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Executive Summary

The open burning of crop residue (crop residue burning) is a historic practice in Idaho and is considered an important tool for farmers. However, crop residue burning can also produce substantial air emissions and, if not managed properly, can lead to significant smoke impacts that endanger human health.

This annual report reviews and analyzes the Idaho Department of Environmental Quality's (DEQ's) crop residue burning (CRB) program for the 2010 burn season. DEQ is required to prepare an annual report that includes, at a minimum, an analysis of the causes of any measured air pollutant levels above the program-defined concentration limits and an assessment of the circumstances associated with any reported endangerment to human health associated with a crop residue burn.

This report also includes a summary of program modifications and planned program improvements, a summary of the meteorological conditions affecting the burn season, an assessment of the burn-decision process and acres burned in each burn management area (BMA), and a summary of trends in crop residue burning throughout the state.

Evaluation of the Burn Season

The weather of 2010 presented many difficulties for growers in accomplishing their crop residue-burning goals. Weather conditions throughout the state in the late spring and early summer were cooler and wetter than normal, which delayed the growing season. Many growers who would typically be ready to burn by August, were not ready to burn until September or October. Furthermore, August rainfall delayed crop residue burning for some growers who were ready to burn in August. These factors pushed many of the requests to burn into September and October, when the days became shorter, temperatures became lower, mixing heights and dispersion decreased, and precipitation became more likely. Despite these difficulties, DEQ was able to approve many burn days and accommodate most requests to burn by the end of the season. Generally, the fields that did not get burned were those that were registered just as the season was coming to a close due to rain and snow or that needed specific, uncommon wind directions due to nearby institutions with sensitive populations (ISPs).

Statewide, 64,165 acres were burned under the CRB program in 2010, a 17% increase from last year. The acres burned in the northern Idaho BMAs remained fairly consistent compared to last year, while acres burned in the southern Idaho BMAs—especially the Eastern Idaho and Southeast Idaho BMAs—increased significantly. DEQ believes that this difference may be a result of northern Idaho growers being more familiar with the CRB program from previous years of operation under the Idaho State Department of Agriculture, whereas southern Idaho growers are less familiar with operating under a regulated crop residue disposal program. For this reason, DEQ projects that acres burned in the northern Idaho BMAs will continue to remain fairly stable, while acres burned in the southern Idaho BMAs will continue to increase over the next couple of years as growers become more familiar with the CRB program.

Evaluation of Air Quality

DEQ operates the CRB program under guidelines and procedures designed to avoid causing or contributing to ambient air pollution concentrations above program-defined limits; causing an adverse impact to ISPs; or causing a public roadway safety hazard. DEQ carefully evaluates the

program's effectiveness in meeting these goals. That evaluation process is explained in detail within this report.

A thorough evaluation of the 2010 burn season showed that approved crop residue burning was the principle cause of a measured air pollutant concentration above a program-defined concentration limit on one day (August 18 in the Kootenai County BMA), did not cause or contribute to an adverse impact to an ISP, and caused reduced visibility on public roadways on two days (September 14 and 15 in the Boundary County BMA).

Recommended Improvements

Subsequent to the annual CRB program analysis, DEQ concluded that certain improvements will help the program operate more effectively and efficiently without sacrificing the protection of human health. The recommended improvements that were approved by the Director are listed below:

- **Evaluate the implications of allowing burning on weekends and holidays**—DEQ will present a summary of the evaluation and any recommendation to the CRB Advisory Committee at the 2012 meeting.
- **Modify the guidelines in the Operating Guide for observing burns**—DEQ will modify the criteria used to determine which burns will be observed with the goal being to better utilize DEQ resources and continue to provide the highest level of protection to public health.
- **Define what is not an adverse impact to an ISP**—DEQ will set a 1-hour average concentration level for particulate matter less than 2.5 microns (PM_{2.5}) and a visibility impairment level below which there would be no adverse impact to an ISP. Measured PM_{2.5} concentrations or visibility reduction greater than the levels would require further evaluation to determine whether an adverse impact occurred.
- **Define the procedure to ensure burns do not create a hazard for travel on public roadways**—The registration review process will continue to include an evaluation of field location relative to public roadways and, where necessary, the inclusion of permit conditions restricting allowable wind direction and speed. DEQ will clearly state that roadway safety is the grower's responsibility, utilize an industry standard stopping sight distance criteria to assess visibility reduction from smoke on public roadways, and determine whether the grower has an approved traffic control plan.
- **Change the program concentration limit for ozone**—DEQ recommends that the current program concentration limit for ozone (75% of the National Ambient Air Quality Standard [NAAQS]) be evaluated and that the following steps be completed in 2011:
 - Evaluate meteorological data on those days where the ozone concentration falls between 56.25 parts per billion (ppb) (75% of the NAAQS) and 67 ppb (Air Quality Index = 75).
 - Determine whether DEQ is not allowing burning on good or marginal burn days due solely to ozone concentration.
 - Determine an appropriate ozone concentration for the program concentration limit and develop a recommendation to the CRB Advisory Committee at the 2012 meeting.

- **Evaluate methods of outreach to ISPs**—DEQ will evaluate methods of outreach to ISPs to determine which methods are most effective.
- **Add a section on the history of the CRB program to the DEQ website**—DEQ will add a section to the website explaining the history and purpose of the program.

1. Introduction

This report reviews and analyzes the Idaho Department of Environmental Quality's (DEQ's) crop residue burning (CRB) program for the 2010 burn season. DEQ is required by rule (IDAPA 58.01.01.622.02) to prepare an annual report that includes, at a minimum, an analysis of the causes of any exceedance of the program-defined ambient air pollutant concentration limits (hereafter referred to as the program concentration limits) and an assessment of the circumstances associated with any reported endangerment to human health associated with a crop residue burn. This report also includes planned program improvements necessary to prevent future instances of measured pollutant concentrations above the program concentration limits.

This report only presents information specific to the 2010 burn season. For more in-depth information on the CRB program design, please refer to the 2008 annual report available on the DEQ website at:

http://www.deq.idaho.gov/air/prog_issues/burning/crop_residue_burning.cfm#reports.

2. Program Updates

DEQ updated the CRB program during 2010 based on recommendations presented in the 2009 annual report. These improvements were reviewed and endorsed by the CRB Advisory Committee. Other than these updates, the CRB program remains the same as in 2009. This section summarizes the status of the recommended changes.

- ***Delineate the Treasure Valley CRB management area for ozone***
DEQ has incorporated this recommendation into the CRB program. Ozone concentration limits in the Treasure Valley now only apply to burns within Canyon or Ada Counties. DEQ conducted a modeling analysis, which showed that burns outside Canyon or Ada Counties result in very insignificant effects on ozone concentrations in Canyon or Ada Counties and that monitored ozone levels in these counties are not representative of ozone levels in other parts of the Treasure Valley Airshed. Incorporating this recommendation allowed DEQ to authorize some burns on days that previously would have been declared no-burn days.
- ***Develop guidelines for public roadway safety for growers***
DEQ continues to work with the Idaho Transportation Department (ITD) and local transportation authorities to identify public roadway safety requirements and develop guidelines for maintaining adequate visibility on public roadways during crop residue burning. Several growers did work with ITD and local highway districts to determine the best method for ensuring public roadway safety.
- ***Develop best management practices for burning***
DEQ continues to develop best management practices (BMPs) for burning under the CRB program. These BMPs focus on residue load, stubble height, and ignition techniques (method and number of people) and are expected to help improve smoke management. These BMPs will be included in the grower training.

- ***Require growers to pass (80%) a test to receive credit for the grower training***
DEQ will implement this requirement in 2012 when the majority of growers will be required to renew their training.
- ***Develop a protocol for institutions to request “sensitive population” status***
DEQ developed and approved a final policy and protocol for requesting institution with sensitive population (ISP) status. This policy is posted on the DEQ website at http://www.deq.idaho.gov/rules/policies/pm10_3.cfm.
- ***Develop a streamlined process for harrow pile and spot burns***
DEQ initiated a rulemaking process to implement a separate permit by rule for the burning of harrow piles, spot burns, and propane flaming. A draft rule was developed and public comments have been received. DEQ intends to submit the final draft to the Board of Environmental Quality for consideration for temporary adoption at the April 2011 board meeting.

Following DEQ adoption of the draft rule, several actions must take place, including development of a revised State Implementation Plan (SIP) and approval of the SIP by the U.S. Environmental Protection Agency (EPA). Prior to EPA SIP approval, growers wanting to conduct spot burns, baled agricultural residue burns, or propane flaming must obtain a permit by rule in accordance with existing DEQ regulations.

- ***Include a better summary of outreach results from contacts with ISPs***
In 2009, DEQ conducted a survey of all ISPs. DEQ received very few responses to the survey. Of those responses received, few expressed interest in the CRB program. DEQ continues to evaluate methods to provide outreach to ISPs and is open to suggestions for improvement. During 2010, DEQ’s outreach to ISPs has generally focused on ensuring accurate and up-to-date location and status based upon field observations.
- ***Move an air quality monitor to the Garwood School on the Rathdrum Prairie***
This recommendation has been completed. The monitor was installed at the Garwood School prior to the 2010 fall burn season and operated during the fall burn season.
- ***Develop a process for improved documentation of the postburn analysis***
DEQ refined the enhanced documentation process to evaluate possible adverse impacts to ISPs and visibility hazards on public roadways. The process includes a review of the meteorological data and recommendations to improve future burn decisions.
- ***Remove the requirement for DEQ to be present for propane flaming operations within 3 miles of an ISP***
DEQ implemented this recommendation beginning with the spring 2010 burn season. Propane flaming is conducted only in the spring and generates minimal smoke emissions.

3. Outreach for the 2010 Burn Season

Outreach remains an important component of the CRB program. DEQ’s outreach effort has two main objectives: public awareness and grower education. Many of the same outreach methods used in previous years were again used in 2010, including distributing brochures; providing telephone hotlines; maintaining an internet website with public and grower sections; maintaining

an email list service; communicating directly with fire and sheriff departments; attending and providing information at agricultural expos and county fairs; and visiting ISPs (such as schools, hospitals, and assisted-living facilities).

DEQ conducted group training sessions for growers at eight locations throughout southern Idaho. This in-person training provided growers with information about the CRB program, including program requirements and compliance. In addition to the group training, DEQ staff in both northern and southern Idaho provided individual grower training in-person and over the telephone.

DEQ conducted the following new or enhanced methods of outreach in 2010:

- ***Grower Education***

On-site field assistance continues to be an effective outreach technique for DEQ as it provides an opportunity to meet growers, develop a positive working relationship, and emphasize good burning strategies and techniques.

At this point, many growers, especially those in northern Idaho, seem familiar with the CRB program and successfully navigate the registration process. However, we continue to invest extra time with growers who are new to the program, have never completed a registration, or do not have computer access. DEQ staff conducted registration training sessions for groups and individual growers. A continuing emphasis of our grower education has been reminding growers to obtain all necessary fire safety permits and to consult with ITD or the applicable county road department regarding public roadway safety requirements.

- ***Grower Meetings***

In addition to the grower education described above, DEQ gave a series of presentations in conjunction with the University of Idaho's Living on the Land program, which is aimed at small-acreage farmers. These presentations focused on understanding and complying with the requirements of the CRB program and provided a valuable opportunity to meet growers, answer questions, and receive feedback from growers about the CRB program.

- ***Collaboration with fire departments***

DEQ representatives met with several fire chiefs on an individual basis and in group settings to present information about the CRB program and to help ensure that fire department personnel and DEQ are providing the public with consistent and accurate information about the CRB program.

- ***Public outreach through mass media***

DEQ used radio advertisements and newsletter articles to reach members of the general public and growers who may not have been reached by previous outreach methods. These efforts included radio public service announcements during Boise State and University of Idaho football games. DEQ used two advertisements: one intended for the general public and one intended for the grower community.

