

# State Approaches to Particulate Matter Emissions from Agricultural Burning: Laws and Policies Across the United States

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## Executive Summary

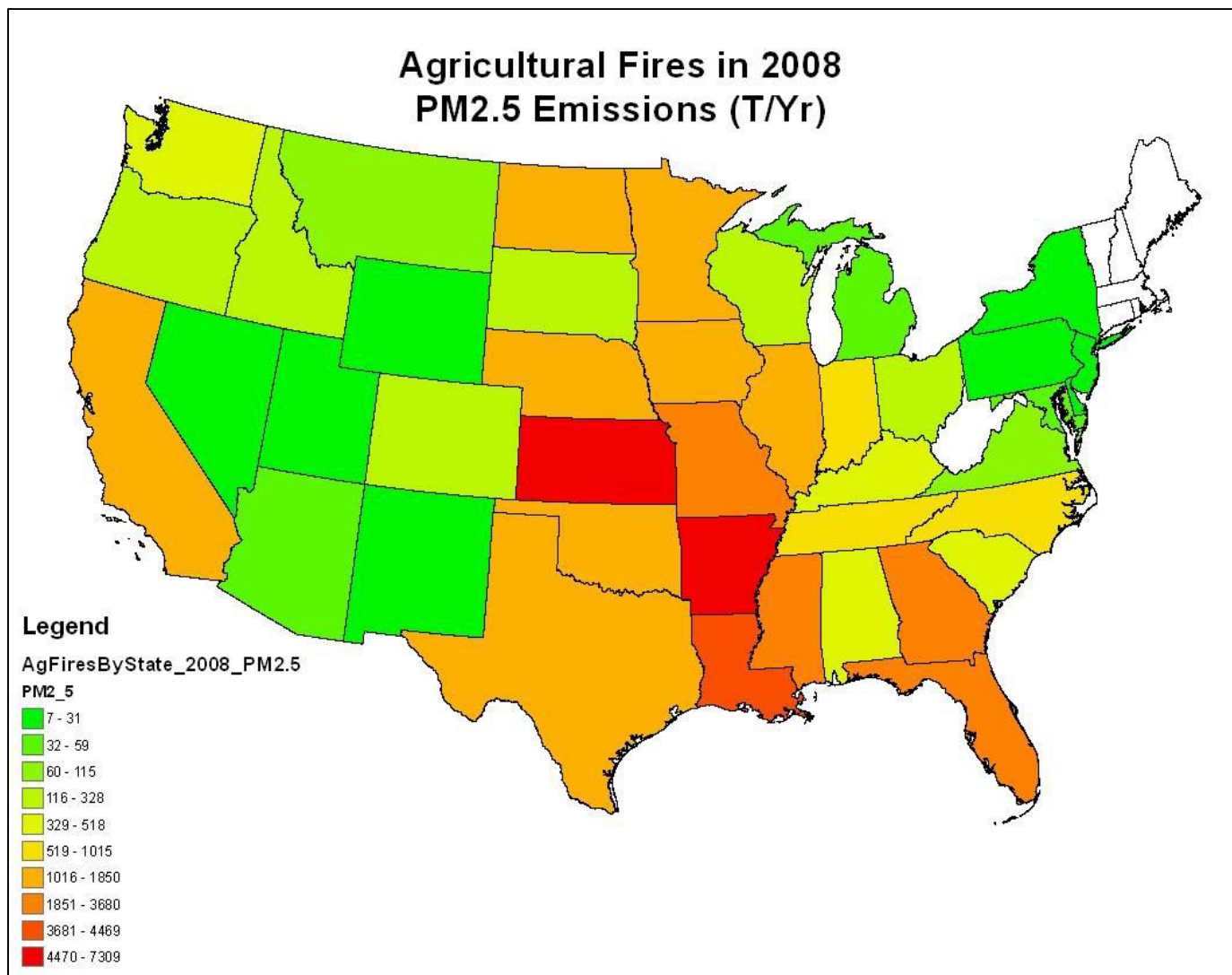
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This report focuses on states' approaches regarding agriculture-based particulate matter derived from agricultural burning activities in light of recent tightening of the National Ambient Air Quality Standards for particulate matter established under the Clean Air Act and its implementing regulations administered by the U.S. Environmental Protection Agency (EPA).

Currently, Arkansas has no areas considered to be "nonattainment" for particulate matter. However, in its 2008 National Emissions Inventory, EPA reported that based on EPA-compiled data Arkansas ranked the highest of all states in emission estimates for particulate matter derived from agricultural burning (See Figure 1). While Arkansas' air is relatively clean when compared to many other states, levels of fine particulate matter could reach a point where Arkansas could obtain "nonattainment" status. This development would trigger required corrective measures by Arkansas policymakers that could impact economic growth and sustainability of businesses that emit particulate matter, specifically agricultural burning activities. It bears noting that some of those industries could be impacted by other aspects of the Clean Air Act as well. Thus, it is important to identify and compile approaches taken by states regarding agricultural burning activities as a means of providing objective and fact-based policy considerations for Arkansas policymakers and stakeholders.

As detailed in this report, a few states have implemented policies designed to reduce the use of agricultural burning. However, the majority of states continue to allow agricultural field burning with minimal regulation. In instances where there is regulation, there exists considerable variance in policies. States, including those that contain "nonattainment" areas, continue to recognize the role of agricultural burning when creating policies related to air pollution emissions. In addition, minimal information about the impacts and outcomes of those policies is publicly available.

This report provides a basic overview of state laws and regulations related to agricultural burning. It includes examples of how other states address crop residue burning in smoke management plans and through their burn permitting process. Also included are examples of incentives related to agricultural burning, education programs for landowners and burners, and steps some states have taken to engage stakeholders.



**Figure 1.** National EPA estimates for agricultural burning for each state. U.S. EPA, 2008 National Emissions Inventory, version 2 Technical Support Document (June 2012)<sup>1</sup>.

<sup>1</sup> [http://www.epa.gov/ttnchie1/net/2008neiv2/2008\\_neiv2\\_tsd\\_draft.pdf](http://www.epa.gov/ttnchie1/net/2008neiv2/2008_neiv2_tsd_draft.pdf)

## Descriptions of Terms & Abbreviations

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**Attainment** – A geographic area that meets or does better than the national ambient air quality standard.

**Coarse particles** – Particulate matter with a diameter larger than 2.5 micrometers but smaller than 10 micrometers. These particles are often found near roadways and dusty industries.

**Criteria air pollutants** – The six common pollutants for which the Environmental Protection Agency has set National Ambient Air Quality Standards. The six pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, particle pollution (PM<sub>2.5</sub> and PM<sub>10</sub>) and sulfur dioxide. These six pollutants are subject to strict regulation.

**Fine particles** – Particles that have a diameter of less than 2.5 micrometers. These particles, often found in smoke and haze, can be directly emitted from sources such as forest fires, or they can form when gases emitted from other sources react with elements in the air.

**National Ambient Air Quality Standards** – Air quality standards established by the U.S. Environmental Protection Agency under the Clean Air Act for criteria air pollutants. These standards are categorized as primary standards and secondary standards. Also known as NAAQS.

**Nonattainment Area** – A designated area of a state, usually a county, where air pollution levels consistently exceed National Ambient Air Quality Standards.

**Particulate Matter** – Particulate matter, or PM for short, is a complex mixture of small solid particles and liquid droplets found in the air. Examples of particulate matter include acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles. The EPA is concerned about smaller PM because they are capable of being inhaled and passing through to the lungs possibly resulting in adverse health effects.

**Particulate Matter 2.5** – Particulate matter that is 2.5 micrometers in diameter or smaller in size. To put this in perspective, 2.5 micrometers is approximately 1/30 the dimension of a human hair. Also known as PM<sub>2.5</sub>.

**Particulate Matter 10** – Particulate matter that is less than 10 micrometer in diameter, but larger than PM 2.5. Also known as Coarse PM or PM<sub>10</sub>

**Prescribed burning** – Prescribed burning is the intentional burning of certain land areas to accomplish natural resource management objectives.

**Primary standards** – Standards that protect against adverse health effects for the public, including protecting the health of “sensitive” populations such as children and asthmatics. Also known as Primary NAAQS.

**Secondary standards** – Standards that provide protection for the public welfare. These standards provide for protections against decreased visibility (smog) and damage to crops, vegetation, and animals.

**State Implementation Plan (SIP)** – A federally approved and enforceable plan by which each state identifies how it will attain and/or maintain health-related standards. Essentially, a state’s blue print for clean air.

## Introduction

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Fire has been used as a land management tool throughout history. In agriculture, farmers use fire in their fields to reduce dead vegetation, replenish nutrients in the soil, stimulate new growth, and to eliminate pests and disease.

Despite the benefits of fire as a management tool, over time the acceptance and use of fire in general has decreased as communities have become more populated and new understandings of human health have driven air quality policies at the local, state and federal levels. Crop residue management through the use of fire, however, remains a fundamental practice in agricultural production.

Air pollution policies and scientific studies have prompted many states to acknowledge how fine particles emitted during burning can pose health problems for many people when inhaled. These fine particles are known as particulate matter, or PM, and are a complex mixture of solid particles and liquid droplets found in the air. PM comes from a variety of sources such as agricultural fields, unpaved roads, woodstoves and fireplaces, tobacco smoke, smog and forest fires. Under the right conditions, this material can travel vast distances.

The U.S. Environmental Protection Agency, or EPA, established standards for fine particle pollution in the 1990s as part of the National Ambient Air Quality Standards outlined in the Clean Air Act. The standards for the various sizes of particulate matter have been revised and reduced several times since.

