the Air Commission in 2002. It has been amended several times to address fee and other housekeeping issues.

The Air Division believes the Regulation is a reasonable, workable framework for its current and evolving SMP and therefore does not need to be fundamentally revised in order to support and increase where possible the appropriate and responsible use of prescribed fire. Sections IV and V are the relevant parts of the Regulation for the purposes of this report. A selective review of these sections reveals the Commission's commonsensical and flexible approach. For example:

- An application and permit conditions must ensure the burn can and will be conducted in a manner that minimizes emissions from the burn and the impacts of the smoke on visibility and on the health and welfare of the public. (Regulation No. 9, §IV.A.2, §V.C, & §V.E.2)
- The Air Division shall consider the following to condition and decide whether to grant a permit:[18]
    - Did the applicant evaluate alternatives to the burning of the fuel? (§IV.B.d & §V.D.2)
    - What is the location of the proposed burn(s) in relation to smoke sensitive areas and Class I areas? (§V.D.3)
    - What are the meteorological conditions under which the burn is proposed, and how well will they promote good dispersion of pollutants? (§IV.B.1.b, §IV.C.3, §IV.C.5, §IV.C.6 & §V.D.4)
    - Will the burn will be conducted in accordance with a smoke management plan/narrative that requires:
        - use of best smoke management techniques that are appropriate to the burn? (§IV.C.2, §V.D.6, and §V.D.8.a)
        - visual and/or instrumented monitoring to track smoke during the burn? (§V.D.8.c)
        - public notification? (§V.D.8.e)

The Air Division believes these are appropriate considerations for smoke permitting within which land managers can conduct needed prescribed fires in a responsible manner. Generalizing along the lines of these examples, the Air Division also believes that major, substantive or structural changes are not needed to Regulation No. 9 for levels of the use

[18] This is not a complete list and is provided as examples of typical elements in the Regulation. For more information, see Regulation No. 9 Sections IV and V.

of prescribed fire to increase.

2009 Workgroup Review of Regulation No. 9 Found No Major Issues
The 2009 Workgroup reviewed Regulation No. 9 and identified no major issues with Regulation No. 9 per se. However, the Workgroup did not fully complete its work and did not include representation from all potentially interested stakeholders. Nevertheless, it did find some issues with interpretation, implementation and enforcement of the Regulation as well as identifying a need for additional clarification of terms used in the Regulation. These are included in the recommendations below.

Recommendations

No Fundamental Changes to Regulation No. 9
The Air Division's findings above do not suggest that Regulation No. 9 is an inappropriate constraint to the responsible use of prescribed fire. Therefore, no fundamental, structural or substantial changes to the Regulation are recommended.

Specific Edits to the Regulation
The Final Report of the 2009 Workgroup identified areas to delete or amend regarding fire safety language that is not related to air pollution or smoke. The Air Division will propose edits to the Regulation for public hearing before the Air Commission consistent with the intent of the workgroup report.[19] The Air Division also has identified §V.D.7 regarding modeling and §V.D.8.e, public notification, as elements that may need updating to reflect evolution of the program.

[19] Since the July 3, 2009 Final Report, the Air Division has found fire safety language in the CRS at 25-7-123(2)(a). The Division believes the statutory requirements can be met by retaining the language in §IV.B.1.c, "Compliance by the applicant for the permit with applicable fire protection and safety requirements of the local authority."

Additional Definition and Clarification of Terms
The 2009 Final Report also recommends some additional clarification and definition of terms used in the Regulation related to smoke impacts. They include public welfare, visibility and smoke sensitive community/area/receptor. The Air Division will propose in the near future, definitions and/or clarifications to these and other terms identified for hearing before the Air Commission.

III. Implementation of Regulation No 9 – Permit Conditions

It is via the use of permit conditions that the Air Division brings forward the elements of national standards, state laws, and Regulation No. 9 that it must consider during permitting.

Permit conditions may range from constraints such as acres burned per day to meteorological prescriptions under which the burn may occur. Particular permit conditions have are designed to directly respond to the numerous specific requirements of Regulation No. 9, issues raised by problematic burns, and lessons learned based on experience. Several permit conditions may apply to the same burn (i.e., acreage limit, wind direction, meteorological dispersion). The 2009 Workgroup examined in detail the Air Division's permit conditions during its meetings.[20]

Findings
Air Division Has Implemented Past Recommendations
During the 2009 Workgroup, numerous permit conditions were discussed and, in some cases, specific recommendations. Since that time, the Air Division has acted on many of the recommendations, although a number are still in progress.

No Individual Permit Condition is Inappropriate or Overly Restrictive
Permit conditions are intended to be a constraint in order to minimize emissions and/or otherwise protect public health and welfare and limit visibility impacts. If a condition never were constraining, it would have no purpose and should be eliminated. The issue is whether each condition is an appropriate constraint. If not, the permit condition should be modified, applied less restrictively or omitted entirely as it may directly or indirectly affect how much burning can be done.

After a thorough review of permit conditions and related issues during the 2009 Workgroup meetings, the represented agencies' stated belief (subject to additional review and analysis) was "that most of the specific conditions by themselves are not overly restrictive of burn projects."[21] The Air Division believes this is a key finding of the 2009 Workgroup.

[20] Not all permit conditions were discussed, only those identified as priorities by the burn agencies. Pages 10-14 of the Colorado Smoke Plan Interagency Review, March – June, 2009, Final Report of Findings and Recommendations contain findings and recommendations regarding permit conditions.
[21] Colorado Smoke Plan Interagency Review, March – June, 2009, Final Report of Findings and Recommendations, p. 11; not all permit conditions were reviewed.

Layers of Permit Conditions
The 2009 Workgroup's Final Report also found that permittee representatives believe "the multiple layers of the permit conditions can be very limiting to the burner."[22] The Air Division recognizes that this may be the case. As with the assertion that an individual condition is constraining, however, the question should be framed to ask whether multiple layers are inappropriately limiting.

Each permit condition is a response to a legal mandate appearing in Regulation No. 9 and/or a response to a problematic burn. It is not the intent of this report to rehash individual permit conditions; that on-going exercise is better suited to a more informal context.

'Nuisance Smoke' and Smoke Impacts to Public Welfare
When the public is impacted by smoke under the NAAQS levels, it is often referred to as 'nuisance smoke' though this term does not appear in Colorado regulation. Regardless, Regulation No. 9 requires the Air Division and applicants to minimize impacts of smoke to public welfare. The USDA Forest Service believes the state lacks the authority to regulate federal agencies based on nuisance effects of smoke. The USDA Forest Service believes that "nuisance" does not meet the requirements of Section 118 of the Clean Air Act. The Air Division believes that welfare impacts are inclusive of "nuisance" and that it does have the authority to regulate for public welfare. The regulatory definition of public welfare is included in the glossary of this report. A number of permit conditions reduce emissions and/or duration of public exposure to emissions to protect public welfare.

Recommendations

Continue to Make Progress on 2009 Workgroup Recommendations
A number of 2009 Workgroup Recommendations regarding permit conditions are either ongoing works-in-progress or have yet to be taken up. The Air Division will continue to move ahead with its past commitments and will inform stakeholders regarding implementation at least semi-annually.

Continue to Discuss Any Concerns with Particular Permit Conditions
It is important for the Air Division to follow-up on concerns expressed by any permittee regarding a particular application of a permit condition to insure the permit condition and its implementation are appropriate, to air issues so they do not fester, and to build mutual understanding.

Continue to be Open to Examine the Concept of "Layers"
Since the 2009 Final Report was completed, the Air Division has subsequently informally reviewed its permit conditions and their use in light of this finding. The review specified the intent of each condition to ensure each addresses a specific and different air quality outcome of a burn project that the Division must consider by law. The Division does not

[22] Ibid, p. 11. "Layering" is several permit conditions that apply to a given burn. For example: acreage limitation, prescribed wind directions, varying amounts of acres that can be burned at corresponding levels of meteorological dispersion, and public notification requirements.

doubt that for some members of the regulated community the experience of several permit conditions applying to a project may feel overly constraining. The question once again is whether this is appropriate or inappropriate for a particular burn project. The Division has not found any obvious duplication, although there may be cumulative effects on both burn opportunities and actual implementation.