4. Analysis of the Burn Season

For management of the CRB program, the state is divided into 13 burn management areas (BMAs) based on similarity of meteorological conditions and topography, as well as proximity to DEQ regional offices. The 13 BMAs are shown in Figure 1. This analysis of the burn season includes examining statewide air quality impacts, complaints, compliance and enforcement, the monitoring network, meteorology, and specific monitoring for each BMA.

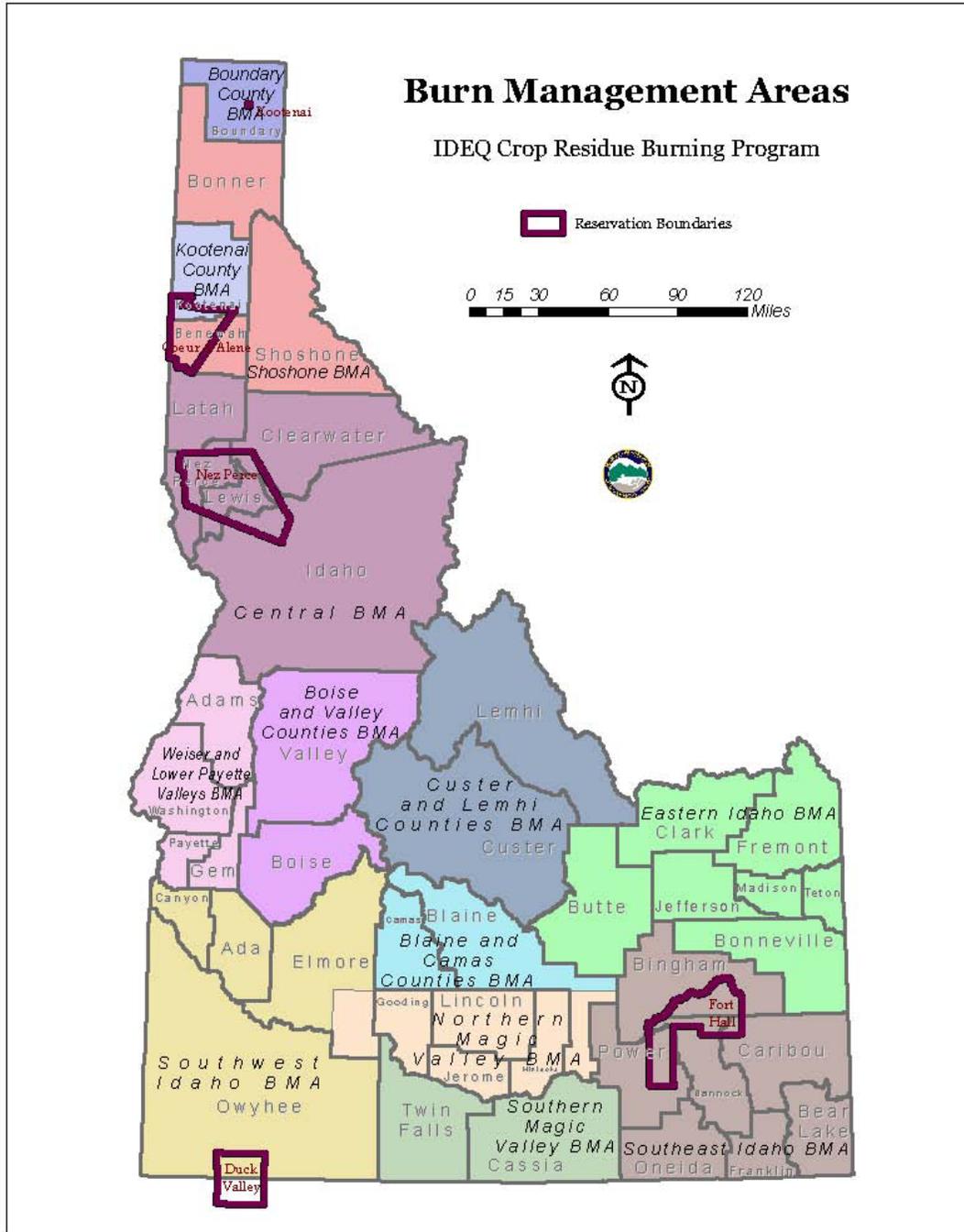


Figure 1. Idaho burn management areas

The BMA summaries include area geography, acres burned, and daily burn decisions and air quality conditions. No crop residue burning was conducted in the Custer and Lemhi Counties BMA during 2010; therefore, this BMA is not discussed further. Also, the Shoshone BMA and the Boise and Valley Counties BMA have not been included in the statewide summaries since negligible burning was conducted in these BMAs, with 3 acres and 5 acres burned in these BMAs, respectively.

4.1 Air Quality Impacts

This section includes evaluations of CRB program compliance with program concentration limits, discussions of the circumstances surrounding approved burning on days when measured pollutant concentrations were above the program concentration limits, an evaluation of possible adverse impacts to ISPs, and an evaluation of additional burn days. DEQ evaluated additional burn days in two circumstances: 1) when approved burning was conducted and measured concentrations of particulate matter less than 2.5 microns (PM_{2.5}) were above the program-defined 4-hour average preburn or postburn trigger limits or the 24-hour average preburn trigger limits and 2) to evaluate possible public roadway safety visibility impacts.

4.1.1 Compliance with Program Concentration Limits

To approve a request to burn, DEQ must determine that ambient air quality levels 1) do not exceed 75% of the level of any National Ambient Air Quality Standard (NAAQS) on any day 2) are not projected to exceed such level over the next 24 hours, and 3) have not reached, and are not forecasted to reach and persist at, 80% of the 1-hour action criteria for particulate matter. The limits for the pollutants of concern for crop residue burning, given as micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) of PM_{2.5} or PM₁₀ or parts per billion (ppb) of ozone, are defined as follows:

- PM_{2.5} 1-hour average (64 $\mu\text{g}/\text{m}^3$)
- PM_{2.5} 24-hour average (26.25 $\mu\text{g}/\text{m}^3$)
- PM₁₀ 24-hour average (112 $\mu\text{g}/\text{m}^3$)
- ozone 8-hour average (56 ppb)

During 2010, ambient air quality monitors recorded values above the program concentration limits in many instances. However, on most of these days no crop residue burning was approved. For days when measured PM_{2.5} or ozone levels were above the program concentration limits and crop residue burning was conducted, DEQ evaluated both the location and the time of the burn in relation to the air quality monitoring data. During 2010, there were no measured PM₁₀ concentrations above the program concentration limit; therefore PM₁₀ is not evaluated in this report. Burning under the CRB program was reasonably suspected to have been the cause of a measured concentration above a program concentration limit only when both of the following items were true:

- An approved crop residue burn occurred during, or shortly prior to, the recorded concentration
- Wind direction and proximity of the burn were such that smoke from the burn was transported toward the monitor

DEQ has determined through previous analyses that crop residue burns conducted outside Ada or Canyon Counties result in insignificant effects on ozone concentrations in Canyon or Ada Counties and that measured ozone concentrations in these counties are not representative of ozone levels in other parts of the Treasure Valley Airshed. In 2010, there were a few days when monitors in the Treasure Valley measured ozone concentrations above the program concentration limit and burning was approved within the Southwest Idaho BMA, but outside Ada or Canyon Counties.

The days discussed below are when air quality monitoring data was above a program concentration limit and crop residue burning was conducted within the same BMA. Also discussed are those days when a measured ozone concentration in the Treasure Valley was above the program concentration limit and burning was conducted in the Treasure Valley Airshed but outside of Ada or Canyon Counties.

July 23—1-hour average PM_{2.5} concentration in the Southwest Idaho BMA

July 23 was a burn day in the Southwest Idaho BMA; 27 acres were burned at one field west of Nampa in Owyhee County. The PM_{2.5} monitor in Nampa recorded the following concentrations:

- 1-hour average of 91.7 $\mu\text{g}/\text{m}^3$ for the hour ending at 10:00 a.m.
- 4-hour average of 67.6 $\mu\text{g}/\text{m}^3$ for the 4 hours ending at 11:00 a.m.
- 24-hour average of 20 $\mu\text{g}/\text{m}^3$

The hourly PM_{2.5} concentration rose from 8.2 $\mu\text{g}/\text{m}^3$ to 84.4 $\mu\text{g}/\text{m}^3$ between 7:00 a.m. and 8:00 a.m., before any crop residue burning had been conducted, all of which was in the afternoon. At the time the crop residue burning was approved on July 23, the 1-hour average PM_{2.5} concentration had dropped below 20 $\mu\text{g}/\text{m}^3$ and DEQ determined that the concentrations were not forecasted to rise during the day. A review of the monitoring data shows that the measured concentrations did not increase during or after the burn. The cause of the elevated readings in the morning is unknown. Preburn enhanced documentation should have been completed but was not. DEQ approved burning in this BMA even though measured concentrations were above the preburn trigger level because conditions were expected to improve.

August 2, 3, and 20 and September 13—8-hour average ozone concentrations in the Southwest Idaho BMA

August 2, 3, and 20 and September 13 were burn days in the Southwest Idaho or Weiser and Lower Payette Valleys BMAs. The burns on these days were all located in Owyhee, Payette, or Washington Counties and would not have affected ozone levels in the Treasure Valley Airshed, as previously discussed.

August 18—8-hour average ozone concentration in the Southwest Idaho BMA

August 18 was a burn day in the Southwest Idaho and Weiser and Lower Payette Valleys BMAs, where 14 acres were burned at one field in Canyon County and 14 acres were burned at one field in Washington County. The ozone monitor at St. Luke's Hospital in Meridian was recording data but was not transmitting the data to DEQ. The ozone forecast for the day was made using data from the White Pine Elementary School monitor in Boise, which is typically the highest-reading monitor location in the region. The ozone forecast for the day was for an Air Quality Index

(AQI) of 46, which equates to an ozone concentration of 54 ppb, below the 75% criteria that DEQ uses to approve burns. Once the communication problem with the St. Luke's monitor was resolved, the data showed a higher than expected 8-hour ozone concentration of 57.3 ppb for the 8-hours ending at 8:00 p.m. Atmospheric conditions this day turned out to be more stable than predicted, resulting in more favorable conditions for ozone formation. Surface winds were from the southwest and transport winds were from the west at the Canyon County burn. The burn conducted in Washington County would not have affected ozone levels in the Treasure Valley Airshed, as previously discussed. Based upon the location of the field, the location of the monitor, and the surface and transport wind direction, the elevated concentrations are unlikely to be attributable to the crop residue burns. Enhanced documentation was completed for this burn.

August 18—1-hour average PM_{2.5} concentration in the Kootenai County BMA

August 18 was a burn day for Kootenai County, where 80 acres of bluegrass were burned at one field. The field had been baled, which reduced the amount of residue left in the field, and the standing grass was quite green. Just prior to ignition, winds were light and from the appropriate direction (southwest). Shortly after the grower started igniting the field, wind speeds increased and carried the smoke directly toward the Lancaster monitor. When it was observed that the grower was having difficulty igniting the field and the increased wind speed was preventing good lift of the smoke column, DEQ requested the grower extinguish the fire and the grower complied; however, the field continued to burn for about 45 minutes before the fire was completely out. The Lancaster PM_{2.5} monitor recorded the following concentrations:

- 1-hour average of 125.6 $\mu\text{g}/\text{m}^3$ for the hour ending at 3:00 p.m.
- 4-hour average concentrations of 43.5 $\mu\text{g}/\text{m}^3$ for each of the 4-hour periods ending at 4:00 p.m. and 5:00 p.m.

DEQ determined that the crop residue burn contributed significantly to the elevated PM_{2.5} concentrations at the Lancaster monitor. Enhanced documentation was completed for this burn.