Using science-based guidelines, the EPA set permissible levels of these pollutants based upon a set of standards. Primary standards protect human health, and secondary standards are intended to prevent environmental damage. If a region is below these national standards, it is considered to be in attainment. An area with levels above is called a nonattainment area. States with nonattainment areas must draft a plan indicating how they will improve air quality. These policies and standards are discussed more in-depth below.

### Objectives

Currently, Arkansas has no areas considered as nonattainment for PM. However, a growing issue for Arkansans is the potential conflict between federal environmental policies and state land management policies that involve prescribed burning, PM emissions and smoke management.

States have taken different approaches to addressing agricultural field burning's impact on local emissions of particulate matter, but there is not a central database disclosing these strategies.

The University of Arkansas Division of Agriculture's Public Policy Center partnered with the National Agricultural Law Center to review air quality regulatory approaches across the United States. The review was part of a larger study on managing crop residues to reduce particulate matter emissions the Division of Agriculture undertook on behalf of the Arkansas Department of Environmental Quality.

The objectives of the Public Policy Center study were to research and compile current regulations and incentive approaches undertaken in other states in relation to agricultural field burning to aid decision makers in Arkansas.

To acquire this information, we reviewed:

- State Implementation Plans for policies related to agricultural field burning and open burning
- State laws regarding agricultural field burning and open burning
- Smoke management plans and guidelines from multiple states
- Court decisions
- Websites for Air Pollution Control Districts or other state agencies responsible for air quality
- Various journals for impact of state and federal policies
- Cooperative Extension Service air quality publications across multiple states

What became clear early on during our review is that little information exists about the impact of agricultural burning policies. Few states have implemented policies aimed at reducing agricultural fires. Regulatory agencies across the United States, including states that have nonattainment areas, continue to recognize the role of fire in agriculture when creating policies related to air pollution emissions.

States that have policies aimed at reducing agricultural fires have very little publicly available data about their outcomes and impacts. The state of California, for example, removed a requirement in state law for regular reporting on the impact of the Connelly-Areias-Chandler Rice Straw Burning Reduction Act after the California Air Resources Board's 2003 progress report. That last report stated that despite state subsidized grant and tax credit programs, an off-field market for rice straw had not materialized as they had hoped to offset producer costs for managing straw rather than burning it.

Scientific studies and journal articles about agricultural field burning have focused more on quantity of particulate matter, quality of air and resulting medical issues than the impact of policies on reducing particulate matter or the effect laws and policies have had on the producers who burn less.



As we detail further in following pages, the majority of states continue to allow agricultural field burning with minimal regulation. Policies differ from state to state on the permitting requirements, the hours in which burning is allowed and even the definition of what is considered agricultural field burning.

The next section provides a more detailed overview of the Clean Air Act and its application to particulate matter.

### **Related Resources**

University of Arkansas Division of Agriculture. (2007). The Clean Air Act and Prescribed Fire: What It Means for Arkansas. [Fact sheet]. Retrieved from <http://www.uaex.edu/publications/pdf/FSA-5016.pdf>

University of Arkansas Division of Agriculture. (2007). Why We Burn: Prescribed Burning as a Management Tool. [Fact sheet]. Retrieved from <http://www.uaex.edu/publications/pdf/FSA-5009.pdf>

## Clean Air Act: An Overview

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Protection of our nation's air quality has been an issue since the mid 1900's. The Clean Air Act<sup>2</sup>, along with its comprehensive implementing regulations, is a complex law that was enacted to accomplish a basic purpose: "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population."<sup>3</sup> The Act enjoys a long and controversial history, a reality that is not likely to abate for many years to come.

In 1955, Congress took the first step towards developing the Clean Air Act as we know it today by enacting the Air Pollution Control Act.<sup>4</sup> This Act was amended several times with significant amendments occurring in 1970, 1977, and 1990. The 1990 amendments establish the statutory foundation of the Clean Air Act as it currently exists.

The Clean Air Act, or CAA, is administered by the U.S. Environmental Protection Agency (EPA) in partnerships with states and tribes. The EPA continues to promulgate extensive regulations to implement the Act.<sup>5</sup> These regulations remain a source of controversy that have resulted in a significant body of complex litigation and court decisions. Often, agricultural interests are among the competing environmental and industry groups that challenge various aspects of the CAA and its implementing regulations. These court decisions shape the contours of the Act and are relevant to future CAA implementation, including its application to agricultural and forest burning events.<sup>6</sup>

The CAA authorized the development of regulations to limit emissions from both mobile and stationary sources and gave the EPA the authority to implement the following regulatory programs for stationary sources:

- National Ambient Air Quality Standards (NAAQS)
- State Implementation Plans (SIPs)
- New Source Performance Standards (NSPS)
- National Emission Standards for Hazardous Air Pollutants (NESHAPs)

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<sup>2</sup> 42 U.S.C. §§ 7401- 7671q.

<sup>3</sup> 42 U.S.C. § 7401.

<sup>4</sup> EPA, History of the Clean Air Act, <http://www.epa.gov/air/caa/amendments.html> (last accessed June 9, 2015).

<sup>5</sup> For links to Clean Air Act regulations, visit the National Agricultural Law Center Clean Air Act Reading Room, available at <http://nationalaglawcenter.org/research-by-topic/caa/>.

<sup>6</sup> For an annotation of Clean Air Act court decisions, please visit the National Agricultural Law Clean Air Act Reading Room, Case Law Index, available at <http://nationalaglawcenter.org/research-by-topic/caa/>. This list will be updated in the future, so check back for future updates.

## National Ambient Air Quality Standards

The National Ambient Air Quality Standards, or NAAQS, are the centerpiece of the Clean Air Act and the basis of EPA regulatory and enforcement activities. The Act requires the EPA to establish standards for pollutants it determines to endanger public health.<sup>7</sup> Currently, EPA has set standards for six “criteria air pollutants,” or pollutants determined to be hazardous to the human health, to be regulated under NAAQS.<sup>8</sup>

These six pollutants are:

- Ozone
- Particulate Matter 2.5 (PM2.5) and 10 (PM10)
- Lead
- Carbon Monoxide
- Sulfur Dioxide, and
- Nitrogen Dioxide.

The CAA established two standards for criteria air pollutants: primary and secondary. Primary standards provide public health protection, which includes protecting the health of “sensitive” populations such as asthmatics, children, and the elderly.<sup>9</sup> Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.<sup>10</sup>

Particulate matter, or PM, is one of the six criteria air pollutants, and is directly relevant to issues surrounding agricultural burning. There are two types of PM: PM2.5 and PM10. The numbers represent the diameter of the particulate matter in micrometers. These particles, when inhaled, can damage the heart and lungs causing serious health concerns. The difference between PM2.5 and PM10 is more than just the size difference; the source of particles is different as well.

PM2.5 and below are classified as “fine particles,” and are found in smoke and smog. These particles can derive from fires, automobiles, power plants and industry plants. PM10 is particulate matter that falls between 2.5 and 10 micrometers. PM10 is classified as “inhalable coarse particles” and are particles of dust and dirt mixed with other materials. This type of pollution is found near roadways and other dust dispersing industries. PM2.5 is the primary concern in relation to agricultural burning.

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<sup>7</sup> 42 U.S.C. § 7409

<sup>8</sup> EPA, National Ambient Air Quality Standards, <http://www.epa.gov/air/criteria.html> (last accessed June 10, 2015).

<sup>9</sup> Id.

<sup>10</sup> Id.

Over the years, standards for PM have become more stringent. The 1997 standards for PM<sub>2.5</sub> were revised in 2006. The daily standard, which is averaged over 24-hour periods, was reduced from the 1997 standard of 65 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) to 35  $\mu\text{g}/\text{m}^3$ .<sup>11</sup> The annual standard, which addresses human health effects from chronic exposures to the pollutants, remained unchanged from the 1997 standard of 15  $\mu\text{g}/\text{m}^3$ .<sup>12</sup>

The 2006 revisions did not substantially modify the daily standard for PM<sub>10</sub>, but did remove an annual standard.<sup>13</sup> In December 2012, EPA again tightened the PM<sub>2.5</sub> standard to 12.0 micrograms per cubic meter from 15 micrograms per cubic meter.

***Particulate Matter 2.5 standards throughout the years***

<b>PM<sub>2.5</sub></b>	<b>1997</b>	<b>2006</b>	<b>2012</b>
Annual Standard	15.0 $\mu\text{g}/\text{m}^3$	15.0 $\mu\text{g}/\text{m}^3$	12.0 $\mu\text{g}/\text{m}^3$
Daily/24-Hour Standard	65 $\mu\text{g}/\text{m}^3$	35 $\mu\text{g}/\text{m}^3$	35 $\mu\text{g}/\text{m}^3$

States are required to comply with all NAAQS requirements, and are designated by the EPA as either being in “attainment” or “nonattainment” of the requirements. Attainment status is important because the designations determine what polluting sources must do to comply with NAAQS standards. Nonattainment occurs when the concentration of one or more of the six pollutants in a geographic area is found to exceed standards. Areas with pollutants below the established levels are in attainment.

States that are in attainment strive to maintain their status by implementing policies and practices that aim to prevent significant deterioration of air quality.