During the 2009 Workgroup the Air Division requested that the burn agencies represented bring specific examples of inappropriate "multiple layers" to its attention at any time. To date, none has done so. While no specific near-term revisions to permit terms are identified at this time, the Air Division recommends continuing a review of the individual permit conditions and their interactions to learn from any actual situations that have occurred. Adjustments over time would be considered to support the appropriate use of prescribed fire while protecting air quality and public health.

Permit Conditions Related to 'Nuisance Smoke' and Smoke Impacts to Public Welfare
The Air Division will make every effort to balance permit goals and objectives with reasonable public welfare concerns including those that are raised by affected citizens.

IV. Implementation of Regulation No. 9 – Communication, Transparency, and Clarification.

Connected with the permit conditions themselves are considerations that include providing information about:

- what is required of smoke permittees,
- what are the intent and bases,
- what are the processes for attaining an approved permit with conditions,
- how are the conditions determined,

- what are the purposes of site inspections and field office visits,
- what are questions that permittees have asked over the years, and
- what does the Air Division consider in permit application review.

Any misunderstandings between the Air Division and the regulated community may serve to inappropriately interfere with the use of prescribed fire. As an illustration, if an applicant is not aware of all of their options they may overlook one that is best for a particular burn.

Findings

Providing Explanations and Better Organized Information Are Areas the SMP Can Improve

The 2009 Workgroup process helped the Air Division recognize several important findings:

- Over its 20 years the SMP has grown into a complex operation, in part due to the desire to be both predictable (e.g., standardized conditions) and to respond flexibly to unique burn project situations (e.g., non-standard tailored conditions).
- It became clear to the Air Division during the 2009 Workgroup's meetings that a significant portion of the discussions explored misunderstandings about how particular permit conditions work, reasons for/intent/history of individual permit conditions, past problematic burns and Air Division responses, and explaining how some particular past decisions had been made.
- The Workgroup's Final Report stated, "A smoke liaison position is invaluable in land management agencies with substantial burn programs as designated liaisons aid in ongoing communication, clarifying roles and procedures, and other issues that arise, and also in mentoring burners."[23] Active burn agencies are encouraged to identify a liaison. The largest permittee in the state, the USDA Forest Service, currently does not have a liaison. However, the agency continues to pursue its options.
- Formal means of communication between permittees and the Air Division have atrophied and degraded over the years.

Recommendations

Improving communication, transparency and complexity may serve to reduce misunderstandings and might lead to some additional use of prescribed fire in Colorado. Additional resources and funding may be necessary to make meaningful progress on several of these recommendations in a timely way.

Regularly Scheduled Communication Practices

In the past, the Air Division hosted an annual meeting and made staff available at annual Burn Boss gatherings. The Air Division ceased holding annual meetings several years ago and relied on the annual Burn Boss meeting. This has proved not to be sufficient. As a result, the Air Division will now hold a bi-annual meeting. The first of these occurred on October 23, 2009 and was attended by over thirty individuals, representing land

[23] Ibid, p. 9.

management agencies and the public.[24] Additionally, the Air Division will continue its long-standing practice of sending electronic newsletters to its permittees and stakeholders as changes, news, and/or events occur. A new subscription service for individual email notifications was recently offered and several notices have already been distributed.[25]

SMP Manual

Information important to a permittee about the SMP is distributed among multiple policies and guidance, instructions to applicants, site inspection protocols, and permit conditions. These are found variously on worksheets, application forms, a FAQ section on its web site and so on. It is obvious that most of this information should be pulled together into a single on-line document with a hypertext table of contents. The Air Division has completed the first draft of the manual and it is undergoing internal review.

SMP On-Line Permitting & Reporting System

Offering an on-line option for submitting permit applications and for reporting on permit activity, all currently paper forms, has been a long-time goal of the SMP. Ideally these web-based forms will be linked to the permit database. Such a tool would save considerable time with the many burn notification forms from permittees and permit renewals. One reason is that these web applications could contain on-line help for permittees and built-in error checks. Also, the Air Division spends considerable time each year correcting introduced errors as forms are entered manually from paper versions into the SMP's database. The Air Division will continue to pursue such a system. Procedural, security, and other internal issues remain very challenging.

Additional Thoughts About Simplifying the SMP

There is a trade-off between simplicity and flexibility in the SMP. As stated in the 2009 Final Report:

> To make permit conditions site-specific means that they may be more complicated, but the burner may get more burning opportunities as a result of the extra effort. Making conditions work for all sites means they may be simpler to meet but will be more restrictive to the burner. Another reality of SMPs is that adverse smoke impacts from a single burn can instigate revision of statewide permit conditions. (p. 11)

The Air Division has been discussing internally a concept that may help with this issue. It is based on the belief that a good deal of the complexity has come from having "standard" and "non-standard or tailored" permit conditions. If these two parts of the program were further separated and made into two tiers, the Air Division believes information, forms, guidance, and conditions that support the two could be organized behind each with less opportunity for them to be confused. The Air Division will bring a specific proposal for stakeholder comment in the near future.

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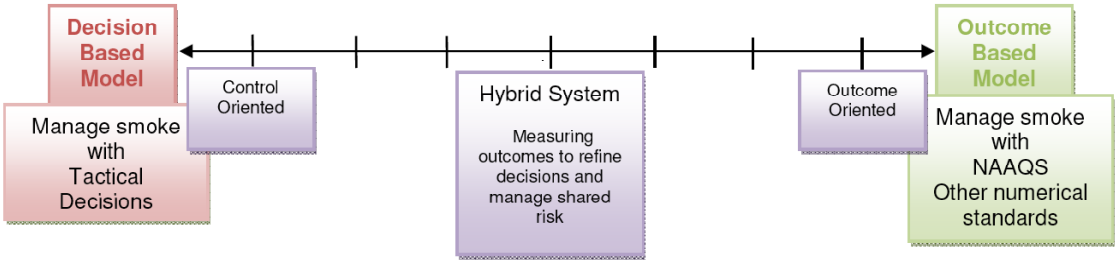
[24] The agenda and presentation materials from the meeting are available at: http://www.cdphe.state.co.us/ap/smoke/BigPicture.html

[25] The current Newsletter is available at: http://www.cdphe.state.co.us/ap/smoke/Newsletter.html

V. Implementation of Regulation No. 9 -- Colorado's SMP is Currently and Appropriately Decision-Based/Experience-Based in Structure. Therefore Change is Experience/Data-Driven and Based on Field Observations of the Smoke Outcomes of Fire and Weight of Evidence.

During the 2009 Workgroup, a number of terms were developed to describe various approaches to describing, designing, and implementing SMPs. The terms are useful in the context of this report. Essentially a continuum of program types was conceptualized. Three points on the spectrum were described as pictured below: decision-based (left side of the diagram below), outcome-based (right side) and hybrid (middle).



- Decision-Based Program Model. In this program type, responsibility for the consequences of smoke management decisions fall to the air regulatory agency. The air agency makes the myriad of decisions that affect smoke.[26] The decisions are based on experience. The burner has no permit-based legal responsibility for bad smoke outcomes as long as it complies with its permit conditions. The air agency alone is responsible to figure out what decisions yield what smoke outcomes. Within this program model, the regulatory agency enforces on the verifiable permit conditions, not the outcomes.

- Outcome-Based Program Model. In this program type at the other end of the spectrum, all responsibility for the consequences of smoke management decisions fall to the entity that burns. The air regulatory agency requires that numerical NAAQS and perhaps other numerical/quantitative values not be exceeded during a burn. There are no other permit requirements. Through increased fees to the programs users, the permittee would pay for and the air agency would monitor every burn's drainages, nearby residences and downwind communities to determine compliance, probably using multiple particulate instruments per burn day. If values are exceeded, this would be a serious outcome leading to enforcement action by the regulatory agency regardless of the reason the exceedance occurred (e.g., meteorological forecast was incorrect, high background pollution levels, a resident was at home who was not expected to be, holding challenges, and more duff and litter consumption than anticipated).

[26] Decisions could include: selecting number of acres for a particular day, the wording and forum choices for all smoke-related public outreach and notification, whether and when during a day to implement smoke contingency plans, all operational decisions that affect how quickly ignition ends and how much initial loft the fire generates, daily smoke go/no go decisions, specifying the details of day and night smoke monitoring, etc.