September 3—8-hour average ozone concentration in the Southwest Idaho BMA

September 3 was a burn day in the Southwest Idaho BMA, where 5 acres were burned at one field in Canyon County southwest of Caldwell. On September 3, the AQI was forecasted to be 46, which equates to an ozone concentration of 54 ppb. The ozone monitoring data from the morning remained low and the AQI forecast was considered to be relatively accurate. However, atmospheric conditions in the afternoon became more stable than predicted, resulting in more favorable conditions for ozone formation. The burning of 5 acres was approved based on the AQI forecast. The actual AQI for the day turned out to be 50, which equates to an ozone concentration of 59 ppb. The highest measured ozone concentration this day was 59.6 ppb at St. Luke's Hospital in Meridian for the 8-hours ending at 8:00 p.m. Field observations during the burn noted that the surface and transport winds were from the southeast and the smoke from the burn dispersed to the northwest. Smoke from the burn would not have reached the monitor in Meridian, which is located about 25–30 miles east of the field. It is unlikely that the burning of 5 acres contributed to the ozone concentration this day. The concentration likely resulted from regional emissions and meteorological conditions that were conducive to ozone formation and accumulation. Enhanced documentation should have been completed for this burn but was not.

September 10—1-hour average PM_{2.5} concentration in the Southwest Idaho BMA

September 10 was a burn day in the Southwest Idaho BMA, where 8 acres were burned at one field in eastern Canyon County. The PM_{2.5} monitor in Nampa recorded the following concentrations:

- 1-hour average of 66.3 $\mu\text{g}/\text{m}^3$ for the hour ending at 7:00 p.m.
- 4-hour average of 46.3 $\mu\text{g}/\text{m}^3$ for the 4 hours ending at 8:00 p.m.

From 2:00 p.m. to 4:00 p.m., routine maintenance was conducted on the monitor, including a filter change. With the tapered element oscillating microbalance (TEOM) type of monitor, anomalous high readings are occasionally seen for several hours after a filter change. The reason for this anomaly may be due to filter preconditioning, but since it has no bearing on compliance with the NAAQS, the data was not voided. The data from the Nampa monitor for this day followed this pattern. The readings were under 5 $\mu\text{g}/\text{m}^3$ for the hours just prior to the maintenance, then rose to 49 $\mu\text{g}/\text{m}^3$ immediately following the maintenance, and then stabilized at normal levels after several hours.

During the burn, surface and transport winds were observed to be from the southwest. Field observations indicated that the smoke dispersed in an easterly direction, away from the Nampa monitor, which was approximately 20 miles away from the burn. Based on the location of the field, the location of the monitor, and the surface and transport wind direction, the cause of the elevated concentrations was not crop residue burning. Enhanced documentation should have been completed for this burn but was not.

September 13—1-hour average PM_{2.5} concentration in the Southwest Idaho BMA

September 13 was a burn day in the Southwest Idaho BMA; 32 acres were burned at two fields west of Nampa in Owyhee County. The crop residue burns were started at 1:10 p.m. and 2:05 p.m. The PM_{2.5} monitor at St. Luke's Hospital in Meridian recorded the following concentrations:

- 1-hour average of 75.2 $\mu\text{g}/\text{m}^3$ for the hour ending at 2:00 p.m.
- 4-hour average of 43.0 $\mu\text{g}/\text{m}^3$ for the 4 hours ending at 5:00 p.m.
- 24-hour average of 18 $\mu\text{g}/\text{m}^3$

This monitor underwent maintenance from 12:00 p.m. to 1:00 p.m., and, as described in the discussion of September 10 above, the pattern of anomalous readings following monitor maintenance appears to have occurred. The PM_{2.5} readings from the Nampa monitor, which is closer to the burn, remained below the program concentration limits and pre- and postburn trigger levels. On this day, the measured concentrations became elevated prior to when smoke from the crop residue burning could have reached the monitor. The cause of the elevated readings is unknown, but it was not crop residue burning. Enhanced documentation should have been completed for these burns but was not.

October 20—1-hour average PM_{2.5} concentration and 24-hour average PM_{2.5} concentration in the Central BMA

The elevated monitor levels recorded on October 20 at the Moscow and Kendrick monitors peaked at 3:00 a.m. and 6:00 a.m., respectively. The PM_{2.5} monitor in Moscow recorded the following concentrations:

- 1-hour average of 64.5 µg/m³ for the hour ending at 3:00 a.m.
- 4-hour average of 59.1 µg/m³ for the 4 hours ending at 4:00 a.m.

The PM_{2.5} monitor in Kendrick recorded the following concentrations:

- 1-hour average of 83.3 µg/m³ for the hour ending at 6:00 a.m.
- 4-hour average of 82.4 µg/m³ for the 4 hours ending at 7:00 a.m.

As a result of when these concentrations were measured, DEQ examined all burning activity from October 19 to determine the most likely source. A total of 150 acres of crop residue burning was completed at four fields across Latah County between 11:30 a.m. and 3:00 p.m. Three of the fields were 10 to 15 miles north of Moscow and were not suspected to have contributed to the measured concentration due to their locations relative to the monitors. The fourth field was a 30-acre field located about 5 miles southeast of Kendrick. DEQ did not have a field coordinator at this burn, but the grower reported that all burning was completed by 2:30 p.m. Additional burning that occurred in the airshed included 420 acres of prescribed burning, approximately 50 acres consumed by wildfire, and possible burning allowed by seven fire safety permits issued by the rural fire district, which allowed burning during a window that included October 19. On October 19, the winds were light and from the west and southwest during the midday and afternoon, shifting to a generally light easterly wind during the night.

After conducting a detailed analysis of the meteorological data from October 19–20, DEQ has determined that the measured PM_{2.5} concentrations likely resulted from residual smoke from the burning that occurred on October 19, which drifted toward the Kendrick monitor with the nighttime easterly winds. Nighttime woodstove and fireplace smoke is also suspected of having contributed to the measured concentrations. Because of the completion time of the 30-acre crop residue burn, the smoke had adequate time to disperse prior to the nighttime wind shift; therefore, this burn is not suspected of having a meaningful contribution to the measured PM_{2.5} concentrations. DEQ has met with each of the agencies involved with the burning that occurred on October 19 to inform them of the elevated PM_{2.5} concentrations and to identify measures to prevent similar incidents in the future. Some of the measures identified include looking at alternatives to prescribed burning, verifying that forecasted conditions are representative of actual local conditions, using forecasts to evaluate the potential for elevated concentrations to occur a day or two after burning occurs, and improving communications between DEQ and the prescribed burning agencies.

4.1.2 Institutions with Sensitive Populations

DEQ is prohibited from approving a request to burn if conditions are such that ISPs will be adversely impacted or when the plume is predicted to impact such institutions. To safeguard these populations, DEQ utilizes many procedures, including maintaining a current database of all known ISPs that includes the name, type of institution, and location; reviewing all registrations with regard to field location relative to the location of ISPs; attaching restrictive permit

conditions for all fields within 3 miles of an ISP; and requiring that DEQ personnel be on site and provide final approval to burn for fields within 3 miles of an ISP. DEQ field coordinators frequently conduct an in-person examination of ISPs that are near proposed crop residue burns prior to ignition to ensure that the location and operational status of the ISP are understood.

During the 2010 burn season, there were no documented cases of adverse impacts to ISPs from approved burns. Enhanced documentation was completed for two burn days to evaluate whether an adverse impact to an ISP occurred. These days are discussed below.

September 15—Mount Hall School and Kootenai Tribe Health Clinic in the Boundary County BMA

On September 15, approved crop residue burning was conducted near the town of Copeland in Boundary County. A DEQ field coordinator observed two burns earlier in the day in which smoke dispersed to the north. The coordinator launched a pilot balloon to observe the transport winds prior to approving the burning of this grower's final 200 acres. After conferring with the grower, the field coordinator believed that the nearby Mount Hall School was done for the day at 3:00 p.m. and approved this burn to start at 3:12 p.m. Shortly after the field was ignited, the wind direction shifted and the wind speed increased, resulting in smoke drifting toward the school. The field coordinator visited the school at about 3:30 p.m. and observed that school still in session and that smoke had drifted to the school. During a subsequent interview with school officials the field coordinator was told that school hours were from 7:55 a.m. to 3:55 p.m. The PM_{2.5} monitor located at the school recorded a 1-hour average concentration of 22.1 µg/m³ for the hour ending at 4:00 p.m. At 5:00 p.m. the concentration had dropped to 8.7 µg/m³ and the measured concentrations continued to drop throughout the evening hours. DEQ received a complaint from the general public related to this incident, but no complaints from the school and no reports of adverse health effects at the school were received. DEQ interviewed school staff and was informed that no smoke odor was detected inside the school.

Coinciding with the above burn, a field owned by another grower was approved for simultaneous burning approximately one-half mile to the south. This 70-acre field was influenced by the same wind conditions and subsequently DEQ was concerned about the possibility of smoke reaching the Kootenai Tribe Health Clinic. The PM_{2.5} monitor located just south of the health clinic and operated by the Kootenai Tribe recorded a 1-hour average concentration of 23.4 µg/m³ for the hour ending at 5:00 p.m. The clinic closes for the day at 4:00 p.m. At 6:00 p.m., the concentration had dropped to 9.4 µg/m³ and the measured concentrations continued to drop throughout the evening. DEQ received no complaints from the clinic and no reports of adverse health effects.

These events were not considered to be an adverse impact to an ISP because of the short duration of the smoke, the level of the maximum concentrations, and the fact that no adverse health effects were reported. DEQ completed enhanced documentation for each of these burns.

October 20—Caribou Memorial Hospital in the Southeast Idaho BMA

On October 20, 100 acres of approved crop residue burning was conducted near the town of Grace in Caribou County. A DEQ field coordinator observed the burn and noted that smoke from the burn dispersed to the northeast where it drifted over a ridge and descended onto the town of Soda Springs. The DEQ field coordinator had expected the smoke to remain on the west side of the ridge and disperse to the north due to the terrain and wind conditions. DEQ operates a

seasonal PM_{2.5} monitor in Soda Springs at the Caribou Memorial Hospital. During this event, the PM_{2.5} monitor measured a 1-hour average concentration of 31.2 µg/m³ for the hour ending at 4:00 p.m. The elevated PM_{2.5} concentration was short-lived, and by 5:00 p.m. the 1-hour average concentration was 3.8 µg/m³. DEQ contacted the hospital, which reported that no adverse health effects occurred due to the smoke. This event was not considered to be an adverse impact to an ISP because of the short duration of the impact, the level of the maximum concentrations, and the fact that no adverse health effects were reported. DEQ completed enhanced documentation for this burn.

4.1.3 Evaluation of Additional Burn Days

In addition to the program concentration limits described in Section 4.1.1 and the possible impacts to ISPs, DEQ further evaluated the effectiveness of the CRB program by using the PM_{2.5} 4-hour average concentration preburn and postburn triggers of 22 µg/m³ and 32 µg/m³, respectively; the PM_{2.5} 24-hour average concentration preburn trigger of 16 µg/m³; and possible visibility hazards on public roadways. The 4-hour average concentrations can help to identify potential particulate sources that have a duration lasting longer than 1 hour but less than 24 hours, which is a typical timeframe for a crop residue burn. DEQ used the same process as described in Section 4.1.1 to determine whether smoke from crop residue burning was reasonably suspected of having caused an impact. The following days are discussed because approved crop residue burning was conducted and monitoring values were recorded at concentrations above the PM_{2.5} trigger levels or smoke was observed on a public roadway.

The days with monitored PM_{2.5} concentrations above the trigger levels that also had either 1-hour or 24-hour average PM_{2.5} levels above the program concentration limits are not repeated here—see Section 4.1.1.

March 11—4-hour average PM_{2.5} concentration in the Shoshone BMA

The peak 4-hour average PM_{2.5} concentration of 40.4 µg/m³ occurred at the Pinehurst monitor (located in Pinehurst in central Shoshone County) for the 4 hours ending at 6:00 a.m., indicating it was likely caused by woodstove use in the Pinehurst area. The only crop residue burning approved in the Shoshone BMA this day was a 3-acre field in Bonner County that was burned later in the day after the monitoring data had returned to below the trigger levels. No crop residue burning was conducted in this BMA prior to the elevated concentration. Preburn enhanced documentation is not applicable in this instance as burning in this area is separated by 40 air miles southeast, mountainous terrain with elevations over 2000 feet above field ground level and is clearly a completely separate airshed.