Each state is provided the opportunity to determine its own methods for meeting National Ambient Air Quality Standards. Once a standard is issued, each state must submit to the EPA a State Implementation Plan, or SIP. The SIP provides EPA with the state’s plan for the implementation, maintenance and enforcement of NAAQS. Once approved by the EPA, pollution control measures included in SIPs are federal law, enforceable in federal court.<sup>14</sup> If a

<sup>11</sup> EPA, Fact Sheet Final Revisions to the National Ambient Air Quality Standards for Particle Pollution (Particulate Matter), [http://www.epa.gov/pm/pdfs/20060921\\_factsheet.pdf](http://www.epa.gov/pm/pdfs/20060921_factsheet.pdf) (last accessed June 8, 2015).

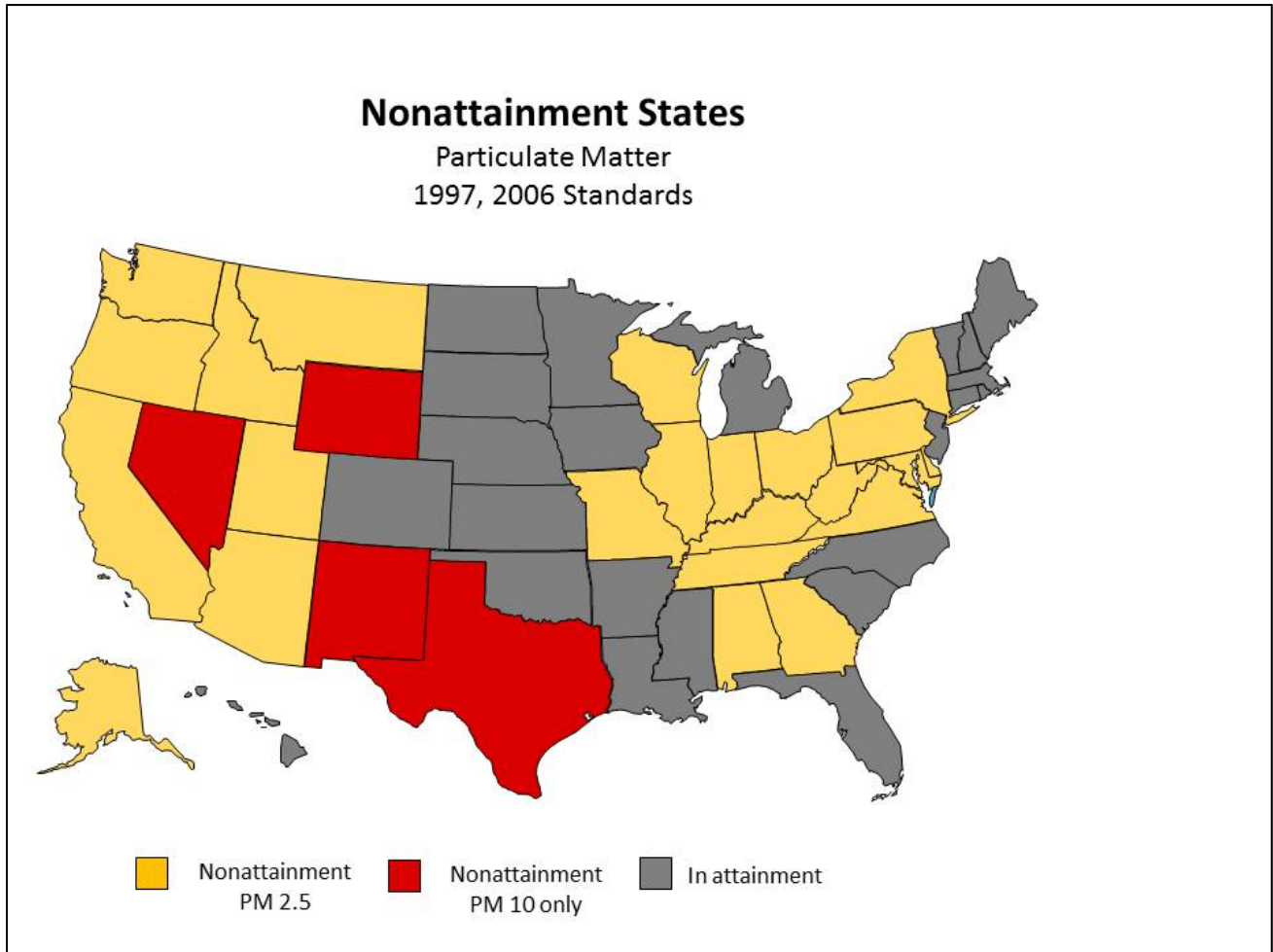
<sup>12</sup> Id.

<sup>13</sup> Id.

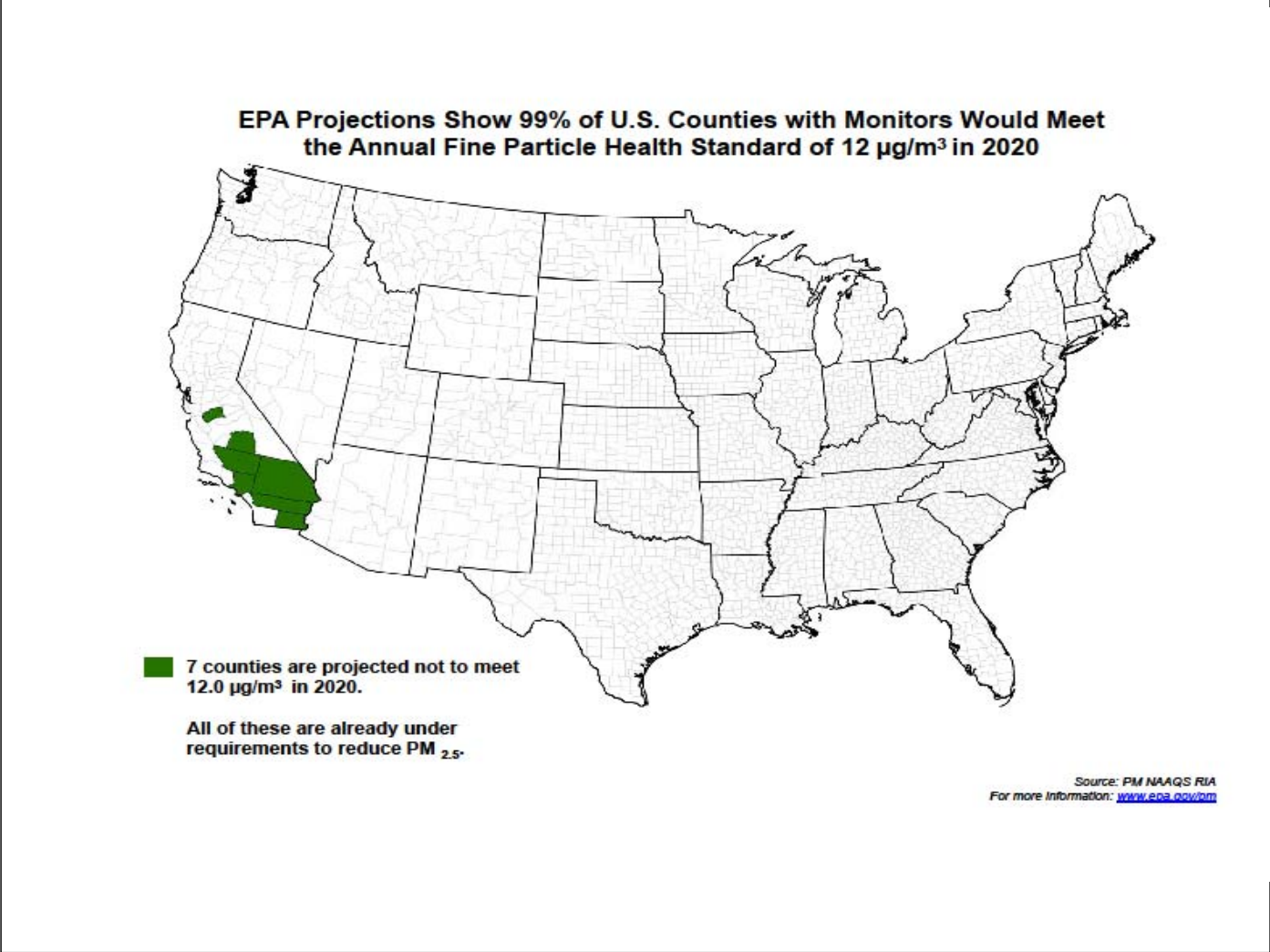
<sup>14</sup> See, *Safe Air for Everyone v. U.S. EPA*, 488 F.3d 1088, 1097 (stating that “the SIP became *federal law*, not *state law*, once EPA approved it, and it could not be changed unless and until EPA approved any change.”)

state fails to submit an SIP or if EPA disapproves a plan, EPA is required to develop a Federal Implementation Plan.

States that are in nonattainment for PM2.5 and PM 10 based on 1997 and 2006 standards are depicted below in Figure 2. By 2020, EPA projects that only California will have problems meeting 2012 standards for PM2.5, as shown in Figure 3.



**Figure 2.** States that do not meet 1997 and 2006 particulate matter standards are highlighted in yellow and red, while those in gray are states that are in attainment.



**Figure 3.** EPA projections of areas not meeting annual fine particle health standards in 2020.

## Policy Review

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In this section, we review policies related to agricultural field burning across the United States. This review includes agriculture in State Implementation Plans, agricultural burning regulations in state laws, smoke management plans, and the permitting process for field burning. We also address other important issues related to field burning, such as education for burners, stakeholder engagement and incentives.