- Hybrid Program System. In a hybrid program type, responsibility for the consequences of smoke management decisions is shared by both the fire manager and the air agency. Some but far from all the variables that influence smoke outcomes are specified in a permit. In contrast to the outcome or decision-based models, the program's permit decisions and conditions are incrementally refined over time with objective data about smoke generation and impacts. In this hybrid, permit conditions evolve toward the connected goals of being based on data about outcomes, and being demonstrably necessary and sufficient to achieve good outcomes as per statutory and regulatory law.

Findings

Colorado's SMP is Currently and Appropriately Decision/Experience-Based

Over the 20 years of its existence, thousands of permits have been written. Permitted burn projects have been, with a few exceptions, completed without unacceptable smoke impacts. Because the existing numeric computer-modeling systems that predict PM2.5 concentrations and visibility impacts have widely varying results and/or insufficient accuracy in the complex terrain of Colorado, the SMP has based its program on experience of what has occurred in the past and had acceptable results.

Lack of Data and Information

Does the smoke and pollutants from burns permitted under the current SMP decision-based model run the risk of exceeding the NAAQS, other air quality concerns such as visibility impacts for Class I areas, or public welfare? Is the current SMP too stringent in some respects or 'about right' with its permit conditions for any particular burn and its associated smoke? Quantitative data and information to inform these questions are limited. The number of official particulate monitors in Colorado is small given the locations of all possible burns and the movement of smoke across the State.[27] Additionally, it has not been the practice of states or of land managers, for various good reasons, to use portable monitors and digital images in a systematic manner to learn about prescribed fire smoke impacts.

A Hybrid Program is the Recommended Direction but it Needs More Operational Definition

During the 2009 Workgroup, it appeared that some land managers represented desire that Colorado's SMP can someday be solely outcome-based but recognize that the infrastructure and experience do not currently exist to jump to such a system overnight. Others are concerned that with a purely outcome-based program, freedom may increase but that at least some additional enforcement actions would be almost inevitable through a reduction in the current practice of "shared-risk." In the case of a bad outcome, responsibility, risk, and blame would fall exclusively on the burn community. The Air Division's sense of the 2009 Workgroup was that all the agencies represented ultimately embraced the idea of a hybrid program, but that the term continues to mean different

[27] A map of filter-based PM10 and PM2.5 monitoring sites in Colorado is at http://www.colorado.gov/airquality/other_sites_map_ags.aspx
A map of real-time, continuous PM2.5 monitoring sites is at http://www.colorado.gov/airquality/aqi_map_ags.aspx

things to different Workgroup participants.

Computer Dispersion Modeling
The Air Division's currently approved "model" is based on experience and expert judgment of what has worked in the past. This has been captured in worksheets that show standard allowable daily acres or numbers of piles for particular situations (e.g., fuel loading or pile size, distance to homes). It is not a computer-based numeric atmospheric dispersion model. As stated in the 2009 Final Report:

> This approach was developed in response to APCD's lack of confidence in the accuracy of any of the smoke dispersion models (e.g., SASEM, SIS, and BlueSky). This [experience-based/expert judgment] type of model is valid, but can be improved.
>
> The current spreadsheet model does not involve numeric dispersion modeling of any projected emissions concentrations. Some burners want the capability to model emissions and determine how many acres can be considered in permitting. There is disagreement about the importance of making credible numeric projections as well as the extent to which effort is made and the feasibility of the effort. (p.10)

Change in Colorado's Program Will Continue to Be Evidence/Data Driven
The Air Division believes that evaluating the extent to which more burning can take place for a given scenario is likely to be an incremental process based on sufficient data and evidence related to smoke impacts that may include a role for computer dispersion modeling.

Feedback Loop Assumptions Have Not Been Met with Current Program Model
The Air Division's current SMP has an unwritten assumption about how the program would evolve that became more explicit during the 2009 Workgroup. The Air Division believed that over time numerous experiences would be documented of burn projects at or near the limits of standard condition acres and number/sizes of piles. In turn, the information learned would feed back into the program to aid in evaluating the standard conditions. Program evolution would continue to be based on an established feedback loop. While this has happened to a small degree, for the most part this feedback loop has not functioned.

Why has this not occurred?

1. In relation to the total number of projects burned, relatively few permittees burn even 50% of their permitted standard acres or pile sizes.
2. Fewer still have systematically photographed or measured what occurred with the smoke.
3. Less still are the numbers of burn days with good documentation of smoke that were in critical categories of interest (e.g., near populated areas).
4. Finally, not all of those documented burn days went well from a smoke perspective. Hence the few data points that do exist do not all point in the same direction. Given the complexity of the natural physical processes involved, it is not surprising the data implies complexity, but it does generate a need for more data points and information than a simpler situation would.

The Air Division recognizes that land managers experience considerable pressure to reduce wildland fuels in the State. With the onset of multiple forest insect and disease epidemics, the public and political establishments have become aware of wildland fuels concerns to an extent that is unprecedented. The Air Division believes that smoke permits are just one of the reasons that more acres are not being treated across the State. There are many constraints on the use of prescribed fire[28] and more broadly, on fuel treatments.

Permittees acknowledge the existence of other constraints on burners that limit opportunities to fully complete projects. The implications are that, assuming all of the Air Division's evaluations and potential adjustments to the program succeed with the result of a less restraining SMP, this may not be obvious in the level of overall burning in any given year. Yet, many land managers believe that any accommodation will lead to an environment wherein they will be able to burn more efficiently.

Recommendations

The Air Division believes the recommendations in this section collectively offer the most opportunity in developing needed information that will result in learning and program

[28] There are many more constraints on the use of prescribed fire than those contained in smoke permits. For any given burn project constraints may include available resources, availability of personnel, public acceptance of intentionally ignited fire by governmental agencies, the risk of fire escape creating a wildfire situation, weather conditions prior to and during the burn, drought conditions, agency reviews/protocols/bureaucracy before the burn is authorized, and so on. These constraints become more important for larger-scale burns entailing more risk.

evolution. They are essential in order to "support, and increase where possible, appropriate responsible use of prescribed fire" as per HB09-1199.

Commit to Continue a Hybrid Program
The Air Division believes that adjusting permit conditions, acreage limitations and pile sizes should continue to be based on data and information about outcomes. Tying future permit conditions to measured outcomes is a direction the Air Division will continue to pursue. It is recognized that this evolution involves incremental steps supported by continually increasing the understanding of the relationships between smoke impacts, monitored values, visibility, visual range, appearance of smoke in photographic images, size of projects, fuel and other site conditions, and/or meteorology under which they are burned. The Air Division is also hopeful that public welfare issues may become more tangible once better information about smoke and particulate matter concentrations have been collected in a variety of projects.

Collecting instrumented and detailed photographic information about smoke and the many factors that influence it is costly, time-consuming, and error-prone. A need exists to establish a balanced set of qualitative and quantitative best practices for obtaining high-quality information. Attaining sufficient high-quality information for decision-making will take time. If an adequate extent of observation-based information about actual smoke indicates that less restrictive

smoke permit conditions would have been sufficient, then relaxation of various permit constraints can occur at a meaningful pace. Fire managers from the most active agencies agree to treat collection of useful and reliable information as a mutual challenge. The Air Division cannot collect all the necessary information without significantly increased participation of fire managers.

It will be important to continue the dialogue as to what a "hybrid" program means operationally and how to directionally make progress toward this programmatic goal. The Air Division will be working with land managers and interested stakeholders to make more explicit operational plans and timelines for the continuing development of a hybrid program.

Building Infrastructure for Monitoring and Ongoing Operation and Analysis
Building further on the above recommendation, there is currently little monitoring infrastructure to support the learning habit that underlies a strong hybrid program. Despite best efforts, the experience of burn agencies and regulators with portable particulate monitors has been disappointing due to the instruments' chronic unreliability. Currently, the Air Division uses on-the-ground experience and photos from site inspections and other feedback from the regulated community to make incremental, data-based changes to the SMP. However, the Air Division recognizes the largest potential for change will come only with an investment in:

- portable smoke monitoring equipment including digital cameras and particulate measuring instruments,[29]
- significant resources for planning and for collecting on-site data and information,
- data and information analysis efforts, and
- an ongoing commitment to learn more about smoke impacts and the variables that affect them.