April 15—4-hour average PM_{2.5} concentration in the Southeast Idaho BMA

April 15 was a burn day in the Southeast Idaho BMA; 289 acres were burned near Arimo (about 30 miles southeast of the Pocatello monitor) and 81 acres were burned about 10 miles south of Rockland (located about 41 miles southwest of the Pocatello monitor). The Pocatello PM_{2.5} monitor recorded a 4-hour average concentration of 33.7 µg/m³ for the 4 hours ending at 4:00 p.m. During the burns, surface winds were observed to be generally from the south and transport winds were observed from the north and west. Field observations indicated that the smoke dispersed with the transport winds in a southerly direction away from the monitor. The Pocatello monitor is located in an industrial area and is subject to emissions generated by local industry, heavy equipment, and emissions from a nearby railroad. Due to the distance from the

monitor, terrain, and direction of smoke dispersion, the evaluation of this event determined that the elevated PM_{2.5} concentration recorded by the monitor was not caused by crop residue burning. Enhanced documentation was not required since these burns were not reasonably suspected of causing or contributing to the measured PM_{2.5} concentration.

August 3—4-hour average PM_{2.5} concentrations and 24-hour average PM_{2.5} concentrations in the Southwest Idaho BMA

August 3 was a burn day in the Southwest Idaho BMA; 210 acres were burned near Grand View (about 50 miles south-southeast of the monitors in Meridian and Nampa). The PM_{2.5} monitor in Nampa recorded the following concentrations:

- 4-hour average of 26.8 µg/m³ for the 4 hours ending at 10:00 a.m.
- 24-hour average of 24 µg/m³

The PM_{2.5} monitor in Meridian recorded the following concentrations:

- 4-hour average of 30.2 µg/m³ for the 4 hours ending at 9:00 a.m.
- 24-hour average of 19 µg/m³

The monitoring values trended lower after peaking in the morning, and the 4-hour averages were below the preburn trigger levels at the time the burn began in the afternoon. The Nampa monitor recorded elevated concentrations again that night, recording a 4-hour average PM_{2.5} concentration of 31.0 µg/m³ for the 4 hours ending at 1:00 a.m. on August 4. However, based on the relative locations of the field and the monitor and the wind direction, the source of the elevated concentrations was not crop residue burning. Preburn enhanced documentation should have been completed but was not. DEQ approved burning in this BMA even though measured concentrations were above the preburn trigger level because conditions were expected to improve.

August 19—Public Roadway Safety in the Central BMA

On August 19, a 35-acre field was burned approximately 2 miles to the east of the town of Potlatch. As a result of this burn, smoke drifted across Onaway Road. The southern edge of the field is bordered by State Hwy 6, and the eastern edge of the field is bordered by Onaway Road. The grower routinely uses flaggers due to the close proximity of major roadways and decided to post flaggers on Hwy 6 this day because of higher traffic volumes. When the smoke drifted across Onaway Road, the grower responded by repositioning the flaggers from Hwy 6 to Onaway Road. Enhanced documentation was not completed due to the responsiveness of the grower in addressing this problem.

September 14 and 15—Public Roadway Safety in the Boundary County BMA

On September 14 and 15, approved crop residue burning was conducted near Bonners Ferry in Boundary County. A DEQ field coordinator observed the burns both days. On September 14, the field coordinator noted that during about the first 10 minutes of the burn, smoke drifted across Pine Island Road, an unpaved public road. The field coordinator documented the smoke with photographs but did not make an assessment of the remaining sight distance or the traffic speed and volume on the road.

On September 15, the field coordinator observed and noted that the wind direction shifted after the burn had been ignited, resulting in smoke drifting across Market Road and Highway 1. The

field coordinator made note of the smoke but did not make an assessment of the remaining sight distance or the traffic speed and volume on the roads.

Assessments of public roadway safety impacts cannot be made after the fact using photographs because accurate estimates of sight distances cannot be made. DEQ considers these incidents to be possible public roadway safety impacts. DEQ issued Notices to Comply to the two growers for failure to maintain public roadway safety during the burns.

September 15—4-hour average PM_{2.5} concentration in the Central BMA

September 15 was a burn day in the Central BMA; 253 acres were burned near the town of Potlatch (about 20 miles northeast of the Moscow monitor). The Moscow PM_{2.5} monitor recorded a 4-hour average concentration of 36.5 $\mu\text{g}/\text{m}^3$ for the 4 hours ending at 9:00 p.m. The decision to allow burning in this area on this day was based on monitor readings from the Potlatch monitor located approximately 3 miles southeast of the burn location. The preburn and postburn 4-hour average PM_{2.5} concentrations recorded at the Potlatch monitor were 12.4 $\mu\text{g}/\text{m}^3$ and 15.9 $\mu\text{g}/\text{m}^3$, respectively. Enhanced documentation should have been completed but was not.

September 16—4-hour average PM_{2.5} concentration in the Southern Magic Valley BMA

September 16 was a burn day in the Southern Magic Valley BMA; 363 acres were burned at several fields around Twin Falls. The Twin Falls PM_{2.5} monitor recorded a 4-hour average concentration of 25.0 $\mu\text{g}/\text{m}^3$ for the 4 hours ending at 9:00 a.m. This concentration was above DEQ's PM_{2.5} 4-hour average preburn trigger level of 22 $\mu\text{g}/\text{m}^3$. However, the concentrations recorded between 9:00 a.m. and the time that the burns were started in the afternoon, as well as the concentrations recorded during and after the burns, were all below the preburn trigger levels. Preburn enhanced documentation should have been completed but was not. DEQ approved burning in this BMA even though measured concentrations were above the preburn trigger level because conditions were expected to improve.

October 13—4-hour average PM_{2.5} concentration in the Southwest Idaho BMA

October 13 was a burn day in the Southwest Idaho BMA; 115 acres were burned from four fields in Canyon County, west of Boise. The Nampa PM_{2.5} monitor recorded a 4-hour average concentration of 34.3 $\mu\text{g}/\text{m}^3$ for the 4 hours ending at 9:00 p.m. Field observations during the burns indicated that the transport winds were from an easterly direction and moved smoke to the west, away from the monitor. The cause of the elevated readings is unknown, but it was not crop residue burning. Enhanced documentation should have been completed but was not.

October 18—4-hour average PM_{2.5} concentration in the Southern Magic Valley BMA

October 18 was a burn day in the Southern Magic Valley BMA; 2 acres were burned at one field about 30 miles east of Twin Falls. The Twin Falls PM_{2.5} monitor recorded a 4-hour average concentration of 25.2 $\mu\text{g}/\text{m}^3$ for the 4 hours ending at 6:00 a.m. This concentration was above DEQ's PM_{2.5} 4-hour average preburn trigger level of 22 $\mu\text{g}/\text{m}^3$. However, the concentrations recorded between 6:00 a.m. and the time of the burn, as well as the concentrations recorded during and after the burn, were all below the preburn trigger levels. There was no burning conducted the day before. Preburn enhanced documentation should have been completed but was not. DEQ approved burning in this BMA even though measured concentrations were above the preburn trigger level because conditions were expected to improve.

October 22—4-hour average PM_{2.5} concentrations and 24-hour average PM_{2.5} concentrations in the Southwest Idaho BMA

October 22 was a burn day in the Southwest Idaho BMA; 5 acres were burned in western Canyon County near Parma. The PM_{2.5} monitors in Nampa and Meridian recorded 4-hour average concentrations of 28.0 µg/m³ and 24.1 µg/m³, respectively, for the 4 hours ending at 10:00 a.m. The readings dropped throughout the morning so that when the 5-acre burn was approved, the monitors were each reading below the preburn trigger levels. After the burn was conducted, the Nampa monitor readings rose again and peaked with a 4-hour average concentration of 34.4 µg/m³, above the postburn trigger level, for the 4 hours ending at 11:00 p.m. The wind direction during the burn was from the west and northwest and shifted to a southerly wind in the evening. In this case, the size of the burn and distance and direction to the monitor indicate that the source of the elevated PM_{2.5} readings was not the crop residue burn. Preburn enhanced documentation should have been completed but was not. DEQ approved burning in this BMA even though measured concentrations were above the preburn trigger level because conditions were expected to improve.

November 3—4-hour average PM_{2.5} concentration in the Boise and Valley Counties BMA

November 3 was a burn day in the Boise and Valley Counties BMA; 5 acres were burned at one field in Valley County near Smiths Ferry. The Idaho City PM_{2.5} monitor recorded a 4-hour average concentration of 38.4 µg/m³ for the 4 hours ending at 3:00 p.m. This concentration was above DEQ's PM_{2.5} 4-hour average postburn trigger level of 32 µg/m³. The monitor is located about 30 miles to the southeast of the burn location over complex terrain, and based on the wind conditions and terrain, this burn would not have influenced the monitor. This burn was not suspected of having contributed to the elevated concentrations; therefore, enhanced documentation was not required.

4.2 Complaints

Complaint response remains a critical part of DEQ's smoke management program. Like information from ambient monitoring or meteorological data, complaints provide smoke managers with information that can help them understand how the public perceives burning, air quality, and smoke behavior. DEQ focused on the location, content, and circumstances of the complaints and used the information learned to improve future burn decisions. Some of the complaints involved smoke from crop residue burning conducted within the CRB program. Other complaints involved crop residue burning conducted outside DEQ's CRB program, such as the burning of an unregistered field, burning on a no-burn day, or crop residue burning conducted by another entity, such as burning on tribal land.

DEQ used a familiar toll-free hotline number for the public to submit questions, comments, and complaints. This number was previously used by the Idaho State Department of Agriculture when it operated the CRB program. DEQ, in cooperation with the Nez Perce and Coeur d'Alene Tribes, used a contractor to answer the calls. Information from each call was immediately e-mailed to CRB program staff. Complaints received through the hotline included both complaints about burning conducted within the CRB program and complaints about burning outside DEQ's CRB program. The following information was collected from the callers:

- Name
- Phone number
- Is a call back requested?
- City, state, and county of caller's location
- Is smoke visible from caller's location?
- Is smoke at ground level?
- Brief description of the problem

In addition to the complaint hotline, DEQ also directly received questions, comments, and complaints in the regional offices and some complaints were received by other methods, such as by DEQ field coordinators. In all cases, crop residue burning complaints were entered into DEQ's Complaint Tracking System by regional office staff. Table 1 summarizes the number of calls received on the hotline for 2010. Table 2 shows the total number of crop residue burning complaints received by BMA, including those that were related to DEQ's CRB program and those from non-DEQ crop residue burning.

Table 1. Summary of calls to the crop residue burning hotline in 2010

Month	Number of callers who listened to the answering message ^a	Number of callers who hung up after the answering message	Number of callers who selected "Speak with an operator" ^b	Number of callers who selected "Nez Perce tribe burn decision"	Number of callers who selected "North Idaho burn decision"	Number of callers who selected "South Idaho burn decision"
January	0	0	0	0	0	0
February	0	0	0	0	0	0
March	23	6	17	11	43	30
April	20	20	1	1	19	45
May	20	19	0	2	15	37
June	27	27	1	0	0	39
July	13	13	0	11	19	27
August	168	19	0	42	46	46
September	233	36	45	44	62	46
October	177	26	29	38	42	42
November	73	9	4	7	19	34
December	2	1	0	0	0	1
Overall totals	653	91	111	156	265	347

a. To be included in this category, the caller had to listen to the entire message before selecting another option.

b. Callers who chose to speak with an operator could register a complaint, ask a question, or make a comment, which was then immediately communicated by e-mail to pre-identified DEQ staff.

Table 2. Summary of crop residue burning complaints received in 2010

Burn management area ^a	Total crop residue burning related complaints	Complaints likely associated with DEQ-approved burning	Complaints associated with other smoke sources ^b
Central	11	5	6
Kootenai County	12	2	10
Boundary County	15	7	8
Southwest Idaho	4	2	2
Weiser and Lower Payette Valleys	3	1	2
Northern Magic Valley	2	0	2
Southeast Idaho	1	1	0

a. The burn management areas that had no related complaints during 2010 are not included.

b. Complaints from other sources include crop residue burning on reservations and illegal crop residue burning off reservation.