### Agriculture in State Implementation Plans

All states are required to submit a State Implementation Plan , or SIP, to EPA. The SIP details a state's efforts to meet individual National Ambient Air Quality Standards, or NAAQS, and include information about the state's capabilities to attain, maintain and enforce those standards.<sup>15</sup> Once an SIP is approved, it is codified in the Federal Register.<sup>16</sup>

According to the EPA, the SIP serves two main purposes:

1. Demonstrates that the state has the basic air quality management program components in place to implement a new or revised NAAQS.
2. Identifies the emissions control requirements the state will rely upon to attain and/or maintain the primary and secondary NAAQS.<sup>17</sup>

There is a general structure to each SIP, with basic required elements about each criteria pollutant.<sup>18</sup> If a state has a nonattainment area, the SIP must include regulatory programs designed to achieve or maintain standards. Each SIP is actually a series of plans that are submitted as a whole in response to federal requirements.

Despite the similar requirements, states' plans differ on strategies and infrastructure put in place to meet air quality requirements. When it comes to agriculture, the majority of plans incorporate state laws regarding open burning laws when discussing regional haze or particulate matter.

Regulations implementing the Clean Air Act require states to consider smoke management techniques for agricultural and forestry management purposes as a factor in developing its

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<sup>15</sup> 42 U.S.C. § 7410.

<sup>16</sup> See 40 C.F.R. Part 52.

<sup>17</sup> <http://www.epa.gov/air/urbanair/sipstatus/overview.html>

<sup>18</sup> See generally 40 C.F.R. Part 51 (setting out bulk of EPA SIP approval criteria).

long-term strategy for regional haze.<sup>19</sup> Because of this requirement, agricultural field burning is mentioned in many SIPs in passing, typically indicating that the practice is regulated through a state's open burning law.

**Idaho** offers a comprehensive window into the interplay between state agricultural burning laws and SIP approval.<sup>20</sup> The current Idaho SIP is the result of longstanding policy and legal conflict regarding agricultural burning activities in the state, which resulted in significant changes to state statutes and regulations that were subsequently incorporated into the Idaho SIP. The information set out below traces key highlights of that evolution.

The Idaho Air Quality Rules in effect in 1970 stated that “[t]he open burning of plant life grown on the premises in the course of any agricultural, forestry or land clearing operation may be permitted when it can be shown that such burning is necessary and that no fire or traffic hazard will occur. Convenience of disposal is not of itself a valid necessity for burning.”<sup>21</sup> The 1970 state law was incorporated into the Idaho SIP, which was first approved by EPA in 1972.

Idaho later modified its laws pertaining to crop residue burning and incorporated them into subsequent SIP revisions. Over time, these changes triggered litigation in federal court that ultimately resulted in the current laws pertaining to agricultural burning that have been approved in the Idaho SIP.<sup>22</sup> In 1985, the Idaho legislature passed a law allowing for the open burning of crop residue. In light of that law, the Air Quality Rules were amended “to provide for more specific regulation of crop residue burning.”<sup>23</sup>

However, in 1986 and prior to submitting the new Air Quality Rules for crop residue burning to EPA for incorporation into the SIP, the Idaho legislature enacted new legislation that prohibited the Department of Environmental Quality from issuing agricultural burning rules and that repealed the agricultural burning state regulations in place at that time.<sup>24</sup> These changes were among those that Idaho subsequently submitted to EPA as part of the SIP revision process.

In 1993, EPA approved the SIP revisions to the Air Quality Rules, which arguably left the SIP and the state rules silent on the issue of crop burning.<sup>25</sup> In 1999, the Idaho legislature repealed the 1985 open burning law and replaced it with a statute that authorized the Idaho Department of Agriculture to issue agricultural burning regulations. That law also terminated the state

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<sup>19</sup> Section 51.308(d)(3)(v)(E)

<sup>20</sup> See, generally, *Safe Air for Everyone (SAFE) v. EPA*, 488 F.3d 1088 (9<sup>th</sup> Cir. 2007).

<sup>21</sup> State of Idaho Department of Environmental Quality, *Open Burning of Crop Residue State Implementation Plan (SIP) Revision* (Sept. 2009), available at [https://www.deq.idaho.gov/media/347121-crb\\_sip.pdf](https://www.deq.idaho.gov/media/347121-crb_sip.pdf), at 1 (citing Section 2,3(H) of the Idaho Air Quality Rules).

<sup>22</sup> *Id.*

<sup>23</sup> *Id.*

<sup>24</sup> *Id.* At that time, the Idaho Department of Environmental Quality did not exist under that name.

<sup>25</sup> *Id.*



statutory provision enacted in 1986 that prevented the Department of Environmental Quality from issuing agricultural burning regulations.<sup>26</sup>

In the wake of those changes, the Department of Environmental Quality issued regulations that allowed agricultural burning. These regulations were submitted as revisions to the state the SIP on the basis that it clarified the longstanding laws and policies in Idaho regarding agricultural burning.<sup>27</sup>

An organization known as Safe Air for Everyone filed a lawsuit challenging the submitted SIP revisions on the grounds that the submissions actually changed the SIP such that it now allowed agricultural burning rather than as being prohibited in accordance with the terms of the previous SIP approval.<sup>28</sup> The United States Court of Appeals for the Ninth Circuit agreed with the plaintiffs and sent the matter back to EPA for reconsideration in accordance with its decision.<sup>29</sup>

Following the decision, stakeholders in Idaho began discussing a potential agreement for an agricultural burning program. In late 2007, the parties agreed to several terms, including that air quality would be protected within 75% of NAAQS. In 2008, the Idaho Legislature enacted new legislation in accordance with this agreement.<sup>30</sup>

The new law states, in part, that “[t]he open burning of crop residue to develop physiological conditions conducive to increase crop yields, or to control diseases, insects, pests, or weed infestations shall be allowable form of open burning, . . .”<sup>31</sup> The law further provides that crop residue burning must occur in the field in which it is generated and that a burn can only occur with preapproval from the Department of Environmental Quality.<sup>32</sup> The Department cannot approve a burn if it determines that air quality levels “[a]re exceeding, or are expected to exceed, seventy-five percent . . . of the level of any national ambient air quality standard on any day, and these levels are projected to continue or recur over at least the next twenty-four . . . hours”.<sup>33</sup>

In addition, the Department cannot approve a burning activity if air quality levels “[h]ave reached, or are forecasted to reach and persist at, eighty percent . . . of the one . . . hour action

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<sup>26</sup> Id.

<sup>27</sup> Id.

<sup>28</sup> See *Safe Air for Everyone (SAFE) v. EPA*, 488 F.3d 1088 (9<sup>th</sup> Cir. 2007). For text of this decision, please visit the Clean Air Act Reading Room published on the National Agricultural Law Center website, a

<sup>29</sup> Id.

<sup>30</sup> Idaho Code Ann. § 39-114.

<sup>31</sup> Id.

<sup>32</sup> Id.

<sup>33</sup> Id.

criteria for particulate matter pursuant to . . . rules for the control of air pollution in Idaho.”<sup>34</sup> Another key provision of the law include a requirement that before a burn occurs, the Department will make available to the public information “the date of the burn, location, and acreage and crop type to be burned.”<sup>35</sup> Importantly, the law also provides that “[i]f the agricultural community desires to burn more than twenty thousand . . . acres annually of bluegrass within the state, . . . then, prior to approving the burning of additional acres, the department shall complete an air quality review analysis to determine the ambient air quality levels . . . will be met.”<sup>36</sup>

Some states specifically mention that agricultural field burning regulations are not incorporated into their SIPs because of its relatively small impact on air quality in their particular state. For example, the EPA in December 2014 agreed with **Texas** that agricultural field burning did not need to be included in the state’s SIP for regional haze<sup>37</sup> because it was managed through the Texas smoke management plan. According to the proposed rule regarding Texas’ regional haze SIP, the Texas Forest Service coordinates fire and smoke management issues in the state and has developed a voluntary plan under which land managers inform the forest service prior to performing prescribed burns. Texas also has an outdoor burning rule<sup>38</sup> that includes requirements for prescribed burning, and counties have the authority to prohibit open burning during droughts.

**Oklahoma** took a similar approach, noting that despite the prominence of agricultural burning in the Oklahoma emissions inventory, the state’s environmental agency did not believe the sources contributed significantly to regional haze. The proposed rule cited state laws already in place to address burning of cropland. Oklahoma Administrative Code 252:100-13-7(4) allows open burning for land management and land clearing for crop land in accordance with practices recommended by the Oklahoma Department of Agriculture.

Suggested rulemaking for reducing particulate matter from agricultural practices were not included in **Utah’s** SIP because it was determined that the majority of farmers in erodible regions were already enrolled in Natural Resources Conservation Service programs<sup>39</sup>. Additional rules were deemed unnecessary, according to the state’s 2013 SIP submission. The state did

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<sup>34</sup> Id.

<sup>35</sup> Id.

<sup>36</sup> Id.

<sup>37</sup> Regional haze SIPs apply to Class 1 areas, which include national parks and wilderness areas. See 40 C.F.R. § 51.308 (Regional Haze Program Requirements).

<sup>38</sup> 30 TAC Chapter 111, subchapter B

<sup>39</sup> In addition to routine conservation practices to reduce erosion, NRCS has established the National Air Quality Initiative. The program provides financial assistance to implement approved conservation practices to address air quality resource concerns for designated high priority locations in the nation. See <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/air/>

include agriculture in its Utah Clean Diesel Program, a state-based grant and loan program to retrofit or replace diesel-fueled vehicles or machines with cleaner, more fuel-efficient machinery.