State law requires that the smoke management program fully recover its costs from permittees. If costs increase in order to support more information collection and possible faster evolution of permit conditions, permit fees will increase in direct proportion. Regardless of whether the Air Division and/or permittees install most of the monitoring, substantially increasing the pace of relevant learning <u>will</u> cost more. Movement within a hybrid program will involve human and capital resources to perform the activities listed above. Therefore, in addition to the dialogue called for in the previous recommendation, discussions must also include an estimate of what is needed and how to staff and fund it over what period of time. Even with a substantial effort, there are no certainties about the extent to which new data and information collection will support less restrictive permit conditions.

To make meaningful and timely progress to better understand the impacts of prescribed fire on the public will require significant additional resources beyond those currently available to the SMP. The Air Division looks forward to a collaborative effort to proactively develop a more robust monitoring program that is developed in concert with interested stakeholders as well as cooperating academic institutions. Opportunities for interagency cooperation are being explored, including sharing of equipment and resources. It is recognized that the community of people and agencies who burn must take primary responsibility either themselves to staff substantially increased smoke documentation and/or to fund the Air Division for more activity in this area. This overall

[29] The Division has recently purchased a DustTrak monitor and will be testing it during the next fire season. See http://www.tsi.com/en-1033/index.aspx

effort will be costly, take time, and will need long-term collaboration/partnerships between land managers and the Air Division. An adaptive management strategy will continue to be used, in which policy, modeling, measurements, feedback, and other experiences cycle through the SMP to inform change over time. It will be important to continue to talk about how operationally to develop and make continued progress within this overall program direction.

Computer Dispersion Modeling
Despite differing views between the Air Division and some federal land managers of what may be possible in the relevant future, the Air Division will remain engaged in tracking computer model development, testing, and use. The Air Division will continue to evaluate modeling options in conjunction with interested stakeholders. The hope is that a computerized numeric model may be used to accurately predict concentrations and would be useful in permitting. Science will continue to evolve and both the Air Division and stakeholders want to take advantage of relevant science, including numeric computer models, as it is available. However, the Division recommends that the most promise in the near-term is to focus on moving forward within a hybrid program based on a weight of evidence approach through monitoring, observation and experience.

VI. The View Forward

The findings, recommendations for change, and programmatic directions described in this report together offer a responsible path forward. The appropriate increased use of prescribed fire in Colorado can continue to be balanced with the matrix of air quality requirements that take into account statute, regulatory law, public health NAAQS, public welfare, and Class I visibility protection rules.

The challenges should not be minimized. Most land managers experience considerable pressure to increase burning and lower wildfire risk. There is a sense of urgency to responsibly and significantly increase the use of prescribed fire. At the same time, the questions raised by the Air Division remain: how to accommodate this without affecting public health and consistent with federal and state laws. Increased prescribed fire use, consistent with current understandings of its many benefits, will likely increase smoke levels and the public's exposure to smoke. This could increase complaints and concerns about health and welfare impacts.

During both the 2009 Workgroup and throughout the current evaluation study driven by the mandates of HB09-1199, the Air Division's view is that no simple, single action or

‘quick fix’ in the near-term emerged as the solution to “support, and increase where possible, appropriate responsible use of prescribed fire consistent with section 25-7-106 (7) and (8).” Instead the picture that emerges is that a steady, incremental, evidence-driven approach continues to offer the best path forward; a path that is uncertain, a path that will require fire and regulatory community collaboration as well as additional resources, and a path that will evolve over time.

Summary of Recommendations:

- Program Context:
    - Communicate regularly to the regulated community and other interested stakeholders about items outside the SMP’s control but are part of the context within which it operates. Such contextual items (e.g., potential changes in national public health standards) may affect the use of prescribed fire. Utilize the Air Division’s SMP newsletter and semi-annual stakeholder meetings as means of communication.
- Regulation No. 9:
    - No specific revisions to Regulation No. 9 are identified as being necessary to support the increased appropriate use of prescribed fire while protecting air quality and public health.
    - The Air Division will propose clarifying edits and, where feasible, more explicit definitions of some terms to the Regulation in the near future.
- Implementation – Permit Conditions:
    - While no specific near-term revisions to permit terms are identified at this time, the Air Division recommends continuing review of the individual permit conditions and their interactions. Adjustments over time would be considered to support the increased appropriate use of prescribed fire while protecting air quality and public health.
- Implementation – Communication, Transparency and Clarification:
    - The Air Division recommends
        - continued regularly scheduled meetings and newsletters,
        - development of a SMP Manual,
        - continued effort to develop an on-line permit application and activity reporting system, and
        - simplification of the SMP, especially how it is presented and organized for permit applicants.
- Implementation -- Colorado’s SMP is Currently and Appropriately “Experience-Based” in Structure. Therefore Change Is Based on Field Observations of the Smoke Outcomes of Fire and Weight of Evidence:[30]
    - The Air Division recommends
        - continued and increased commitment to measuring and documenting smoke in the field at various receptor locations to develop a more robust monitoring capability combined with data

[30] The Air Division believes the recommendations in the section aimed at continued shared learning about smoke impacts collectively offer the best opportunity for program evolution that will “support, and increase where possible, appropriate responsible use of prescribed fire” as per HB09-1199.

analysis to use the information to feedback into the program;

- where necessary to effect program improvement, additional resources beyond those currently available to the SMP in order to make meaningful and timely progress to better understand the impacts of prescribed fire on the public;
- that an adaptive management strategy continue to be used, in which policy, modeling, measurements, feedback, and other experience and evidence continue in a cycle to inform change over time. It will be important to continue to talk about how operationally to develop and make continued progress within this overall program direction (termed "hybrid program" in the body of this report); and
- continued evaluation of computer modeling options in conjunction with interested stakeholders.

Glossary and Web-Page Links

Agricultural Open Burning (Air Commission Regulation No. 9.II.A) - "The open burning of cover vegetation for the purpose of preparing the soil for crop production, weed control, maintenance of water conveyance structures related to agricultural operations, and other agricultural cultivation purposes."

Class I Areas - An area set aside under the Clean Air Act to receive the most stringent protection from air quality degradation. Mandatory Class I Federal Areas are (a) 44 international parks, (b) national wilderness areas and memorial parks larger than 5,000 acres in size, (c) national parks that exceed 6,000 acres in size and which were in existence when the 1977 Clean Air Act amendments were enacted. The extent of a mandatory Class I Federal area includes subsequent changes in boundaries, such as park expansions. There are 12 Class I areas in Colorado.

Colorado Air Quality Control Commission (Air Commission) - Created in 1970 by the Colorado Legislature, the Air Quality Control Commission develops air pollution control policy and regulatory law, regulates pollution sources and conducts hearings involving violations of the state's air pollution laws. The governor with the consent of the Senate appoints the nine-member citizen board.

National Ambient Air Quality Standards (NAAQS) - The standards established by the United States Environmental Protection Agency (EPA) that apply to outdoor air throughout the country.

Nuisance Smoke (from EPA's Interim Air Quality Policy on Wildland and Prescribed Fires): Amounts of smoke in the ambient air which interfere with a right or privilege common to members of the public, including the use or enjoyment of public or private resources.

Ozone - In the troposphere, the air closest to the Earth's surface, ground-level ozone is a pollutant that is a significant health risk, especially for children with asthma. It also damages crops, trees and other vegetation. It is a main ingredient of urban smog. The level of the NAAQS for ozone was established in 2008 at 0.075ppm over 8-hours based on the 4th maximum annual value monitored.

PM2.5 – Fine particles ($PM_{2.5}$), which are 2.5 micrometers in diameter and smaller (a micrometer is $1/1000^{th}$ of a millimeter; there are 25,400 micrometers in an inch.) EPA strengthened the 24-hour fine particle standard in 2006 to $35 \mu g/m^3$ (micrograms/per cubic meter). An area meets the standard if the 98th percentile of 24-hour $PM_{2.5}$ concentrations in a year, averaged over three years, is less than or equal to the level of the standard of $35 \mu g/m^3$.

Scientific studies have found an association between exposure to particulate matter and significant health problems including: aggravated asthma; chronic bronchitis; reduced lung function; irregular heartbeat; heart attack; and premature death in people with heart

or lung disease.

Prescribed Fire (Air Commission Regulation No. 9.II.M) - "Fire that is intentionally used for grassland or forest management, including vegetative, habitat or fuel management, regardless of whether the fire is ignited by natural or human means. Prescribed fire does not include open burning in the course of agricultural operations and does not include open burning for the purpose of maintaining water conveyance structures."