4.3 Compliance and Enforcement

DEQ's existing Air Quality Division Compliance and Enforcement Program is used for the CRB program. DEQ continued to focus on compliance assistance during 2010 with the goal to continue educating growers about their permits and requirements and help them comply with those requirements. In those instances where an enforcement action was appropriate, DEQ continued to use both informal and formal enforcement tools. This process is considered a "proactive" step to help avoid future issues that could result from poor smoke management. DEQ believes this approach will pre-empt future emissions and is not solely an after the fact enforcement stance.

The CRB program forwarded 16 potential violations of the CRB rule to the enforcement coordinator in the Air Quality Division. Of those, 1 case was not pursued because further investigation revealed that no violation occurred, 7 cases were issued consent orders with penalties, and 8 cases remain under development. To date, \$3,912 in penalties has been collected for CRB violations in 2010. In addition to the 16 violations above, DEQ issued 5 Notices to Comply for minor violations of the CRB rule.

4.4 Crop Residue Burning Ambient Air Quality Monitoring Network

DEQ continued to operate the existing air quality monitors and seasonal CRB PM_{2.5} monitors (nephelometers) during 2010. Figure 2 shows the locations of the DEQ, Coeur d'Alene Tribe, Kootenai Tribe, and BC Environment PM_{2.5} and ozone monitors in the northern Idaho BMAs. Figure 3 shows the locations of the DEQ and Nez Perce Tribe PM_{2.5} monitors in the Central BMA. Figure 4 shows the locations of the DEQ PM_{2.5} and ozone monitor locations in the southern Idaho BMAs.

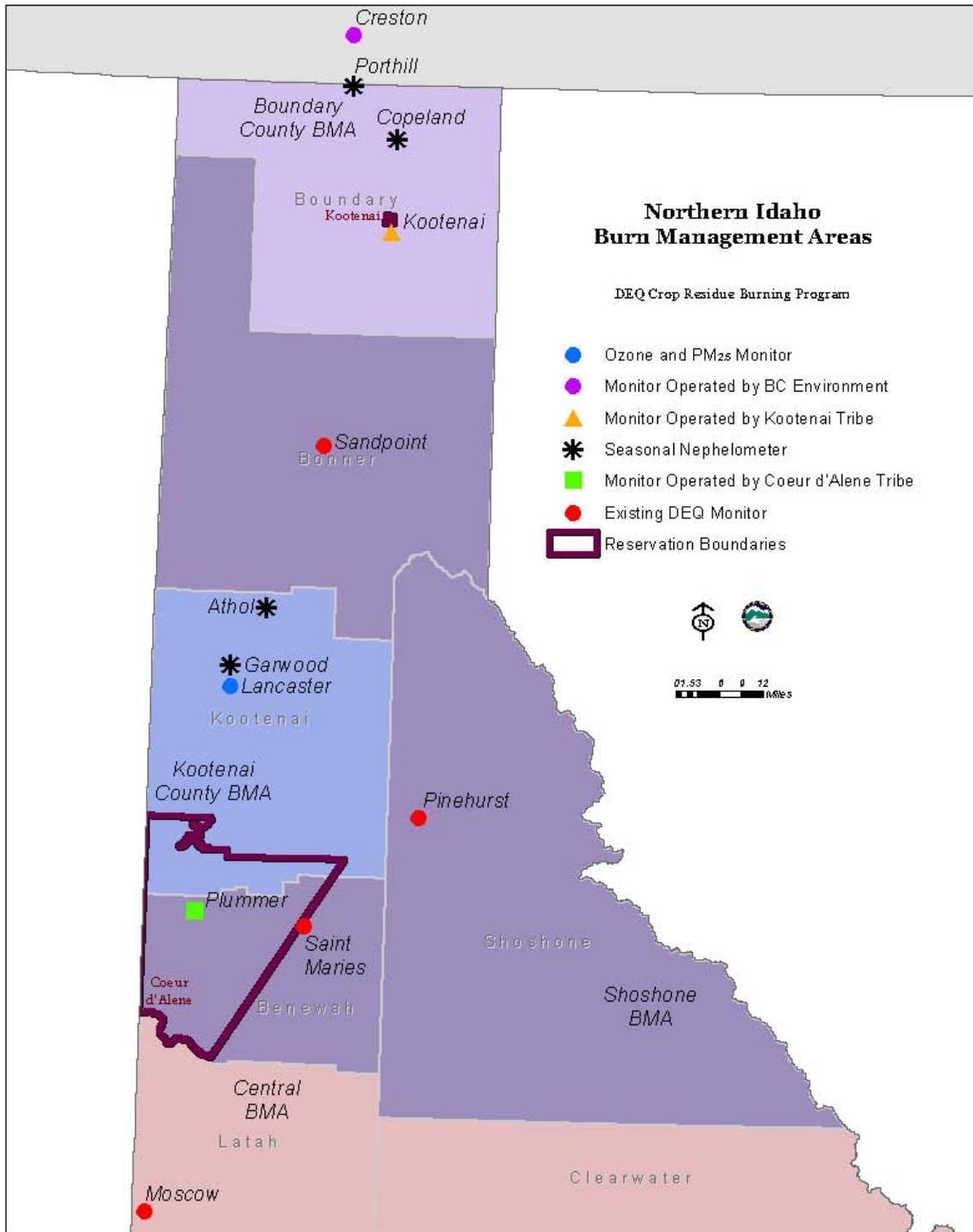


Figure 2. Air quality monitor locations for northern Idaho burn management areas

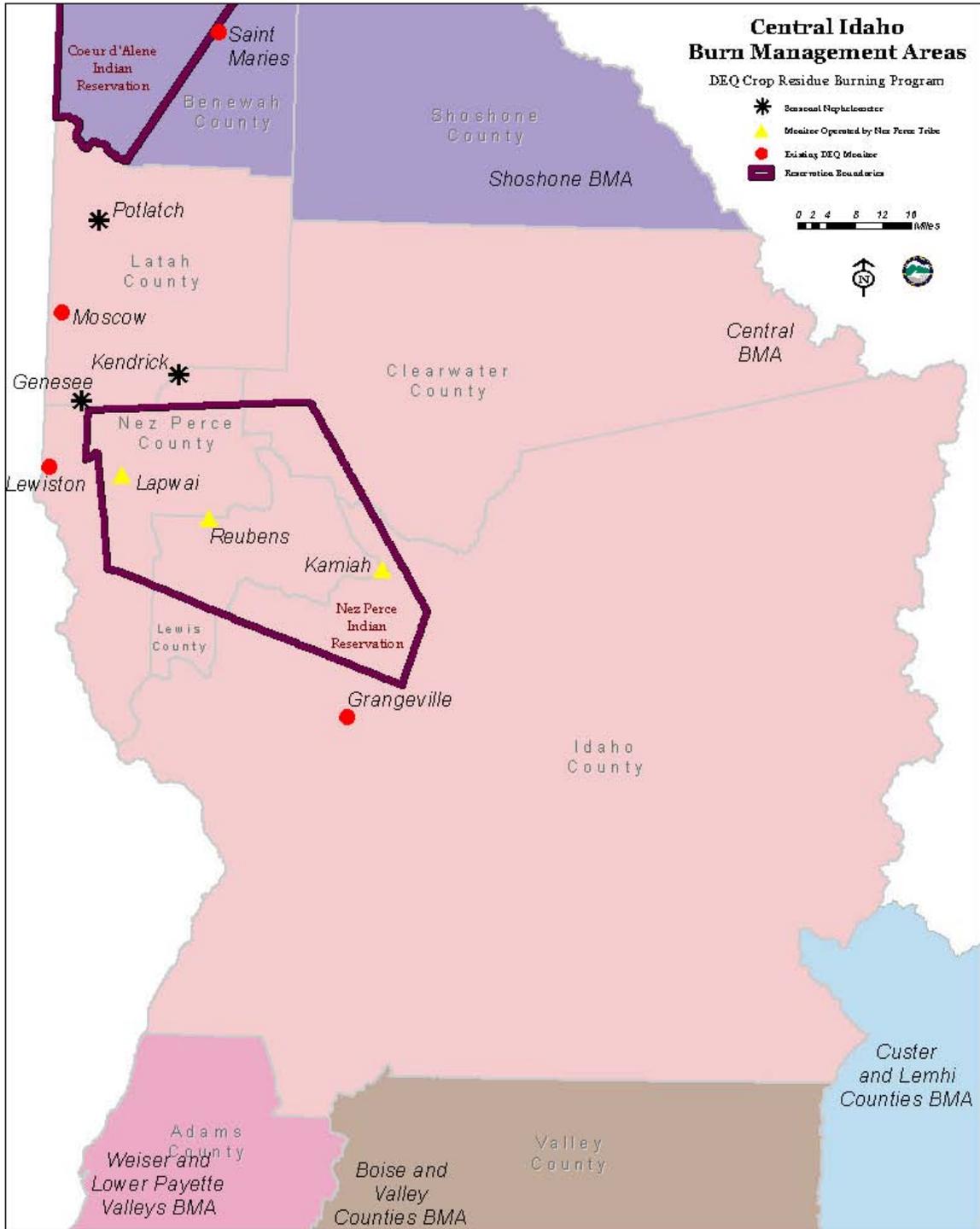


Figure 3. Air quality monitor locations for the Central Burn Management Area

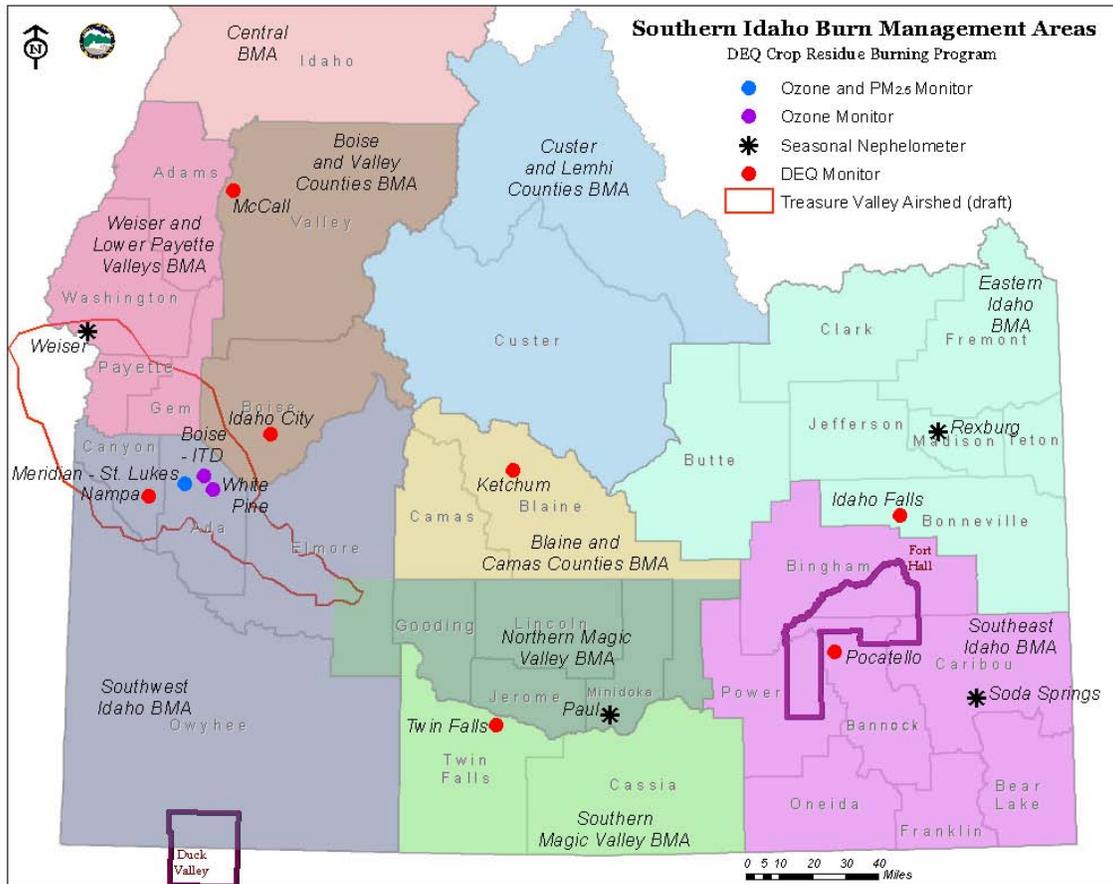


Figure 4. Air quality monitor locations for southern Idaho burn management areas

4.5 Meteorology

Meteorological conditions play an important part in DEQ’s burn decision process. DEQ contracted with Bennett Fire Weather Services to provide fire weather forecasting services during the fall burn season. Bennett Fire Weather Services provided DEQ with region-specific meteorological forecasts each morning and afternoon, with an emphasis on parameters related to smoke dispersion and ventilation. Appendix A contains a detailed summary of the meteorological conditions throughout the state during the fall burn season.