**Arizona's** SIP stands out for its inclusion of Agricultural Best Management Practices related to air quality. The Phoenix metropolitan area has failed to meet federal air quality standards since 1990, and the region was designated as a Serious PM10 Nonattainment area in 1996. This designation created the need for emission reduction programs for previously unregulated sources, such as unpaved roads, parking lots, vacant lots and agriculture (Governor's Agricultural Best Management Practices Committee, 2008). By state statute, the Agricultural Best Management Practices Committee was created in 1998 to address agriculture's contribution to PM10 in Maricopa County.

The committee researched Best Management Practices, or BMPs, and examined their effectiveness at reducing particulate matter and implemented an "agricultural PM10 general permit" that was required of farmers operating in the Maricopa County Serious PM10 nonattainment area. The permit required that at least one BMP be implemented to control PM10 when it came to tillage and harvest, non-cropland and cropland. In 2007, after the area continued to exceed air quality standards, the Arizona Legislature revised the state statute to require farmers to implement and maintain at least two approved BMPs for tillage and harvest, non-crop land and crop land. Farmers are also required to keep implementation records detailing their practices, which are open to inspection to the state.

Arizona has since produced a "Guide to Agricultural PM10 Best Management Practices," which covers a variety of practices to reduce dust from a variety of agricultural operations. The manual does not discuss field burning, but does include suggestions for implementing residue management systems that avoid plowing or that leave crop residues undisturbed as long as possible to reduce wind erosion and generation of PM10. Arizona's manual makes several recommendations, such as leaving stubble standing at six inches or more and that residues from previous crops be left to maintain 60 percent ground cover. The guide can be found at <https://www.azdeq.gov/environ/air/plan/download/webguide.pdf>.

**California** has included agricultural burning in its SIP since the early 1980s, when state regulations were established for field burning in Sutter and Yuba counties. Regional SIPs in California go beyond agricultural field burning and take into account other agricultural emission sources such dust, diesel-fueled agricultural vehicles and irrigation pumps.<sup>40</sup>

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<sup>40</sup> The Carl Moyer Memorial Air Quality Standards Attainment Program provides funding to encourage the voluntary purchase of cleaner-than-required engines, equipment and emission reduction technologies. More

California's air quality is not in compliance with the NAAQS for particulate matter, though emission levels overall have declined in recent years because of the country's economic recession (California Environmental Protection Agency, 2011). Many businesses cut back on debt and employment and sold assets that included motor vehicle fleets. The construction industry and the trucking and shipping industries were greatly affected by the recession in California as the downturn meant reduced vehicle activity. Trucking in California decreased by nearly 20 percent between 2007 and 2010 and construction-related activity declined by 50 percent between 2005 and 2010, according to the state's progress report on its particulate matter implementation plan.

### **Related Resources**

Approval and Promulgation of Implementation Plans; Texas and Oklahoma; Regional Haze State Implementation Plans; Interstate Transport State Implementation Plan To Address Pollution Affecting Visibility and Regional Haze; Federal Implementation Plan for Regional Haze and Interstate Transport of Pollution Affecting Visibility, 79 Fed. Reg. 74817 (Dec. 16, 2014). Retrieved from <https://federalregister.gov/a/2014-28930>.

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information about the program can be found at [http://www.arb.ca.gov/msprog/moyer/guidelines/2011gl/2011cmpgl\\_03\\_30\\_15.pdf](http://www.arb.ca.gov/msprog/moyer/guidelines/2011gl/2011cmpgl_03_30_15.pdf).

## Agricultural Burning in State Laws and Regulations

In addition to the federal government, states and many cities and counties regulate air quality through local legislation. The Clean Air Act permits states to adopt standards or requirements that are more stringent than federal requirements.

Each state has a regulatory agency that administers and enforces federal and state environmental policies. Local legislation varies greatly as regulations and rules are promulgated and debated among the state's public. The majority of state and municipal laws seek to control open burning of trash and debris while providing exemptions for agricultural field burning, forest management, and outside cooking.

States differ on agricultural field burning policies when it comes to:

- Permit requirements
- Permitting authority (state versus local)
- How permits are issued (online versus telephone call versus in-person)
- Time of year burning is allowed
- Time of day burning is allowed (day versus night hours)
- Region-wide acreage allocation on burn days
- Time of year burning is prohibited
- Definition of "agricultural" burning
- Materials allowed to prime fires
- Zoning regulations – agricultural burning only allowed on property zoned agricultural;
- Burn ban exemptions (included or excluded)
- Notification requirements of local authorities or neighbors
- Data reporting requirements

Some specific examples of the above policies include:

- No burning permit is necessary for agricultural burning in **Massachusetts**, although burning is subject to permission of the local fire chief. That permission does not need to be in writing.
- To burn 40 acres or more in a year requires written **Alaska** Department of Environmental Conservation approval before lighting, whereas in **Nebraska**, a person has to notify their local fire chief for fire safety reasons.
- The city of Gresham, **Oregon** requires that more than 51 percent of a person's income be derived from the property to qualify for an agricultural burning permit. In addition, the property must be more than 5 acres.

- Jefferson County, **Alabama** prohibits agricultural burning during May 1-Oct. 31 and requires written authorization for commercial agricultural burning during rest of year. In 2013, the area was found to be in attainment for particulate matter for the first time in 30 years as a result of several practices to reduce pollution emission.
- **Virginia** allows burning to destroy strings and plastic ground cover remaining in the field after being used in growing staked tomatoes.
- **Tennessee** state law says priming materials used to facilitate such burning shall be limited to #1 or #2 grade fuel oils, wood waste, or other ignition devices approved by the Technical Secretary of Air Pollution.
- In the town of Westersfield, **Connecticut**, agricultural burning for vegetation management shall only be performed on those properties designated as "farmland" by the Assessor's office.
- The governor of **Oklahoma** has exempted agricultural burns from burn bans at times after consulting with state officials. Producers must fill out a form to be exempt during a burn ban.
- Agricultural burning is prohibited in four **Mississippi** counties when an Ozone Action Day is declared.
- If agricultural burning occurs within a "restricted area," or any area inside a city or village or within 1,000 feet to a mile of a small city, **Ohio** requires burners to give written notice to the Ohio EPA at least 10 days in advance of the burning.
- In **Wyoming**, certain agricultural burning is exempt from some of the inspection, notification and reporting requirements. Despite the exemption, burners must still provide vegetative burn data in response to periodic surveys conducted by the Wyoming DEQ.

Growers who burn in Idaho must report to DEQ within 24 hours the actual number and location of acres burned, as well as the size of any remaining materials if the burn wasn't completed. Despite these many differences, there are only a handful of states with distinctive policies for agricultural field burning.

In 1991, **California** implemented one of the most well-known strategies to reduce agricultural emissions with the passage of the Connelly-Areias-Chandler Rice Straw Burning Reduction Act. The state law established a cap on the number of rice field acres that could be burned, with the maximum number reducing each year between 1991 and 2001. The Act limits the number of rice acreage that can be burned to 25 percent of an individual grower's planted acreage, not to exceed 125,000 acres basinwide (California Air Resources Board, 2003). In order to burn, a farmer must show proof of crop loss residue due to disease.

Rice continues to be a popular crop in the state, as it has been for more than a century. California ranks behind Arkansas in terms of rice production, with an estimated 500,000 acres of rice grown each year (California Rice, n.d.).

The Act defined conditions under which farmers can burn rice residue, such as the presence of disease in the county and good meteorological conditions that do not foster lingering smoke. Policies require agricultural producers to obtain burn permits ahead of time, restrict days that burning is allowed, and establish a specific number of days that stubble must dry before it is burned.

Alternative practices, such as winter flooding and incorporation of straw back into the ground rather than removing stubble due to higher costs associated with baling straw, have replaced burning in many instances. When the Rice Straw Burning Reduction Act was passed, state officials had hoped to develop a market for rice straw to offset producer costs. However, that market has not materialized (California Air Resources Board, 2003).

Additionally, farmers are now dealing with California's severe drought. The drought may make flooding fields more costly than burning although some producers may qualify for federal and nonprofit program funds that seasonally idle land to act as "pop up wetlands" for migrating waterfowl. The state has also more recently investigated the possibility of making rice crops eligible for carbon reduction credits, which would reduce the number of flooded fields.

In the state of **Washington**, state law recognizes agricultural burning as a source of air pollution. The state created an Agricultural Burning Practices and Research Task Force, whose goal is to reduce air pollution emissions from agricultural burning. State law empowers the task force to develop BMPs to reduce air emissions from agricultural activities, determine the level of permit fees, and to further research into viable alternatives to field burning (Washington Department of Ecology, n.d.). The task force is chaired by the Washington State Department of Ecology.

Shortly before the creation of the task force in 1998, Washington enacted a moratorium on burning of Kentucky bluegrass residue. The 1996 policy has resulted in the adoption of other techniques to remove the residue such as the use of herbicides. According to media reports, seed growers in Washington have also sold their excess residues as livestock feed and bedding (McCarty, J., 2014).

Washington state law requires other producers to apply for and purchase a permit for agricultural field burning (Washington Department of Ecology, n.d.). There are exceptions for burning orchard prunings, organic debris along fence lines or irrigation ditches, or organic debris blown by the wind. Application requirements vary. The Puget Sound Clean Air Agency, for example, requires a copy of the burner's most recent year's Schedule F as filed with the

Internal Revenue Service, and a written review by the local fire district or fire marshal indicating their endorsement that local requirements have been met (Puget Sound Clean Air Agency, 2012).