Public Welfare (Colorado Air Quality Commission Common Provisions Regulation I.G) - "As used in these regulations, effects on public welfare include, but are not limited to: effects on soils; water; crops; vegetation; manmade materials; animals; wildlife; weather; visibility; climate; damage to and deterioration of property; and hazards to transportation; as well as effects on economic values and on personal comfort and well being."

Regulation No. 9 link -
http://www.cdphe.state.co.us/regulations/airregs/

Shared-Risk – In the context of this report, the term means that the Air Division and burner share public responsibility for bad outcomes under certain circumstances – that is, if the burner complies with all permit conditions yet the outcome is in some way unacceptable. Under those circumstances the Air Division would not take enforcement action against the burner nor "blame" them in public. The burner and Air Division would work together to learn why the bad outcome occurred and take steps to insure it does not occur again.

Smoke Management (Air Commission Regulation No. 9.II.Q) - "Use of techniques to reduce smoke emissions, dilute smoke, identification and reduction of the impact of smoke on smoke-sensitive areas, monitoring and evaluation of smoke impacts from individual and collective burns and coordination among land managers for these purposes."

Smoke Management Program (SMP) - Requirements and procedures for regulating smoke from prescribed fires and wildland fire use, typically developed by States or Tribes with cooperation from stakeholders. Colorado's SMP website is:
http://www.cdphe.state.co.us/ap/smoke/

State Implementation Plan (SIP) - A plan devised by a State to carry out its responsibilities under the Clean Air Act. For example, for any area of a State that is determined to be non-attainment for a NAAQS the State must develop a SIP. In Colorado, SIPs must be approved in a public hearing process by the Colorado Air Quality Control Commission. Colorado's SIPs must also be approved by the State legislature and by the EPA. Once a SIP is fully approved, any amendments must go through the same review and approval process as the original SIP.

Wildlands (Air Commission Regulation No. 9.II.V) - "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 ten years), is not fallow, and is not in the United States Department of Agriculture 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."

Wildland Fuels (Air Commission Regulation No. 9.II.W) - "Combustible vegetative materials located on wildlands that can be consumed by fire, including naturally occurring live and dead vegetation, such as grass, leaves, ground litter, plants, shrubs, and trees, as well as excessive buildups of these materials resulting from resource management and other land use activities, as well as from natural plant growth and succession."

Attachment 1
Section 4 of HB09-1199

SECTION 4. 25-7-111, Colorado Revised Statutes, is amended BY THE ADDITION OF A NEW SUBSECTION to read:

25-7-111. Administration of air quality control programs -directive - prescribed fire - review - repeal. (5) (a) THE DIVISION SHALL CONFER WITH APPROPRIATE FEDERAL AND STATE LAND MANAGEMENT AGENCY REPRESENTATIVES, INCLUDING THE FOREST SERVICE AS DEFINED IN SECTION 23-31-310 (2), C.R.S., AND OTHER ENTITIES, WHICH MAY INCLUDE, AS APPROPRIATE, LOCAL AGENCY REPRESENTATIVES AND PRIVATE LAND MANAGERS, TO EVALUATE EXISTING PRESCRIBED FIRE PERMIT PROGRAM RULES AND IMPLEMENTATION SO AS TO SUPPORT, AND INCREASE WHERE POSSIBLE, APPROPRIATE RESPONSIBLE USE OF PRESCRIBED FIRE CONSISTENT WITH SECTION 25-7-106 (7) AND (8).

(b) THE EVALUATION REQUIRED BY THIS SUBSECTION (5) SHALL INCLUDE CONSIDERATION OF THE BALANCE BETWEEN THE ATTAINMENT AND MAINTENANCE OF NATIONAL AMBIENT AIR QUALITY STANDARDS AND THE ACHIEVEMENT OF FEDERAL AND STATE VISIBILITY GOALS, WITH THE IMPORTANT BENEFITS OF PRESCRIBED FIRE USE AS A LAND MANAGEMENT TOOL, INCLUDING WILDFIRE RISK MITIGATION, WATERSHED PROTECTION, FOREST HEALTH, AND REDUCED TREATMENT COST. THE DIVISION SHALL PROVIDE A REPORT TO THE COMMISSION BY JUNE 30, 2010, TO INCLUDE ANY RECOMMENDATIONS FROM THE EVALUATION UNDERTAKEN PURSUANT TO THIS SUBSECTION (5).

(c) THE DIVISION'S OBLIGATION TO PERFORM ITS DUTIES SPECIFIED IN THIS SUBSECTION (5) IS CONTINGENT UPON ITS RECEIPT OF REVENUES NECESSARY TO COVER ITS DIRECT AND INDIRECT COSTS FOR SUCH PERFORMANCE FROM THE HEALTHY FORESTS AND VIBRANT COMMUNITIESFUND CREATED IN SECTION 23-31-313 (10), C.R.S.

(d) THIS SUBSECTION (5) IS REPEALED, EFFECTIVE JULY 1, 2011.

Attachment 2
Other Pertinent Sections of Colorado Revised Statutes that Are Referenced in the New Law
CRS 25-7-106 (7) and (8)

(7) (a) The commission is specifically authorized and directed to develop a program to apply and enforce every relevant provision of the state implementation plan and every relevant emission control strategy to minimize emissions, including the impacts of actions by significant users of prescribed fire, including federal, state, and local government, and private land managers that are significant users of prescribed fire. The program developed by the commission under this subsection (7) shall include, but not be limited to, the imposition of any fees necessary to administer the program, including the recovery of costs by the state for the evaluation of planning documents pursuant to subsection (8) of this section, and the imposition of penalties pursuant to section 25-7-122.

(b) The general assembly hereby finds, determines, and declares that the Grand Canyon visibility transport commission's recommendations for improving western vistas report identified the emissions from fire, both wildfire and prescribed fires, as likely to have the single greatest impact on visibility at class I areas through the year 2040. The emissions from fire, both wildfire and prescribed fire, are an important episodic contributor to visibility impairing aerosols. The Grand Canyon visibility transport commission report identified that significant amounts of visibility impairment result from activities on federal lands, from mobile sources, and from Mexico.

(c) The general assembly further finds, determines, and declares that emissions from grassland and forest fires have substantial episodic impacts on ambient air quality throughout the state and are a major source of visibility impairment over which this state has jurisdiction but has not yet developed a comprehensive program to reduce such impairment.

(d) The general assembly further finds, determines, and declares that the standard in its statement of legislative purpose in section 25-7-102 of the "Colorado Air Pollution Prevention and Control Act" requiring the use of all practical methods that are technologically feasible and economically reasonable so as to reduce, prevent, and control air pollution is an appropriate standard to apply in relation to air pollution emissions resulting from the use of prescribed fire in grassland and forest management.

(e) This subsection (7) and subsection (8) of this section are adopted pursuant to section 118 of the federal act and shall be construed to exercise the full extent of the state's authority as granted by the provisions of said federal act. The federal government, as the only landowner of its size in the state and the only landowner in the state other than the state government itself that routinely prepares plans involving the management of grassland and forest lands using prescribed fire, is appropriately subject to the requirements of this section pertaining to review and approval of planning documents.

(f) Persons owning or managing large parcels of land who significantly use prescribed fire as a grassland or forest management tool shall prepare plans addressing the use and role of prescribed fire and the air quality impacts resulting therefrom, and such plans are appropriately subject to the review requirements of this section. The state, by reviewing these types of plans, can achieve significant progress towards cooperatively reducing emissions from those lands that impact visibility in Colorado.

(g) As used in this subsection (7) and in subsection (8) of this section, the term "significant user of prescribed fire" means a federal, state, or local agency or significant management unit thereof or person that collectively manages or owns more than ten thousand acres of grasslands or forest lands within the state of Colorado and that uses prescribed fire. The adoption of a fire management plan by a local or county unit of government pursuant to section 30-11-124, C.R.S., does not constitute management for purposes of this section unless the county or local unit of government owns or manages more than ten thousand acres and is a significant user of prescribed fire. "Prescribed fire" means fire that is intentionally used for grassland or forest management, regardless of whether the fire is caused by natural or human sources. Prescribed fire does not include open burning in the course of agricultural operations and does not include open burning for the purpose of maintaining water conveyance structures, unless the commission acts pursuant to section 25-7-123. The commission shall by rule exempt from the program developed pursuant to this subsection (7) those sources that have an insignificant impact on visibility and air quality.