DEQ analysts and coordinators use a variety of weather forecasting tools to study many parameters during the burn approval process, including wind speed and direction, atmospheric mixing height, transport wind speed and direction, temperature, relative humidity, and probability of precipitation. In addition to weather forecasting, DEQ field coordinators conduct “in-the-field” observations of meteorological conditions and launch and observe pilot balloons to further understand the expected smoke dispersion.

4.6 Burn Management Area Summaries

During 2010, 64,165 acres were burned statewide under the CRB program, an increase of 17% from the 2009 amount and an increase of 92% from the 2008 amount. (The data for 2008 reflect

that the CRB program began on September 2, 2008). As in prior years, a majority of the burning occurred during the fall burn season: for 2010, the fall burn season accounted for 91% of the acres burned.

Detailed summaries of each BMA follow. Acres burned under the CRB program are broken down by burn season and crop type. Crop types include turf grass, cereal grain, other crops, and Conservation Reserve Program (CRP) lands.

Figure 5 shows the number of acres burned under the CRB program for the last 3 years in the BMAs with the most acres burned: Central, Southeast Idaho, and Eastern Idaho. The data show that the acres burned in the Central BMA have remained fairly stable since 2008, while the acres burned in the Southeast Idaho and Eastern Idaho BMAs have increased significantly.

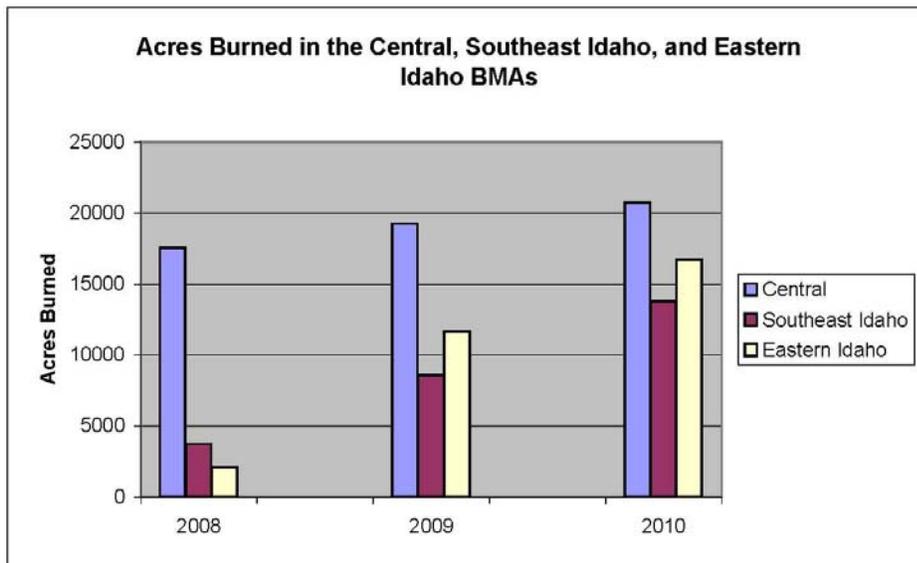


Figure 5. Acres burned in the Central, Southeast Idaho, and Eastern Idaho Burn Management Areas

Figure 6 shows the number of acres burned under the CRB program in the Boundary County, Kootenai County, Southwest Idaho, Weiser and Lower Payette Valleys, Blaine and Camas Counties, Southern Magic Valley, and Northern Magic Valley BMAs for the last 3 years. The data generally show small decreases in acres burned in the northern Idaho BMAs (Boundary County and Kootenai County BMAs) and small increases in acres burned in the southern Idaho BMAs (Southwest Idaho, Weiser and Lower Payette Valleys, Blaine and Camas Counties, Southern Magic Valley, and Northern Magic Valley BMAs).

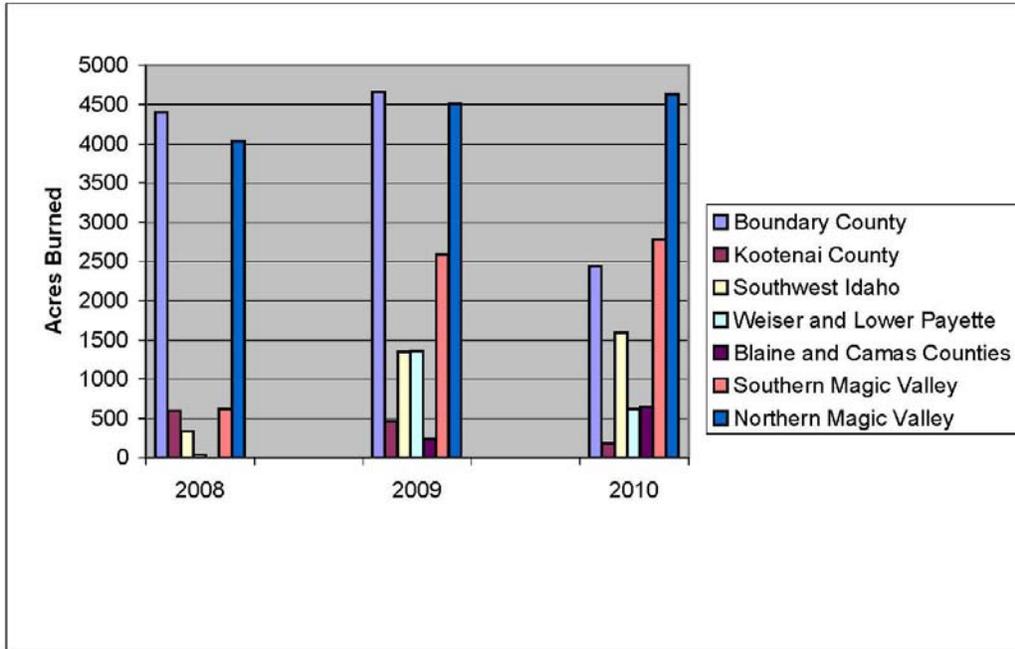


Figure 6. Acres burned in the Boundary County, Kootenai County, Southwest Idaho, Weiser and Lower Payette Valleys, Blaine and Camas Counties, Southern Magic Valley, and Northern Magic Valley Burn Management Areas

4.6.1 Boundary County Burn Management Area

The Boundary County BMA covers 1,278 square miles and encompasses all of Boundary County (Figure 1). The majority of the crop residue burning in Boundary County occurs in the Kootenai River Valley along the river and adjacent benches.

The primary crop residue burned in the Boundary County BMA is cereal grain stubble; residue from other crops, such as turf grass, legumes, and hops, have historically made up the remainder of the acres burned. Typical burn seasons for this BMA are a spring season (April through June) and a fall season (late August through mid-October). High relative humidity and high fuel moisture often limit burning in the early spring and late fall. Seasonal ambient air quality monitors that measure PM_{2.5} are located in Porthill and Copeland. A monitor in Creston, British Columbia, operated by BC Environment and a monitor in Bonners Ferry operated by the Kootenai Tribe provide additional data for program decisions and evaluations.

4.6.1.1 Acres Burned

Table 3 shows the acres burned during the spring and fall burn seasons for each crop type during the 2008–2010 burn seasons. A total of 2,439 acres were burned in the Boundary County BMA during 2010, with the majority burned during the fall burn season. The number of acres burned in the Boundary County BMA was only about 52% of what occurred in 2009 and 2008. Nearly 4,500 acres were eligible (paid) for burning during 2010, but some growers removed fields from DEQ’s burn consideration and other growers never notified DEQ they were ready to burn. This difference in the number of acres paid and the number of acres actually burned was likely the combined result of a late growing season, where some fields never dried sufficiently to be successfully burned, and weather constraints that led growers to consider other options to meet their crop residue disposal goals for the season.

For the 2010 burn season, cereal grain stubble accounted for 98% of the total acres burned, compared to 82% in 2009 and 95% in 2008.

Table 3. Summary of acres burned in the Boundary County Burn Management Area

Burn season and crop type		Acres burned		
		2008 ^a	2009	2010
Spring^b				
	Cereal grain	0	440	396
	Turf grass	0	215	0
	Other crops	<u>0</u>	<u>270</u>	<u>0</u>
	Subtotal	0	925	396
Fall^c				
	Cereal grain	4,427	3,400	1,999
	Turf grass	215	215	0
	Other crops	<u>0</u>	<u>120</u>	<u>44</u>
	Subtotal	4,642	3,735	2043
Grand total		4,642	4,660	2,439

a. The CRB program commenced September 2, 2008.

b. Spring season is March 1–June 30.

c. Fall season is July 1–November 6.

4.6.1.2 Daily Burn Decisions and Air Quality

As the result of a wet spring and delayed harvest, burning started later than usual this year, and throughout September and into October the weather conditions were not conducive to crop residue burning. Rain events, high winds, and stagnant conditions inhibited burning. DEQ field coordinators were onsite in this BMA on several burn days or conditional burn days during August, September, and October to evaluate the suitability of the field and weather conditions for potential burning, of which DEQ authorized a total of nine burn days when burning was conducted. On many of these days, conditions were marginal and only limited burning could be approved. On October 23, heavy rain moved in and ended the burn season in Boundary County.

Table 4 shows the summary of burn decisions for the Boundary County BMA for 2010. The most common reason for a no-burn decision was that no requests to burn were received. High fuel moisture was also a frequent reason for no-burn days in this BMA during 2010, which is likely a result of the La Niña weather patterns and the associated periods of higher than normal precipitation in the region.

Poor air quality was the reason behind a no-burn decision two times in the BMA. DEQ made no-burn decisions based on poor air quality on August 27 and October 15. On August 27, the poor air quality was attributed to a region wide dust storm and a series of small wildfires. Poor air quality on October 15 was attributed to smoke from regional prescribed burning.

Table 4. Summary of burn decisions for the Boundary County Burn Management Area

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons
				Fuel moisture	Wind	Ventilation	
Boundary	18	150	2	40	4	11	0

a. This summary includes all burn decisions issued for 2010. The majority of the no burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix B contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the Boundary County BMA. Only those weeks when burning occurred are included in Appendix B.

4.6.2 Shoshone Burn Management Area

The Shoshone BMA, located in the northern panhandle of Idaho, includes Shoshone, Benewah, and Bonner Counties (Figure 1). This BMA covers 5,340 square miles and is very mountainous, and a significant portion of this BMA consists of timber and large lakes.

4.6.2.1 Acres Burned

Only 3 acres were burned in this BMA in 2010, and no acres were burned during 2009 or 2008. As a result, there is no analysis of crop composition trends or summary of burn decisions. At the close of the burn season 1 acre remained unburned.

4.6.2.2 Daily Burn Decisions and Air Quality

This BMA contains little agricultural land and requests to burn crop residue are infrequent. The most common reason for a no-burn decision was that no requests to burn were received.

Appendix C contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the Shoshone BMA. Only those weeks when burning occurred are included in Appendix C.