Puget Sound’s regulation specifies when agricultural burning is permitted, such as “Burning is a best management practice as established by the Agricultural Burning Practices and Research Task Force (established in RCW 70.94.650 as referenced in WAC 173-430-050); or the burning practice is approved in writing by the Washington State Cooperative Extension Service or the Washington State Department of Agriculture; or the burning is conducted by a governmental entity with specific agricultural burning needs, such as irrigation districts, drainage districts, and weed control boards.”

The agency’s regulation also includes a permit denial section stating that no permit shall be issued if the burning will cause a nuisance.

**Oregon** also regulates the burning of grass seed fields, specifically in the Willamette Valley region. The state undertook regulating field burning smoke after poor visibility during a burn led to a 1988 interstate accident that killed seven people. The state initially implemented regulations that limited field burning to 65,000 acres in the Willamette Valley area. Eventually, the Oregon Department of Agriculture’s Smoke Management Program reduced the amount to 15,000 acres of certain grass seed fields each summer in the valley, limited to identified species and steep terrain burning. In 2009, the state legislature passed a law giving the Oregon Department of Environmental Quality authority to permit another 2,000 acres of field burning during emergency situations to address disease or insect infestations. The state no longer allowed stacked or piled straw and propane flaming methods in 2012, according to an Oregon Department of Environmental Quality fact sheet on burning in the valley. In addition to Willamette Valley, Jefferson County and Union County have adopted local regulations regarding agricultural burning.

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## Smoke Management Plans and Agriculture

Over the past four decades, states have developed smoke management plans as a tool to address air pollution and visibility impairments and to reduce wild fire hazards in an effort to comply with the Clean Air Act.<sup>41</sup>

There was a time in the United States when forest fires were seen as something only to suppress and prevent. Creighton and Walkingstick wrote about the history of prescribed burning in a 2007 University of Arkansas Division of Agriculture fact sheet:

But over time natural resource managers observed dramatic shifts in the very forest they were charged to protect. Without fire, forests and rangelands became choked with dense underbrush, overstocked with less fire-tolerant plants and more susceptible to insect and disease attacks.

Wildlife populations dependent upon more open forests decreased, and some species, like the red cockaded woodpecker, suffered severe habitat and population loss. In short, forests changed dramatically.

Today, natural resource managers and foresters understand that controlled fire is essential to forest health. They also understand that fire can be used to reduce dangerous fire risks. Forests need fire and forests will burn. Foresters and natural resource managers can use prescribed fires to minimize fire risk and to maximize benefits. Fire can be destructive, but it can also be controlled to achieve important goals, such as wildlife hazard reduction, ecosystem restoration, wildlife habitat improvement, site preparation and reducing plant competition.

Prescribed fire is used throughout the southern United States with an estimated 8 million acres burned every year. In Arkansas, prescribed fire is applied to approximately 300,000 acres each year. The use of fire as a management tool is expected to increase as other management tools become either increasingly expensive or socially unacceptable (Creighton & Walkingstick, 2007).

As particulate matter is a result of burning, smoke management programs and any resulting written plan are policy tools used by many states to prevent or reduce emissions and meet air quality standards. These plans are often incorporated in State Implementation Plans or at least mentioned in SIPs. A cursory review of management plans was conducted as we researched open burning policies state by state.

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<sup>41</sup> While outside the scope of this report, it bears noting that a potential legal issue related to burning in Arkansas is the CAA “exceptional events rule”. See 42 U.S.C. § 7619.

Not every state has created a Smoke Management Plan. **Kentucky** was still working on one in 2013. Second, most states that do have plans have written reports advising only prescribed burners of forestland. Some plans were limited to government-owned property while others included private property.

Few smoke management plans include agricultural field burning. **Utah's** plan, for example, specifically excludes agricultural burns. **California**, on the other hand, has a comprehensive smoke management plan for agricultural burning that mostly consists of state statutes regarding burning. **Idaho** has a Crop Residue Burning Program Operating Guide that serves as an implementation guide for its smoke management program. The guide regulates land that is in or has been in the federal Conservation Reserve Program and Conservation Reserve Enhancement Program. **Mississippi's** Voluntary Smoke Management Guidelines refers to forestry and agriculture burns throughout its 39-page document.

**South Carolina** has developed a smoke management plan for vegetative burning, which specifically includes forestry, agriculture, and wildlife purposes. In its document, South Carolina encourages burners to create a written plan that includes location, sketch map or photo, purpose and objective, fuels, optimum weather and fuel conditions, public contacts, preparation required, escaped fire procedures and evaluation.

Similar to the previous section, our review found that smoke management programs differ in many ways between states. Plans were found to be regulatory with mandatory requirements in some states while voluntary in others. **Oregon** developed its smoke management plan as a voluntary program in 1969, and then adopted it as a regulatory program in 1972. The plan's overall purpose is to keep smoke from forestland burning from being carried to areas sensitive to smoke, and to provide for maximum burning while minimizing emissions (Oregon Department of Forestry, n.d.).

**Arkansas' Voluntary Smoke Management Guidelines** do not refer to agricultural burning. The guidelines do state that Arkansas' Smoke Management Program is designed "to assure adherence to air quality standards and to manage smoke from prescribed fire to keep the smoke's impact on people and the environment within acceptable limits."<sup>42</sup> The Arkansas voluntary smoke management guidelines further state the following:

These guidelines will allow the prescribed fire manager to minimize the impact of particulate matter released into the atmosphere by estimating how many tons of fuel may be consumed in an area. The amount of fuels that can be consumed in an airshed (36 square miles) is based up on the ability of the atmosphere to

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<sup>42</sup> Arkansas Voluntary Smoke Management Guidelines, available at <http://forestry.arkansas.gov/Services/ManageYourForests/Pages/default.aspx> (last visited June 20, 2015).

disperse the particulate matter, the distance downwind to a smoke-sensitive areas and the tons of fuel being consumed.<sup>43</sup>

Depending on the state, the plan may address when to burn and how to manage the smoke that arises to prevent it from becoming a nuisance. Items addressed in plans include:

- History of open burning in state
- State statutes related to open burning
- Property owner responsibilities
- Frameworks that help prescribed burners to determine the best time and weather conditions to burn
- Best management practices for open burning management
- Ignition methods
- Burn plan elements
- Smoke plan documents
- Permit applications
- State officials or agencies that should be contacted before burning
- Glossaries

### **Related Resources**

Creighton, J. & Walkingstick, T. (2007). Why We Burn: Prescribed Burning as a Management Tool. [Fact sheet]. Retrieved from <http://www.uaex.edu/publications/pdf/FSA-5009.pdf>

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<sup>43</sup> Id.

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## Permitting Process

When it comes to the permitting process for agricultural burning, there is no standard format or method employed by states to approve or disapprove burns ahead of time. Some arrangements require approval from a state agency, while other states delegate permitting authority to the local fire chief, health department, or air quality board. Some states do not require permits, but rather request notification, which may be as simple as a phone call to the local fire chief.

The method for obtaining approval varies as well. Some states have begun providing online burn applications or permit forms instead of the traditional telephone or in-person systems. In **Maine**, traditional hand-written burn permits are still available, but its online system allows permits to be acquired 24 hours a day, 7 days a week, providing that the fire danger is not high. When permits are issued, Maine's system can notify up to 20 town fire wardens or fire department personnel with emails and text messages. The state sends \$2 of the \$7 permit cost to the local city where the burn will occur.

**Hawaii** allows applicants to submit an agricultural burning permit online through its Department of Health ePermitting Portal or to download a hard copy application from the website. **Florida** allows online permitting only for people who are "certified prescribed burn managers," a classification that involves attending trainings. **Michigan's** permitting process entails someone going online to the Department of Natural Resources website to determine if burning is allowed in their county at that time. If the county is highlighted in green, permitting is allowed. The website serves as the burn permit.

Municipalities, counties and their fire departments are also getting into online permitting systems. Sedgwick County Fire District 1 in Park City, **Kansas** has an online burn permit application for people who are wanting to burn in the unincorporated areas of the county. The permit is valid through the end of the year.

**Montana** has an online burn permit and notification system, which will not activate a permit for agricultural fires if burning is restricted in an area.

**Idaho** goes beyond an application and requires growers who intend to burn crop residues to attend a crop residue burning training session provided by the Idaho Department of Environmental Quality or the Idaho State Department of Agriculture before they receive a permit. Growers must obtain approval from DEQ before burning by registering for a permit at least 30 days before they want to burn.

Time frames for permits also diverge. Some are valid for only hours, while others are good for days, months or a full year.