(8) (a) The commission, in exercising the powers conferred by subsection (7) of this section and this subsection (8), shall require all significant users of prescribed fire, including federal agencies for activities directly conducted by or on behalf of federal agencies on federal lands, to minimize emissions using all available, practicable methods that are technologically feasible and economically reasonable in order to minimize the impact or reduce the potential for such impact on both the attainment and maintenance of national ambient air quality standards and the achievement of federal and state visibility goals.

(b) (I) In order to ensure compliance with the requirements of paragraph (a) of this subsection (8), significant users of prescribed fire shall submit planning documents to the commission. The commission shall then conduct a public hearing to review each planning document submitted relevant to achieving the goal of minimizing emissions and impacts as set forth in paragraph (a) of this subsection (8). Only one hearing shall be held for each planning document. The commission shall hold a hearing and complete its review of the planning documents submitted by any significant user of prescribed fire within forty-five days of their receipt by the commission, unless otherwise agreed to by the significant user of prescribed fire.

(II) As used in this paragraph (b), "planning documents" means documents that summarize the use of prescribed fire as a grassland or forest management tool and the associated discharge or release of air pollution and that demonstrate how compliance

with the state standard expressed in section 25-7-102 shall be achieved. "Planning documents" shall include land management plans or a summary of the equivalent information that explains and supports the land management criteria evaluated and the decision to use prescribed fire as the fuel treatment method. Planning documents shall include a discussion of the alternatives considered and a discussion of how prescribed fire, if selected, minimizes the risk of wildfire.

(III) The commission shall have discretion to adopt rules governing the resubmission of planning documents to prevent such plans from becoming outdated.

Attachment 3
Implementation Plan for HB09-1199 Study
Colorado Department of Public Health and Environment
Air Pollution Control Division
March 25, 2010

I. Overview:

a. This plan contains the final version of the implementation process for the evaluation study of prescribed fire required by CRS 25-7-111(5) - HB09-1199, Section 4.

b. The plan has just completed a public comment and revision phase. Three comments were received.

   i. This plan has been altered to respond to concerns that the "confer" aspect of the draft plan was ambiguous and could lead to unfulfilled high expectations; similar to the Solomon Trap,[31] a well-known problem with public input processes. Adjustments have been made to the implementation plan to help with these issues.

c. Stakeholders are reminded that this implementation process with opportunities for stakeholder and public involvement, while important, is one step in an on-going commitment from CAPCD for additional review, contact and discussion about the Smoke Management Program.

d. Reference materials are contained [in the two prior attachments within this report] ~~in two attachments at the end of this plan~~:

   i. Attachment 1: Section 4 of HB09-1199

   ii. Attachment 2: Other Pertinent Sections of the Colorado Revised Statutes that Are Referenced in the New Law

II. Implementation Plan:

Statutory Requirements Overview

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[31] The Solomon Trap: Public agency planning processes often face polarized situations between the agency and community members, the regulated community, and other stakeholders. The typical response is to increase the *number* of opportunities for public input. While logical, *more* public process may actually make the result worse. Why? More public process often raises expectations that the agency will develop a plan that satisfies *their* interests. The more opportunities for public input, the higher the expectations and the greater the chance that the plan will not be supported by a large share of the relevant community. This dilemma of unfulfilled expectations and the resulting dissatisfaction is difficult to avoid. In the world of professional facilitators, this dilemma is often called "The Solomon Trap". It usually results from a series of events:

- A need arises to develop or update a plan or develop a report about a controversial topic.
- The agency actively engages stakeholders to better understand their perspectives.
- Planners carefully craft and propose a reasonable plan/report based on compromises among competing interests.
- Stakeholders feel betrayed in not getting their needs met.
- Stakeholders strenuously object to the decision.
- The agency defends its decision.
- No one feels appreciated and everyone wonders why they bothered.
- The agency believes that some "golden mean" must have been discovered between the competing interests and that it must be a good plan/report "because no one likes it."

a. The law requires CAPCD to confer with appropriate stakeholders to evaluate the smoke management program rules and their implementation in order to allow for appropriate, responsible increases in the use of prescribed fire where possible.
b. The evaluation is to be done in the context of considering the balance between protecting public health laws and state/federal visibility goals with the benefits of prescribed fire within statutory mandates (see Attachment 2)
c. CAPCD is to report recommendations to the Colorado Air Quality Control Commission.

III. Implementation Plan:
Overall Implementation Approach
a. In response to HB09-1199, CAPCD will draft a report. The draft report will focus on various aspects of the smoke management program in the context of opportunities to increase the use of prescribed fire responsibly.
b. The overall approach is based on building upon and developing what has already been accomplished during 2009 and to-date in 2010.
    i. The smoke management program rules and their implementation were evaluated this past winter/spring in a series of meetings (30+ hours) with the Colorado State Forest Service, US Forest Service, US Bureau of Land Management, and US National Park Service. CAPCD acknowledges that not all of the smoke management program's permittee groups were represented during the 2009 meetings; the 4 agencies constitute approximately 80% of permits written in 2008.
    ii. The final report from that workgroup process will be used by CAPCD as input to the HB09-1199 report. The final report from those meetings is available at: http://www.cdphe.state.co.us/ap/smoke/Docs/SmokeWorkgroupReport.pdf
c. There will be a public review process of the draft report prior to it being revised and submitted to the Colorado Air Quality Control Commission.

IV. Implementation Plan:
Seek Public Comment Process on CAPCD's Draft Report
a. CAPCD will seek public input and comment on the draft report in three ways: 1) confer with selected stakeholders in a workgroup setting, 2) invite written comment from any interested party via email, and 3) hold open public meetings. Each is discussed in further detail below.
    i. CAPCD will confer with invited stakeholder groups in two half-day group sessions. The meeting dates have yet to be set but will be during mid-April and early-May 2010.[32] The workgroup will review an initial draft of the report. The meetings will be facilitated. The makeup of the confer group is not yet finalized but

[32] The work group meetings took place on May 12 and 13, 2010 with a follow-up session to reach consensus on the draft document on September 1, 2010.

is likely to include 1 representative each from:

1. Colorado State Fire Chiefs Association,
2. Colorado State Forest Service (also representing other state land management agencies),
3. Colorado Utilities Coalition or other industry association,
4. County air quality/environmental health agency,
5. Forest products industry,
6. Public health professional,
7. Private burners,
8. The Nature Conservancy,
9. US Forest Service,
10. US Bureau of Land Management,
11. US EPA Region 8,
12. US National Park Service,
13. US Fish and Wildlife Service, and
14. US DOD Fort Carson.

ii. Invite written comment via email.

1. After the draft report is revised based on the confer workgroup meetings, CAPCD will notify by email a wider range of stakeholders of availability of the revised draft report for download from its website.
    a. The public written comment period will be for at least 60 days.

iii. Conduct two public meetings to seek input regarding CAPCD's revised draft report and recommendations.

1. Two facilitated open public meetings[33] will be announced at least 4 weeks in advance via email and CAPCD's web site.
    a. Meeting in Denver, end-of-May, 2010.
    b. Meeting in Grand Junction, early-June 2010.
2. There will be opportunity for verbal comment as well as submittal of written public comment and input.

V. Implementation Plan:

Prepare Final Report and Deliver to the Commission Office by June 30, 2010.[34]

a. CAPCD will revise its draft report in light of stakeholder and public input. CAPCD will deliver the final report to the Colorado Air Quality Control Commission office by June 30, 2010 as per statutory requirement.
    i. CAPCD will request an opportunity to present the report and its recommendations at the July 2010 Commission meeting.[35]

[33] These meetings were ultimately scheduled for October 19 in Denver and October 20 in Grand Junction.
[34] The final report was ultimately delivered to the Commission on February 10, 2011.
[35] Presently, this briefing is scheduled for the March 17, 2011 regular monthly meeting of the Commission.