4.6.3 Kootenai County Burn Management Area

The Kootenai County BMA covers 1,316 square miles, encompasses all of Kootenai County, and includes the Rathdrum Prairie and Rose Lake areas (Figure 1). The Rathdrum Prairie is an area of mixed irrigated and non-irrigated agricultural fields and other rural land. The Rose Lake area is on the eastern edge of Kootenai County and includes the Chain Lakes area that follows the Coeur d'Alene River as it flows into Lake Coeur d'Alene.

The primary crop burned in the Kootenai County BMA is turf grass; however, there is one grower that usually registers a cereal grain stubble field each year. There is typically only a fall burn season (August through October) for this BMA. Ambient air quality monitors that measure PM_{2.5} and are used to make burn decisions in this BMA are located at Athol and on the Rathdrum Prairie (Lancaster and the Garwood School). A monitor in Spokane that is administered by the Washington Department of Ecology and DEQ monitors in Sandpoint and Pinehurst also provide additional useful data. The Lancaster monitor also measures ozone.

Crop residue burning in the Kootenai County BMA has been greatly limited by urban development. The Rathdrum Prairie is bordered to the north by the city of Rathdrum, to the east by the city of Hayden, and to the south by the cities of Post Falls and Coeur d'Alene. The turf

grass fields located on the prairie are nearly surrounded by urbanized cities and growing rural residential communities. Proximity to ISPs and urban centers has created increasingly more restrictive conditions for burning in Kootenai County by severely limiting an acceptable wind direction for approval.

4.6.3.1 Acres Burned

Table 5 shows the acres burned during the fall burn season for each crop type during the 2008–2010 burn seasons. A total of 180 acres were burned in the BMA during the 2010 burn season. The number of acres burned in the Kootenai County BMA usually remains relatively consistent from year to year, as it is usually the same growers who register the same fields from one year to the next. However, unfavorable meteorological conditions resulted in a challenging 2010 burn season for this BMA.

The first and only burn day of the 2010 burn season on the Rathdrum Prairie occurred on August 18 with the burning of 80 acres of turf grass. The field did not burn well due to a light residue load and green standing grass. The DEQ field coordinator inspected the fields in the Rathdrum Prairie on another six potential burn days but each time found that the fields remained too green to burn well. The cereal grain stubble field located in the Rathdrum Prairie was indicated as “ready to burn” in mid September and the field could not be burned because proper wind directions and other atmospheric conditions did not occur for the remainder of the burn season.

One grower registered two fields in the Rose Lake area. These fields had a heavy load of dry residue and were successfully burned on September 14–15.

Table 5. Summary of acres burned in the Kootenai County Burn Management Area

Burn season and crop type		Acres burned		
		2008 ^a	2009	2010
Fall^b				
	Turf grass	447	452	180
	Other	148	8	0
	Total	595	460	180

a. The CRB program commenced September 2, 2008.

b. Fall season is July 1–November 6.

4.6.3.2 Daily Burn Decisions and Air Quality

Table 6 shows the summary of burn decisions for the Kootenai County BMA for 2010. The most common reason for a no-burn decision was that no requests to burn were received. High fuel moisture was also a frequent reason for a no-burn decision in this BMA during 2010, which was likely a result of the La Niña weather patterns and associated periods of higher than normal precipitation in the region. Poor air quality was the reason behind a no-burn decision only one time in this BMA, on October 15 when poor air quality was attributed to smoke from regional prescribed burning. Also, as noted above burning can only be conducted under very limited wind directions.

DEQ issued a burn approval in this BMA on only three days during 2010, illustrating that this was a challenging burn season for this BMA. Early in the burn season, the fields appeared to be

some of the few in the state that were on track to burn during their typical burn window. However, significant precipitation late in the summer resulted in greening-up of the standing grass on the Rathdrum fields, and then persistent poor atmospheric dispersion and inappropriate wind directions during the fall resulted in 43 days when requests to burn were denied.

Table 6. Summary of burn decisions for the Kootenai County Burn Management Area

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons
				Fuel moisture	Wind	Ventilation	
Kootenai	3	178	1	25	5	12	0

a. This summary includes all burn decisions issued for 2010. The majority of the no burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix D contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations and the 8-hour average ozone concentrations recorded and collected by DEQ monitors for the Kootenai County BMA. Only those weeks when burning occurred are included in Appendix D.

4.6.4 Central Burn Management Area

The Central BMA, also known as the Clearwater Airshed, covers 13,403 square miles and includes Latah, Nez Perce, Lewis, Idaho, and Clearwater Counties. Additionally, the Nez Perce Indian Reservation is located entirely within this BMA and also contains portions of each of these counties (Figure 1). All burning within the reservation boundary is managed by the Nez Perce Tribe.

The primary crop burned in the Central BMA is cereal grain stubble; however, turf grass also makes up a significant percentage of the acres burned. Typical burn seasons for this BMA are a winter season (mid-November through February), a spring season (March through June), and a fall season (July through early November). Ambient air quality monitors that measure PM_{2.5} are located in Potlatch, Moscow, Kendrick, Genesee, Lewiston, and Grangeville. For evaluation purposes, this BMA has been separated into three topographically distinct regions that have each been assigned the air quality monitoring data most relevant to that area. The Idaho County region has been assigned the monitoring data from Grangeville. The Nez Perce County region has been assigned the monitoring data from Lewiston and Kendrick. The Latah County region has been assigned the monitoring data from Genesee, Moscow, and Potlatch.

The Central BMA is topographically diverse with many sub-airsheds. High mountains characterize Latah, Clearwater, and Idaho Counties; valleys and steep canyons or drainages dominate Nez Perce County; and a centrally located highland agricultural area intersects all counties except Latah. Sophisticated smoke management is required to address the challenges created by localized weather conditions; the proximity of burning in relation to ISPs and small towns; and the necessary coordination with the Nez Perce Tribe, Washington Department of Ecology, Coeur d'Alene Tribe, and regional prescribed burners.

4.6.4.1 Acres Burned

Table 7 shows the acres burned during the winter, spring, and fall burn seasons for each crop type during the 2008–2010 burn seasons. A total of 20,761 acres were burned in the BMA during

the 2010, with the majority occurring during the fall burn season. The number of acres burned in the Central BMA has increased by 8% since 2009 and by 19% since 2008.

For the 2010 burn season, cereal grain stubble accounted for 78% of the total acres burned and turf grass accounted for 18% of the total acres burned. In 2009, cereal grain stubble accounted for 69% of the total acres burned and turf grass accounted for 23%. In 2008, cereal grain stubble accounted for 66% of the total acres burned and turf grass accounted for 30%. From this analysis, it is clear that turf grass burning is on the decline, while cereal grain stubble burning has increased, at least in the short term. These changes appear to coincide with decreases in the market value and demand for turf grass seed. It is impossible to know if these will be lasting changes or if turf grass acres will increase if the market improves. The acres burned of other crops, such as legumes and pasture, have remained negligible since 2008.

Table 7. Summary of acres burned in the Central Burn Management Area

Burn season and crop type		Acres burned		
		2008 ^a	2009	2010
Winter^b				
	CRP	0	10	0
	Cereal grain	0	0	290
	Turf grass	0	0	0
	Other crops	<u>0</u>	<u>22</u>	<u>57</u>
	Subtotal	0	32	347
Spring^c				
	CRP	0	113	171
	Cereal grain	0	1,516	1,224
	Turf grass	0	0	25
	Other crops	<u>0</u>	<u>67</u>	<u>48</u>
	Subtotal	0	1,696	1,468
Fall^d				
	CRP	357	693	372
	Cereal grain	11,534	11,876	14,632
	Turf grass	5,168	4,457	3,776
	Other crops	<u>387</u>	<u>547</u>	<u>166</u>
	Subtotal	17,446	17,573	18,946
Grand total		17,446	19,301	20,761

a. The CRB program commenced September 2, 2008.

b. Winter season included January 1–February 28 and November 7–December 31.

c. Spring season is March 1–June 30.

d. Fall season is July 1–November 6.

4.6.4.2 Daily Burn Decisions and Air Quality

Table 8 shows the summary of burn decisions for each county in the Central BMA for 2010. The most common reason for a no-burn decision was that no requests to burn were received. High fuel moisture was also a frequent reason for a no-burn decision in this BMA during 2010, which is likely a result of La Niña weather patterns and associated periods of higher than normal precipitation in the region.

Poor air quality was the reason behind a no-burn decision on five different days in the Central BMA. DEQ made no-burn decisions based on poor air quality on August 4 and 5 in Idaho County as a result of wildfire smoke; on August 27 in Idaho and Latah Counties as a result

of a regionwide dust storm; on October 20 in Latah and Nez Perce Counties; and on October 21 in Nez Perce County as a result of smoke from regional prescribed burning.

DEQ issued a final burn approval on 58 days in at least one county in the Central BMA during 2010, an increase from 56 days in 2009 and 32 days in 2008. Crop residue burning in 2010 was limited by a late start to the growing season, persistent poor atmospheric dispersion during the fall burn season, and frequent precipitation events. Nonetheless, DEQ was still able to issue enough burn days to allow growers to complete most or all of their desired burning.

Table 8. Summary of burn decisions for the Central Burn Management Area

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons ^b
				Fuel moisture	Wind	Ventilation	
Latah	28	114	2	53	22	13	1
Clearwater	15	179	0	18	1	4	1
Lewis	1	209	0	7	0	0	0
Nez Perce	16	171	2	19	2	10	0
Idaho	38	124	3	41	6	12	3

a. This summary includes all burn decisions issued for 2010. The majority of the no burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

b. Other reasons include a nearby funeral and waiting for a scheduled no school day.

Appendices E, F, and G contain a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the three subsections of the Central BMA. Only those weeks when burning occurred are included in Appendices E, F, and G.

4.6.5 Southwest Idaho Burn Management Area

The Southwest Idaho BMA includes all of Canyon, Ada, and Owyhee Counties and most of Elmore County (Figure 1). (The southeast portion of Elmore County is included in the Northern Magic Valley BMA.) Most of the crop residue burning activity occurred throughout Canyon County, northwest Owyhee County, and western Ada County, with lesser amounts in Elmore County. The primary crops burned were cereal grain stubble and alfalfa seed residue. Burning may occur year-round, but the typical burn seasons in the BMA are spring (March through April) and fall (July through October). Three ambient air quality monitors that measure PM_{2.5} are located in Nampa and Boise, and three ambient air quality monitors that measure ozone are located in Boise and Meridian.

The Southwest Idaho BMA covers 12,462 square miles and includes complex terrain in the northern foothills of Ada County and the uplands of southwestern Owyhee County. Most of the crop residue burning in the BMA is in the Snake River Valley. The cooling effect of water in the Snake River and in several reservoirs has the potential to influence smoke dispersion and transport.

4.6.5.1 Acres Burned

Table 9 shows the acres burned during the winter, spring, and fall burn seasons for each crop type during the 2008–2010 burn seasons. A total of 1,591 acres were burned in the BMA during

2010, a 17% increase from the 2009 and a 372% increase from 2008. The majority of burning occurred during the fall burn seasons.

For the 2010 burn season, cereal grain stubble accounted for 57% of the total acres burned and other crops accounted for 43% of the total acres burned. In 2009, cereal grain stubble accounted for 45% of the total acres burned and other crops accounted for 55%. In 2008, cereal grain stubble accounted for 26% of the total acres burned and other crops accounted for 74%.

The number of acres of cereal grain stubble burned has increased by 50% from the 2009 amount and by 935% from the 2008 amount. The number of acres of other crops burned has decreased by 10% from the 2009 amount but increased by 173% from the 2008 amount.