## Related Resources

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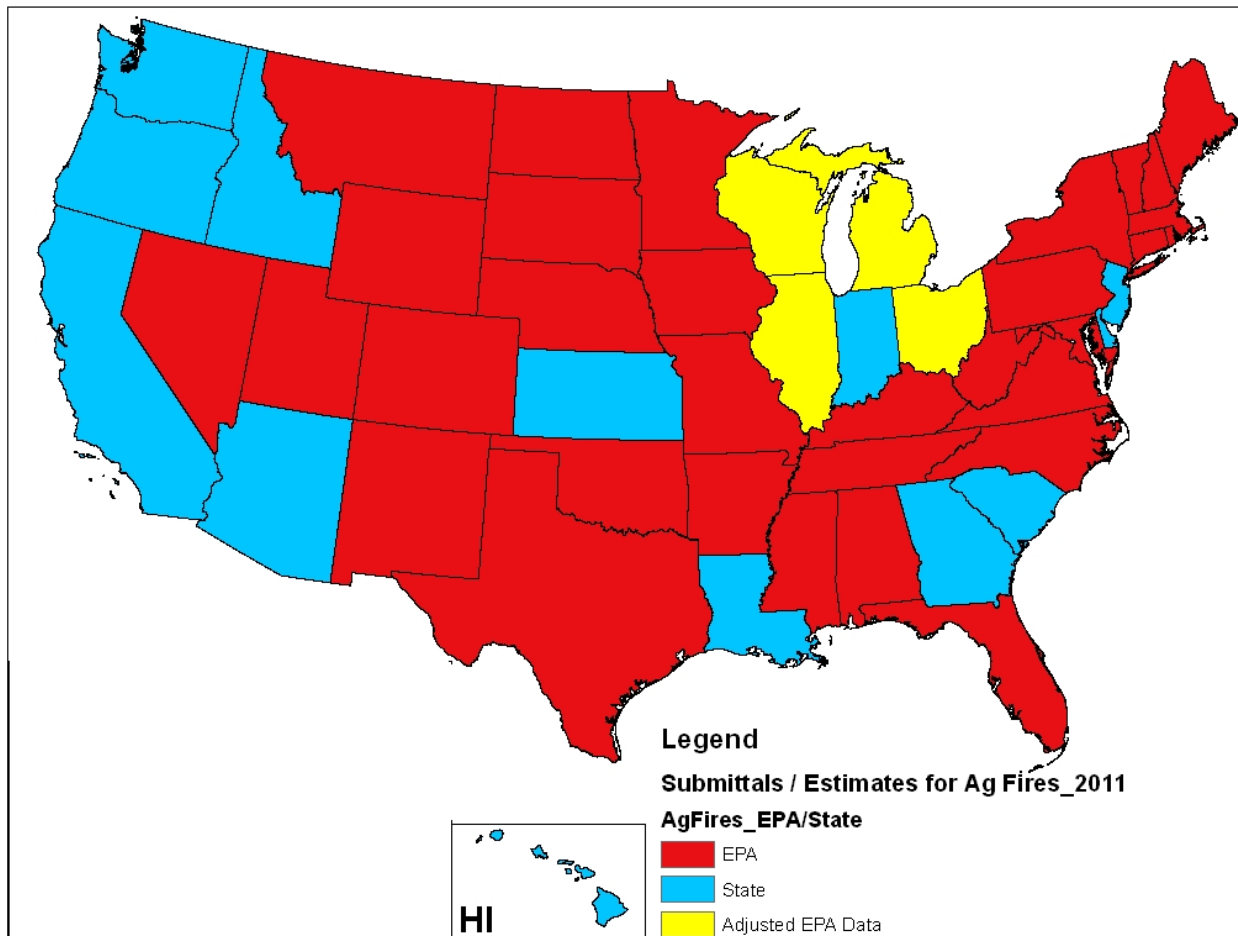
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## Data Reporting

As part of the permitting or authorization process to burn, property owners are often asked a series of questions and must provide detailed information about their plans on burn permit applications before they receive approval to burn agricultural land. Some states seek this information to notify emergency personnel about expected fires while others use the information to compile reports about agricultural burning.

The EPA has issued at least two estimates of states' PM<sub>2.5</sub> emissions from agricultural burning through the 2008 National Emissions Inventory and the 2011 National Emissions Inventory. These estimates are based on data submitted by state agencies or by EPA-created estimates in those instances in which states have not submitted such data. The vast majority of states, including Arkansas, do not submit emissions data for agricultural burning, as shown in Figure 4.



**Figure 4.** States that submitted agricultural burning emissions to the National Emissions Inventory.

In most instances, property owners are asked to provide information only before a burn takes place. The amount of information requested varies by the state as does the reporting method. The **Mississippi** Forestry Commission tells people to call a local central dispatch center and “be prepared” to answer questions about the type of burning, number of acres, purpose, landowner information, person responsible for the fire, location of the property and the beginning and end time of the fire.

Other states have forms for people to fill out. In **Maricopa County, Arizona**, the three-page burn permit application asks for the date of the burn, the reason for the burn (i.e. fence row, pest prevention, land clearance, etc.), how many feet/acres will be burned, method of burning and location.

**Alaska** has a seven-page open-burning approval form that requests much more detail. The form asks for the property location, duration and dates of the burn. It also asks for the number of acres to be burned, number of piles/berms, whether the pile include soil, snow or ice. It asks about fire breaks and whether the piles have been cured. It asks for details on how the piles will be extinguished if need be, and whether the burn can be accomplished within two hours. The person filling out the form is asked about the type of vegetation to be burned and to identify alternative disposal options and why they were not used. The form also asks about sensitive features within a five-mile radius and about the amount of smoke that will be created. Burners are also asked about public notification, specifically about how authorities in control of sensitive features will be contacted if air quality degrades. People are also asked about how weather changes will be monitored.

Several states require information after a burn is complete. **Hawaii** requires burner reports and logs be submitted to its Department of Health for fires related to sugar cane harvesting. Harvesting managers are required to review one-hour average fine particulate matter monitoring data from the Department of Health ambient air quality monitoring stations near their fires to assess air quality impacts that potentially resulted from the burn. If air quality exceeded the one-hour PM2.5 standards (115 micrograms per cubic meter), they have to file permit deviation report forms that include reasons why the concentrations aren’t believed to have been caused by the burn. They are to describe other factors that may have contributed to the elevated PM2.5 and request a determination from the Department of Health about the concentration.

In addition, harvest managers are supposed to enter the number of acres burned into a Department of Health database along with the location, date, start and end of each burn. The database also asks for the one-hour PM2.5 concentration reported during the hour prior to the burn and the average recorded during the four-hour period right after the start of the burn. The

harvest manager also inputs the distance and direction of the field to the nearest monitoring station and a brief summary of smoke plume behavior during the burn.

**Idaho** also asks for postburn information to be submitted online. Along with basic identifying information for the field, data requested includes the number of acres burned, and any comments about the burn or feedback on how the program was effective or ineffective. The postburn information must be reported to Idaho's Department of Environmental Quality within 24 hours after the burn ends. If the grower fails to submit the report, he risks losing priority for his next burn. The state compiles the data into annual reports that analyze the impact burning has had on air pollution levels and provides a summary of crop residue burning trends in the state.

In **Washington**, post-burn reporting details include the name of the field, time ignited and burned out, wind speed and direction, acres burned, and if the burning is complete.

### **Related Resources**

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## Incentives Related to Agricultural Field Burning

One of the objectives of this national review was to identify incentives states provide related to agricultural field burning. Because so many states permit agricultural field burning and consider it a traditional practice of the farming industry, not many incentives exist to reduce burning and the resulting emissions.

A comprehensive review of agricultural burning smoke management programs in western states conducted on behalf of the Western Governors Association found only three states with incentives. Those states are California, Oregon and Washington, all of which provided some level of tax credits. These credits, however, have expired.

California provided tax relief for end users and economic incentives for alternative demonstration projects while Oregon provided tax credits to offset the costs of implementing alternative measures to field burning. Washington provided tax exemptions and credits to encourage alternatives to the field burning of cereal grains and field and turf grass grown for seed.

When the Rice Straw Burning Reduction Act was passed, **California** state officials had hoped to develop a market for rice straw to offset producer costs. However, that market has not materialized (California Air Resources Board, 2003). Since the Act's passage, regional air quality districts have had rules in place that allow established growers to apply for rice straw emission reduction credits based on the amount of rice they no longer burned. The rules were not approved by the U.S. Environmental Protection Agency until nearly two decades later. Many air quality districts have adopted federally approved rules in the past five years.

In Placer County, California, growers who planted rice and burned rice straw between 1988 and 1992 were eligible for the emission reduction credits after the county's EPA-approved rules were adopted in 2009. Growers had to place a deed restriction on the property that limits agricultural burning to 25 percent of the total acres per calendar year to receive the credit. Electric utility companies with new or expanded power plants purchased many of the credits to offset their emissions (Placer County Official Website, n.d.).

For several years, **Washington** farmers qualified for sales tax exemptions when purchasing specific equipment, or to construct hay sheds. The exemption was valid in counties where cereal grain production exceeded 15,000 acres on a yearly basis. To qualify, farmers had to have more than 50 percent of his or her tillable acres in cereal grains and or field and turf grass. This exemption, however, expired in 2011.

The state of **Oregon** started providing tax credits on state tax bills in 1975 to promote the reduction of burning particularly in the Willamette Valley region. The credit proved

controversial in the mid-2000s because farmers used the incentive to build barns and irrigation lines for different crops, while at the same time still burning a smaller portion of their fields. The state provided more than \$13 million in tax credits for the program as of 2006 when a newspaper article raised questions about the credits, which eventually expired in 2007.

More recently, Oregon offered a business energy tax credit to offset the purchase of no-till drills. The Oregon Department of Energy provides a 35 percent tax credit for on-farm energy efficiency projects, including the no-till drills because of the fuel savings associated with no-till methods. This credit is an additional incentive for those looking to reduce field burning. The credit expired in 2012.

### **Related Resources**

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## Agricultural Fires and Education

The majority of state environmental agencies provide some basic information, brochures or videos on their open burning websites about the negative health impacts that smoke from fires can have on sensitive populations. Topics include why open burning can be a problem, health concerns, and what burning is allowed or prohibited. A few states have gone beyond the basic information and have implemented public training programs to educate burners about best management practices and purposes for smoke management.

**Idaho** offers an online training program about proper burning techniques and good smoke management that growers must complete once every five years before they are issued permits. Similar trainings are also offered in person at training sessions.