Attachment 4
Attendance Lists for the
Three "Confer" Meetings with Invited Stakeholders
and
Two Public Meetings
Regarding Comment and Input on the Air Division's Draft Report

Meetings 1 & 2, May 12-13, 2010: Invited stakeholder "confer" meeting to reach consensus on the Air Division's draft report

Name	Representing
Todd Bryan	Keystone Center -meeting facilitator
Dan Ely	CO Air Pollution Control Division
Sarah Gallup	CO Air Pollution Control Division
Coleen Campbell	CO Air Pollution Control Division
Andy Bundshuh	USDI National Park Service
Todd Richardson	USDI Bureau of Land Management
Darwin Schultz	USDI Fish & Wildlife Service
Jeff Sorkin	USDA Forest Service
Jane Lopez	Colorado State Forest Service
Peter Wolf	DOD - US Army, Fort Carson
Dan Hendershott	Summit County, Environmental Health
Natalia Swalnick	American Lung Association
Mike Babler	The Nature Conservancy
Lesli Allison	Banded Peak Ranch
Laurel Dygowski	EPA Region 8

Note: not all participants were present at all times during both sessions.

Meeting 3: September 1, 2010: Invited stakeholder follow-up meeting to make further progress on the revised Air Division's draft report

Name	Representing
Todd Bryan	Keystone Center - meeting facilitator
Dan Ely	CO Air Pollution Control Division
Sarah Gallup	CO Air Pollution Control Division
Andy Bundshuh	USDI National Park Service
Darwin Schultz	USDI Fish & Wildlife Service
Jeff Sorkin	USDA Forest Service
Vaughn Jones	Colorao State Forest Service
Todd Richardson	USDI Bureau of Land Management
Peter Wolf	DOD - US Army, Fort Carson

Doug Bjorlo	Larimer County Dept of Health and Environment

Public Meeting 1, Denver Metro, October 19, 2010	
Name	Representing
Todd Bryan	Keystone Center - meeting facilitator
Dan Ely	CO Air Pollution Control Division
Sarah Gallup	CO Air Pollution Control Division
Mike Broughton	USDI Fish & Wildlife Service
Dennis Haddow	self - retired

Public Meeting 2, Western Slope/Grand Junction, October 20, 2010	
Name	Representing
Todd Bryan	Keystone Center - meeting facilitator
Dan Ely	CO Air Pollution Control Division
Sarah Gallup	CO Air Pollution Control Division
Callie Hendrickson	White River Conservation District
Craig Goodell	USFS Regional Office
Steve White	Montrose County

Attachment 5
Written Public Comment Emails and Letters Received Regarding the Air Division's Draft Report

Comment #1: Summit County Environmental Health

From: "DanH" <DanH@co.summit.co.us>
To: "DAN Ely" <dwely@smtpgate.dphe.state.co.us>
Date: 8/19/2010 5:35 PM
Subject: RE: HB1199 draft report

Hi Dan,
I apologize but I am unable to meet at all in the next 3 months. We have two inspectors and one just had a baby 5 weeks early. The other one goes on vacation the day after the planned meetings, and I (well, my wife) am having a baby mid October. I'm afraid I just have to hope for keeping up with the imminent things and know that you all will represent well.

I only have 4 suggestions for improvement to the open burning policies:

1) Reduce the paperwork. I can see someone getting a permit, with a list of detailed conditions, and going to town. One of the conditions would be that they need to call in (or log in) to check if the weather conditions are favorable and state their intent to burn. If there are problems then they are dealt with on a complaint basis. Most people don't want to cause problems.

2) Maybe a chart could be created where certain volumes of burning can be done with certain weather conditions? For example if you want to burn one 15-20 foot diameter pile you need Good or better weather conditions for 12 or more hours. 8-15 foot piles only need Good weather conditions for 6 hours or more. With This "out cold" by dusk is outdated. We can easily see if weather conditions are going to deteriorate after dusk and permit accordingly.

3) This should be #1. License frequent burners. They wouldn't even need to call in for permission and are only regulated on a complaint basis. These guys know how to look up Vent Rate and POP. If we consistently see problems with the same burner then their license can be revoked or they can be fined. I know some people don't like this but it works in nearly every other industry.

4) Hold classes for licensed burners (for CEU's), other burners just wanting to learn, local regulators, etc. Maybe only once per year prior to winter?

Comment: We have hundreds of thousands of restaurants that serve meals all day, every day. Thousands of people die from food borne illness every year, yet an inspection is only done of these facilities 2 times per year on average. The same holds true for child

care centers, drinking water plants and swimming pools/spas, yet weren't not requiring that they notify us every day that they are serving. Don't get me wrong, this is a very important program but we have to evaluate our programs on a risk based approach and balance that with the need. We have to eat, we have to drink, we have to let our kids interact with other kids and we have to allow burning of biomass. They are all hazardous activities but the hazard with not doing them is greater.

These are just suggestions. Of course I haven't thoroughly thought through the full implications of such changes. If nothing changes I will still happily follow CDPHE's rules. I know you can't please everyone.
Thanks, Dan

Dan Hendershott, REHS
Environmental Health Manager
Summit County, CO 80443
(970) 668-4073

Comment #2: Air Sciences Inc.

To: DAN Ely
Date: 9/29/2010 10:13 AM
Subject: Fwd: RE: Recommendations Regarding Colorado's Smoke Management Program, Notice of Public Comment Period and Public Comment Meetings

Thanks for including me on the public notice email distribution.

I looked over the APCD's report. It reflects a lot of thoughtful work, is well presented and reasonable. Except for the infamous Reg 9 exemption to permitting for open agricultural burning, Reg 9 and the recommendations in the report offer a reasonable, open minded, and balanced approach to increasing planned burning and protecting public health.

If a brain-storming session re: the on-line permitting system or mobile/remote particulate and scene monitoring would be useful to you, please feel free to call on me.

Regards, Dave

Dave Randall - Principal
Air Sciences Inc. (www.airsci.com)
1301 Washington Ave Suite 200
Golden, CO 80401
e/ drandall@airsci.com
w/720.389.4221 (direct)
w/303.988.2960 x221 (main)
c/ 303.618.8489

Comment #3: San Juan Public Lands Center

USDA Forest Service
San Juan National Forest
http://www.fs.fed.us/r2/sanjuan

San Juan Public Lands Center
15 Burnett Court
Durango, CO 81301
Ph (970) 247-4874 Fax (970) 385-1243

USDI Bureau of Land Management
San Juan Center
http://www.co.blm.gov/

File Code: 5140/1560
Date: November 19, 2010

Mr. Dan Ely
Colorado Department of Public Health & Environment
APCD-TS-B1
4300 Cherry Creek Drive South
Denver, CO 80246-1530

Dear Mr. Ely;

We wish to thank the Air Quality Control Commission for the opportunity to review and comment on the draft Report to the Colorado Air Quality Control Commission, Recommendations Regarding Colorado's Smoke Management Program. The committee should be commended for involving the significant users of Prescribed Burn Permits in the review and recommendation process. Upon reviewing the report, San Juan Public Lands has the following comments.

On San Juan Public Lands (San Juan National Forest and Bureau of Land Management lands in Southwest Colorado) there are over 375,000 acres classified as ponderosa pine and warm-dry mixed conifer forests. Numerous research projects have determined that these vegetation types burned an average of once every 10 to 20 years prior to European Settlement. Since the interruption of the natural fire regime over 100 years ago, most of these lands have not experienced fire. As a result, these ecosystems have uncharacteristically high fuel buildups to the point where many are in an unsustainable condition. In the last 10 years the Forest Service and BLM have embarked on an aggressive program to reduce fuels, return fire and restore ecosystem health to these high risk vegetation types. The first step in this restoration program is usually a mechanical treatment to thin the forest and redistribute fuels (e.g. mastication). The follow-up treatment for most projects is prescribed burning. Though some pile burning is conducted in sensitive areas or in the Wildland Urban Interface (WUI), broadcast burning is the most efficient and effective method to restore these forests. First-entry prescribed broadcast burns are always more difficult to implement due to the high fuel loads. Burn windows are usually restricted to the cooler seasons (spring or fall) when the risk of severe fire behavior or an escape is lower.

Overly Restriction Permit Conditions
The report states that "specific permit conditions are not overly restrictive of burn projects." Though most of the permit conditions are fair and reasonable, we believe that some are overly restrictive. In particular, the acreage and "End Ignition Time" restrictions for the timber categories when there are residences or receptors near burn units. One mitigation strategy to reduce smoke impacts is to ignite the unit in a way to produce significant heat to loft the smoke column high in the atmosphere. This is difficult to do when permitted acres are less than 50 and ignition must stop several hours prior to sunset. The late afternoon hours are often the best time of day for accomplishing burn objectives and lofting the smoke column.

The Report states "on relatively few burn days do property owners or land managers complete even 50% of allowable acres or piles." It goes on to say that there are other constraints on burners that limit opportunities for fully complete projects. This statement implies that APCD permit requirements do not restrict burning opportunities and acres. There are numerous other factors that go into determination of a prescribed burn unit including vegetation/fuel type, terrain, natural fire breaks, available resources and budgetary constraints. The size of burn units is based on natural features and existing fuel breaks. Often, burn units need to be burned in a certain order. At other times only a few of the units are prepared or in prescription. Therefore, on a "permitted" burn day, the acres that are burned are based on the burn plan and the conditions on the ground not the maximum number of acres allowed in the prescribed fire smoke permit. Using this as a justification that the existing permit conditions do not restrict burning is erroneous and misleading. For example, a burn area may have 1 unit that is 75 acres in size and another that is 300 acres. If the APCD permitted acres for that burn day is 200 acres, then the 75 acre unit will get burned. It is usually not practical to try to divide the 300 acre unit into a 100 acre unit and a 200 acre unit. Burning the larger unit for two days is not always an option for various reasons, one being that it may only be a one-day window.

The APCD fails to recognize the number of potential burn days when other conditions are met (staffing, fuel conditions, weather) but no burning is implemented because of Permit Conditions concerning smoke dispersal forecasts. This is not necessarily a "Poor" smoke dispersal day. Some of our prescribed burn units are restricted by APCD permits to "very good/excellent" smoke dispersal forecasts.

Nearness of Sensitive Receptors
Any burn within 5 miles of a sensitive receptor, as defined by APCD, has more restrictive burn conditions. We recommend that the APCD apply more site specific conditions based on terrain, wind patterns (diurnal and general) and prescriptive wind directions. If the permittee can justify that the burn under prescribed conditions is unlikely to impact the sensitive receptor then that burn should be permitted as "rural," or at least with less restrictive acreage and end time conditions.

Wildland Urban Interface

In this era of tight budgets, we would like the APCD to allow for more flexibility in the Wildland Urban Interface (which is near homes and thus the most restrictive permit conditions but also high priority for fuels reduction). One day burning 200 acres is better in terms of smoke impacts then 5 consecutive days burning 45 acres or less each day. Under the current federal direction, federal agencies are mandated to implement 90% of fuels budget in the WUI. Burning is always more expensive in the WUI for numerous reasons including values at risk, conflicts with other resources uses, high levels of recreation use, high public visibility and the need for additional firefighters. Therefore, it is more cost effective to burn one large unit in one day rather than dividing it up into several smaller units and burning for numerous consecutive days. With a larger unit, it is easier to loft the smoke higher in the atmosphere during the day where upper level transport winds will disperse it. In low valleys prone to inversions, several consecutive days of smoke incursions tend to accumulate under the inversion and can be slow to leave the area.

Remote Areas and Blacklining

Finally, we think that in very remote areas far from homes and communities and for "blacklining" larger burn units, burning under "poor" smoke dispersal forecasts should be allowed. In order to even begin to get caught up on our backlog of prescribed fire needs we will need to take advantage of all possible burn days.

Summary of Comments:

1. There are over 375,000 acres of ponderosa pine and dry mixed conifer forests on San Juan Public Lands that historically burned every 10 to 20 years. At the current rate of prescribed burning (approximately 2,000 acres/year) it will take over 180 years to burn all of our dry forests once. Anything that can be done to allow for more prescribed burning will improve ecosystem health and reduce the risk of severe wildfire.
2. We feel that some of the conditions <u>are</u> overly restrictive, especially the acreage limitations and stop ignition times near homes and sensitive receptors. We strongly believe that burning more acres/day and being able to burn in the late afternoon will decrease the overall impact to nearby residences. Instead of burning several small units for consecutive days, a larger area would be burned in one day and more of the smoke would be lofted higher into the atmosphere reducing the total smoke impact to residents.
3. We think that site specific criteria (fuels, terrain and acceptable weather conditions) should be applied to determine if a burn could potentially impact a sensitive receptor. If a permittee can demonstrate that a burn is unlikely to impact a sensitive receptor, even if it is within the 5 mile buffer, then that burn should be permitted as "rural."

4. We need more flexibility in permit conditions for burns in the Wildland Urban Interface as this is where the greatest needs exists for fuel reduction.
5. Allow some limited burning under poor smoke dispersal conditions if:
    a. No residences or receptors will be affected by the smoke.
    b. For blacklining to setup a burn for a subsequent higher smoke dispersal forecasts.

We are experiencing dramatic and unprecedented changes in our forested ecosystems in Colorado, partially as a result of over 100 years of fire exclusion. With the uncertainty of climate change adding stress on our ecosystems, managing healthy, resilient forests is more important than ever. Fire is a key tool, and in many places our only tool, for management of dry forests in Colorado. We all need to work together to increase opportunities for prescribed fire. Because fire is inevitable in most of our ecosystems, allowing more prescribed fire under controlled conditions will reduce long-term emissions.

Sincerely,

/s/Brad Dodd (for)
MARK W. STILES
Forest Supervisor/Center Manager

cc: Craig_Goodell
Justin_Kincaid

Comment #4: Grand County

From: "Jennifer Scott" <jscott@co.grand.co.us>
To: <dan.ely@state.co.us>
Date: 11/17/2010 10:04 AM
Subject: smoke comments
Attachments: cdphe smoke comments 10-11.doc

Dan,
Attached is the comment letter from Grand County. Good work on the report. I hope something positive will occur. I can't believe I am saying this, since I am the one on the line locally when things go bad, but burning is such an important component of forest management and Grand County could not have gotten as much mitigation work done without it. According to the CSFS, Grand County is has completed mitigation work on more than 50% of the nearly 50,000 acres of private land!
Hope all is well with you and you enjoyed your brief visit with winter. Hopefully things will get mild and beautiful again.
Thanks,
Jennifer Scott, Grand County

Department of Road & Bridge

Ken Haynes • Road Superintendent

Division of Natural Resources
Jennifer Scott, Division Foreman
469 E. Topaz, PO Box 9, Granby, CO 80446
Office: 970-887-0745 • Fax: 970-887-1858

November 17, 2010

Colorado Air Quality Control Commission
EDO-AQCC-A5
4300 Cherry Creek Drive South
Denver CO 80246-1530

To whom it may concern;

Grand County is in full support of the intent of HB09-1199; open burning should increase where practical across Colorado as a means of fuel load reduction in our wildlands and urban/wildland interface. Grand County has been operating under the Delegation of Authority from the Colorado Division of Public Health and Environment Air Quality Control Division since approximately 2001. Over 90% of the forests covering Grand County are now dead due to the Mountain Pine Beetle epidemic and as a result, Grand County land owners have increased tree removal and the burning of woody debris ten fold. In response to the massive increase in woody debris and with the assistance of the CDPH&E Air Quality Control Division personnel, Grand County has increased open burning, while staying within established air quality parameters, to the greatest daily volume that is possible.

While public health standards are important to maintain, short-term, temporary Class I visibility standards may be an appropriate avenue to relax in order to achieve a healthier more resilient forest in the near and long term. Before the MPB epidemic, Grand County residents expressed a "zero tolerance" about the visibility of smoke plumes. Because of the increased education and communication with residents as a result of the MPB epidemic, Grand County residents have changed and now accept visible smoke allowing both private land owners and public land managers increased access to burning. Any day with good or better air quality is a burn day. The majority of our 600-800 private property permits get completed each year.

Although our program has not been absolutely perfect, out of the 15 million cubic feet of woody biomass burned annually, fewer than 3 instances of enforcement actions per season have occurred. The enforcement actions have been caused mainly by inaccuracies in pile volumes as reported by private land owners or the lack of understanding of the program guidelines. Occasionally the local air quality reports are not representative of on-the-ground conditions. In these instances, where receptors are more than a mile away from burning piles, Grand County formally requests the authority to allow these piles to continue to burn, as they can be extremely difficult to extinguish and in the short term and would produce more smoke. Of course if complaints from citizens are received, Grand County would seek immediate termination through any means possible.

Thank you for your consideration in this matter.

Sincerely,

Jennifer Scott
Foreman
Grand County Division of Natural Resources