The online program is posted on the Department of Environmental Quality's Crop Residue Burning website and is viewable by anyone at any time. The PowerPoint program focuses on regulative and administrative requirements as well as emissions and smoke burning techniques. The recorded program talks about smoke impacts that can endanger public health. Growers are required to answer questions periodically throughout the training. The Powerpoint can be accessed at <https://www.deq.idaho.gov/air-quality/burning/crop-residue-burning.aspx>.

Numerous states offer certified prescribed burning trainings that focus on forestry. There are some states whose education programs include other types of fires, such as field burning.

**Florida** offers a Certified Prescribed Burn Manager Training Course, which may be more geared toward forestry burns but also pertains to agricultural pile burning. The voluntary course is offered online and in person year-round, and costs \$175. People who go through the course are permitted to burn longer hours and are given liability protection. More information about the program can be found at <http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Wildland-Fire/Prescribed-Fire>.

The **Louisiana** Department of Agriculture and Forestry and the Louisiana State University AgCenter (Cooperative Extension Service) developed a voluntary training curriculum titled "Louisiana Smoke Management Guidelines." The free program is called the Certified Prescribed Burn Manager program and is administered by the state Department of Agriculture and Forestry. The guidelines taught in the program are designed to minimize the concentrations of smoke and ash in sensitive areas and to provide for cleaner air. The program consists of a three-day workshop, which is followed by a test. Then to be certified, a person has to be on site and in charge of at least five prescribed fires.

Louisiana also offers special smoke management training related to sugar cane field burning. According to a 2012 program brochure, smoke and ash related complaints have been reduced by more than 75 percent.

### **Related Resources**

Louisiana State University AgCenter. (2000). Louisiana Smoke Management Guidelines for Sugar Cane Harvesting. Retrieved from [https://www.lsuagcenter.com/NR/rdonlyres/8AAEF1B2-EFA6-40A0-AC59-654C15894EE9/12567/smoke\\_management3.pdf](https://www.lsuagcenter.com/NR/rdonlyres/8AAEF1B2-EFA6-40A0-AC59-654C15894EE9/12567/smoke_management3.pdf)

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## Stakeholder Engagement

Stakeholder engagement is critical to any effort to change or alter a community's culture, values, or policies. A stakeholder is anyone who will be affected by a policy or project, and often they bring to the table different perspectives and sometimes opposing views. Successful collaborative processes depend on the integration and management of multiple stakeholder expectations to develop mutually agreeable solutions (Diaz, Juyaratne, Bardon & Hazel, 2014).

States seek public comment on proposed rule changes. This is when the public has an opportunity to provide input on law changes. During our review, we came across a few states that specifically mentioned their stakeholder engagement process in their attempts to address agricultural field burning. The following is a short review of those processes:

**Idaho's** rules related to crop residue burning and its efforts at stakeholder engagement have a history based in litigation over the state's permissive attitude regarding crop residue burning. In 2007, the governor called for growers and activists to join with state regulators to discuss a solution that would allow crop residue burning while at the same time protect public health from smoke impacts.

The process included representatives from government agencies, air quality groups, Native American tribes, and numerous farm organizations and farmers who burned crop residue. With the help of an independent mediator, the groups reached an agreement that included specific steps for the state to take to meet air quality standards and improve transparency of the program. At the end of every year, Idaho's DEQ evaluates the burn seasons and makes recommendations for any improvements.

**Washington** also found itself at the center of several lawsuits over agricultural field burning. The state had signed a memorandum of agreement with wheat farmers to reduce field burning by 50 percent over seven years. Despite the positive intentions behind this agreement, a grassroots organization sued, alleging the state violated its rule making process. In 2001, the state settled with the Save Our Summers organization and those involved agreed on the path forward. That path included a health assessment of the effects of field burning on public health, better public notification of burns, and an agreement to adopt new field burning rules.

When **Utah** put together its most recent State Implementation Plan, the Division of Air Quality hosted several meetings with more than 100 participants from each of the six nonattainment counties. The participants were asked to provide ideas and recommendations for emission control strategies that would "complement" community needs.

In 2012, Utah launched its Clean Air Program, which included the creation of the Utah Clean Air Partnership, a nonprofit overseen by an 11-member board. The idea was to get stakeholders from across the state to work together on voluntary reductions in smoke emissions.

The majority of Utah's PM2.5 is secondary aerosol, meaning that it is not directly emitted as a particle but is produced when gasses such as SO<sub>2</sub> and NO<sub>x</sub> react with other gasses in the atmosphere, such as ammonia, to become tiny particles (Utah Division of Air Quality Annual Report, 2012.) Utah's weather conditions, such as temperature inversions in the winter time, act to trap air in valleys long enough for concentrations to build up to levels that can be unhealthy.

Utah's current focus on reducing particulate matter pollution is centered on burning, but not agricultural burning. The state's laws regarding open burning exempt agricultural operations. Instead, the state has focused on vehicle emissions and personal wood burning. A 2013 University of Utah study found that wood smoke and cooking grill emissions account for 38 percent of emissions in the Salt Lake Valley area. In December 2014, the governor unveiled a proposal to prohibit the use of wood-burning devices, such as stoves and fireplaces, between November and March in nonattainment areas of the state. However, lawmakers were overwhelmed by public opposition to the idea and passed a law that prohibits a seasonal ban on wood burning.

### **Related Resources**

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## Conclusion

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The scope of this report was to focus on states' approaches to particulate matter derived from agricultural burning activities in light of tightening of the PM2.5 NAAQS by EPA. Because EPA is statutorily required to review the NAAQS every five years, it is possible that the PM2.5 standards could be tightened further in the years ahead. As an addendum to this report, the National Agricultural Law Center published the Clean Air Act Reading Room to its website.<sup>44</sup> This Reading Room will continue to be updated with regulatory developments, current and future court decisions, and other resources relevant to PM2.5 emissions from agricultural burning as well as other applications of the Clean Air Act to agriculture.

As noted, the Clean Air Act was enacted "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." The first legislative step taken by Congress towards developing the Clean Air Act as we know it today occurred in 1955 with the enactment of the Air Pollution Control Act. That Act was amended several times, notably in 1970, 1977, and 1990. The current form of the Clean Air Act was established in the 1990 amendments. To date, the majority of enforcement activities of the Act have not directly involved in agriculture. However, that is a trend that could change in the coming years, including with respect to PM2.5 emissions from agricultural burning.

As highlighted in this report, in 2012 EPA tightened the NAAQS for PM2.5 and, as of March 2015, proposed requirements for implementing that standard in areas designated as nonattainment for PM2.5. While Arkansas currently has no nonattainment areas for PM2.5, the 2008 EPA National Emissions Inventory ranked Arkansas as the highest of all states for PM 2.5 emissions from agricultural burning. The 2008 National Emissions Inventory constituted EPA's first attempt to establish EPA-created PM2.5 emissions data from agricultural burning. The 2011 National Emissions Inventory, in its current form, estimates Arkansas's PM2.5 emissions from agricultural burning at approximately the same level as reported in the 2008 Inventory, but no longer ranks Arkansas as the highest ranking state for PM2.5 emissions.

Research conducted demonstrates that few states have established laws or policies to reduce the practice of agricultural burning. The majority of states continue to allow agricultural burning with minimal restrictions or regulation. Moreover, very little information about the impacts or outcomes of those policies is publicly available. States generally continue to recognize the importance of agricultural burning in the establishment of air quality policies.

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<sup>44</sup> See Clean Air Act Reading Room, available at <http://nationalaglawcenter.org/overview/caa/>.

## Appendix A – Policies Across the United States

	Smoke Management Plan or Guidelines	SIP Includes Agriculture or Exemptions	SIP Includes Smoke Plan	State Burn Permit, Authorization, or Registration Required	Local Burn Permit, Authorization, or Registration May Be Required	Burning Prohibited Specific Time of Year	Agriculture May be Exempted from Burn Bans	Education Program
Alabama				X	X	X		
Alaska	X	X	X	X				
Arizona							X	
Arkansas	X							
California	X	X			X	X		
Colorado	X				X			
Connecticut					X	X		
Delaware							X	
Florida		X	X	X	X		X	X
Georgia	X				X			
Hawaii		X		X				
Idaho	X	X	X	X	X	X		x
Illinois					X			
Indiana		X			X			
Iowa	X				X			
Kansas		X			X			
Kentucky		X			X			
Louisiana	X	X			X			X
Maine		X		X				
Maryland					X			
Massachusetts		X			X			
Michigan	X			X	X			
Minnesota	X				X			
Mississippi	X	X		X		X		

	Smoke Management Plan or Guidelines	SIP Includes Agriculture or Exemptions	SIP Includes Smoke Plan	State Burn Permit, Authorization, or Registration Required	Local Burn Permit, Authorization, or Registration May Be Required	Burning Prohibited Specific Time of Year	Agriculture May be Exempted from Burn Bans	Education Program
Missouri	X			X				
Montana				X		X		
Nebraska		X		X	X			
Nevada	X	X		X				
New Hampshire				X				
New Jersey				X				
New Mexico	X	X		X	X			
New York					X			
North Carolina		X		X	X		X	
North Dakota		X			X			
Ohio				X				
Oklahoma		X			X		X	
Oregon	X	X		X	X	X		
Pennsylvania		X			X			
Rhode Island				X	X	X		
South Carolina	X	X		X			X	
South Dakota					X			
Tennessee		X		X	X			
Texas		X			X			
Utah		X			X			
Vermont		X			X			
Virginia					X	X		
Washington		X		x				
West Virginia				X				
Wisconsin	X	X		X	X			
Wyoming		X			X			