Table 9. Summary of acres burned in the Southwest Idaho Burn Management Area

Burn season and crop type		Acres burned		
		2008 ^a	2009	2010
Winter^b				
	Cereal grain	0	0	0
	Other crops	<u>0</u>	<u>10</u>	<u>20</u>
	Subtotal	0	10	20
Spring^c				
	Cereal grain	0	41	22
	Other crops	<u>0</u>	<u>0</u>	<u>49</u>
	Subtotal	0	41	71
Fall^d				
	Cereal grain	88	567	889
	Other crops	<u>249</u>	<u>743</u>	<u>611</u>
	Subtotal	337	1,310	1,500
Grand total		337	1,361	1,591

a. The CRB program commenced September 2, 2008.

b. Winter season included January 1–February 28 and November 7–December 31.

c. Spring season is March 1–June 30.

d. Fall season is July 1–November 6.

4.6.5.2 Daily Burn Decisions and Air Quality

Table 10 shows the summary of burn decisions for each county in the Southwest Idaho BMA for 2010. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and unsuitable meteorological conditions were occasional reasons for a no-burn decision. Poor air quality was cited as the reason for a no-burn decision occasionally in the BMA.

Ambient ozone and PM_{2.5} concentrations were monitored and considered when making daily burn decisions. The Treasure Valley experiences frequent temperature inversions that cause air stagnation and periods of elevated concentrations of ozone and PM_{2.5}. The presence of high-pressure systems in the atmosphere is the meteorological condition that most often causes air quality-related no-burn decisions in the BMA. DEQ made no-burn decisions due to poor air quality on nine days throughout the spring, summer, and fall as a result of high ambient ozone concentrations in the region. On October 20 and 21, the no-burn decision was a result of prescribed fire smoke.

The growing season in this BMA was affected by the wet and cool weather during the late spring and early summer. Therefore, many growers were ready to burn later in the summer or fall than normal. Because of the reduced atmospheric mixing and dispersion in the fall compared to the summer, it was a challenge to accommodate all grower requests to burn. Nonetheless, DEQ was able to accommodate most of the requests to burn. Most of the denied requests were those that were received just as the winter weather arrived in late October and early November.

Table 10. Summary of burn decisions for the Southwest Idaho Burn Management Area

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons
				Fuel moisture	Wind	Ventilation	
Ada	18	161	9	11	7	5	0
Canyon	23	157	8	9	9	6	0
Elmore	8	190	1	1	3	2	0
Owyhee	27	154	2	10	9	8	0

a. This summary includes all burn decisions issued for 2010. The majority of the no burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix H contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations and 8-hour ozone concentrations recorded and collected by DEQ monitors for the Southwest Idaho BMA. Only those weeks when burning occurred are included in Appendix H.

4.6.6 Weiser and Lower Payette Valleys Burn Management Area

The Weiser and Lower Payette Valleys BMA includes Adams, Washington, Payette, and Gem Counties (Figure 1). While some burning was conducted in each county within the BMA, Washington County accounted for the majority of acres burned. The primary crop burned in the BMA was cereal grain stubble. Burning may occur year-round, but the typical burn seasons in the BMA are spring (March through April) and fall (July through October). An ambient air quality monitor that measures PM_{2.5} is located in Weiser. The closest ambient ozone monitor is located in Meridian in the Southwest Idaho BMA.

The Weiser and Lower Payette Valleys BMA covers 3,820 square miles and includes a mixture of complex mountainous terrain and lowlands of the Snake River Valley. The cooling effect of water in the Snake River has the potential to influence smoke dispersion and transport.

4.6.6.1 Acres Burned

Table 11 shows the acres burned during the winter, spring, and fall burn seasons for each crop type during the 2008–2010 burn seasons. A total of 604 acres were burned in the BMA during 2010, a 55% decrease from 2009 and a 1,410% increase from 2008. Most burning occurred during the fall burn seasons.

For the 2010 burn, season cereal grain stubble accounted for 75% of the total acres burned and other crops accounted for 25%. In 2009, cereal grain stubble accounted for 81% of the total acres burned and other crops accounted for 19%. In 2008, cereal grain stubble accounted for 30% of the total acres burned and other crops accounted for 70%.

The number of acres of cereal grain stubble burned has decreased by 59% from the 2009 amount but increased by 3,650% from the 2008. The number of acres of other crops burned has decreased by 39% from 2009 but increased by 450% from 2008.

Table 11. Summary of acres burned in the Weiser and Lower Payette Valleys Burn Management Area

Burn season and crop type		Acres burned		
		2008 ^a	2009	2010
Winter^b				
	Cereal grain	0	0	0
	Other crops	<u>0</u>	<u>23</u>	<u>0</u>
	Subtotal	0	23	0
Spring^c				
	Cereal grain	0	383	93
	Other crops	<u>0</u>	<u>186</u>	<u>30</u>
	Subtotal	0	569	123
Fall^d				
	Cereal grain	12	718	357
	Other crops	<u>28</u>	<u>44</u>	<u>124</u>
	Subtotal	40	762	481
Grand total		40	1,354	604

a. The CRB program commenced September 2, 2008.

b. Winter season included January 1–February 28 and November 7–December 31.

c. Spring season is March 1–June 30.

d. Fall season is July 1–November 6.

4.6.6.2 Daily Burn Decisions and Air Quality

Table 12 shows the summary of burn decisions for each county in the Weiser and Lower Payette Valleys BMA for 2010. The most common reason for a no-burn decision was that no requests to

burn were received. Fuel moisture and unsuitable meteorological conditions were occasional reasons for a no-burn decision.

Poor air quality was cited as the reason for no-burn decisions twice in Gem County and once in Payette County. Ambient ozone and PM_{2.5} concentrations were monitored and considered when making daily burn decisions. Air quality conditions in the Treasure Valley must also be considered when making burn decisions for this BMA due to the proximity and the potential for pollutant transport between regions. DEQ made no-burn decisions on April 15 and 16 and July 27 as a result of high ambient ozone concentrations in the region. Beginning in the fall of 2010, ozone concentrations were no longer evaluated for this BMA (refer to the discussion of ozone outside the Treasure Valley Airshed in Section 2).

The growing season in this BMA was affected by the wet and cool weather during the late spring and early summer. Therefore, many growers were ready to burn later in the summer or fall than normal. Because of the reduced atmospheric mixing and dispersion in the fall compared to the summer, it was a challenge this year to accommodate all grower requests to burn. Nonetheless, DEQ was able to accommodate most of the requests to burn. Most of the denied requests were those that were received just as the winter weather arrived in late October and early November.

Table 12. Summary of burn decisions for the Weiser and Lower Payette Valleys Burn Management Area

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons
				Fuel moisture	Wind	Ventilation	
Adams	1	202	0	1	2	0	0
Gem	9	182	2	9	6	1	0
Payette	8	189	1	2	5	0	0
Washington	24	169	0	8	7	1	0

a. This summary includes all burn decisions issued for 2010. The majority of the no burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix I contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations and 8-hour ozone concentrations recorded and collected by DEQ monitors for the Weiser and Lower Payette Valleys BMA. Only those weeks when burning occurred are included in Appendix I.

4.6.7 Boise and Valley Counties Burn Management Area

The Boise and Valley Counties BMA consists of Boise and Valley Counties (Figure 1). The BMA covers 5,641 square miles and consists of mountain and valley terrain. Lake Cascade and Lake Payette are central features of the region and have the potential to affect smoke dispersion and transport due to the cooling effect of the water. The agricultural activity in the area is mainly pasture cultivation. Ambient air quality monitors that measure PM_{2.5} are located in Idaho City and McCall. The nearest ozone monitors are in the Treasure Valley.

4.6.7.1 Acres Burned

For the 2010 burn season, 5 acres (one field) were burned in this BMA. The type of crop burned was pasture. No crop residue burning occurred in this BMA in 2008 and 2009. As a result, there is no analysis of crop composition trends or summary of burn decisions.

4.6.7.2 Daily Burn Decisions and Air Quality

This BMA contains little agricultural land, and requests to burn cropland are infrequent. The most common reason for a no-burn decision was that no requests to burn were received.

Appendix J contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the Boise and Valley Counties BMA. Only those weeks when burning occurred are included in Appendix J.

4.6.8 Blaine and Camas Counties Burn Management Area

The Blaine and Camas Counties BMA consists of Blaine and Camas Counties with the exception of the southern panhandle of Blaine County, which is included in the Northern Magic Valley BMA (Figure 1). Crop residue burning was primarily conducted on the Camas Prairie. The primary crop burned was cereal grain stubble. Burning may occur year-round, but the typical burn season is fall. One PM_{2.5} air quality monitor is located in Ketchum.

The Blaine and Camas Counties BMA covers 3,740 square miles. The BMA is comprised of high-elevation prairie, foothills, and mountains. The topography and climate of this area tends to be cooler and moister than some of the surrounding areas, creating the potential for more frequent unsuitable burning conditions. Several lakes and reservoirs have the potential to affect smoke dispersion due to the cooling effect of the water.

4.6.8.1 Acres Burned

Table 13 shows the acres burned during the winter, spring, and fall burn seasons for each crop type during the 2008–2010 burn seasons. A total of 644 acres were burned in the BMA during 2010, a 174% increase from 2009. No registered crop residue burning occurred in the BMA in 2008. Nearly 100% of the burning has occurred during the fall burn season. For both the 2009 and 2010 burn seasons, cereal grain stubble has accounted for all or nearly all of the total acres burned.

Table 13. Summary of acres burned in the Blaine and Camas Counties Burn Management Area

Burn season and crop type		Acres burned		
		2008 ^a	2009	2010
Winter^b				
	Cereal grain	0	0	0
	Other crops	<u>0</u>	<u>0</u>	<u>0</u>
	Subtotal	0	0	0
Spring^c				
	Cereal grain	0	0	0
	Other crops	<u>0</u>	<u>0</u>	<u>1</u>
	Subtotal	0	0	1
Fall^d				
	Cereal grain	0	235	643
	Other crops	<u>0</u>	<u>0</u>	<u>0</u>
	Subtotal	0	235	643
Grand total		0	235	644

a. The CRB program commenced September 2, 2008.

b. Winter season included January 1–February 28 and November 7–December 31.

c. Spring season is March 1–June 30.

d. Fall season is July 1–November 6.

4.6.8.2 Daily Burn Decisions and Air Quality

Table 14 shows the summary of burn decisions for the two counties in the Blaine and Camas Counties BMA for 2010. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and unsuitable meteorological conditions were occasional reasons for a no-burn decision. Poor air quality was cited as the reason for a no-burn decision once in Blaine County on August 23 due to wildfire smoke in the area.

When the burn season ended in November due to weather conditions, there were no unmet burn requests in the BMA.

Table 14. Summary of burn decisions for the Blaine and Camas Counties Burn Management Area

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons
				Fuel moisture	Wind	Ventilation	
Blaine	8	188	1	1	7	1	0
Camas	2	201	0	1	2	0	0

a. This summary includes all burn decisions issued for 2010. The majority of the no burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix K contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the Blaine and Camas Counties BMA. Only those weeks when burning occurred are included in Appendix K.

4.6.9 Southern Magic Valley Burn Management Area

The Southern Magic Valley BMA consists of Twin Falls and Cassia Counties (Figure 1). Burning occurred throughout the BMA but was mainly conducted in the vicinity of Twin Falls. The primary crop burned was cereal grain stubble. Burning may occur year-round, but the typical burn seasons are spring (March through April) and fall (July through October). The Southern Magic Valley BMA has one PM_{2.5} air quality monitor located in Twin Falls.

The Southern Magic Valley BMA covers 4,508 square miles and includes mountains and valleys in the south and the Snake River Valley in the north. The area is somewhat arid and often experiences windy conditions. The cooling effect of water in the Snake River and several water storage reservoirs has the potential to influence smoke dispersion and transport.

4.6.9.1 Acres Burned

Table 15 shows the acres burned during the winter, spring, and fall burn seasons for each crop type during the 2008–2010 burn seasons. A total of 2,782 acres were burned in the BMA during 2010, an 8% increase from 2009 and a 349% increase from 2008. Most burning occurred during the fall burn seasons.

For the 2010 burn season, cereal grain stubble accounted for 96% of the total acres burned and other crops accounted for 4%. In 2009, cereal grain stubble accounted for 93% of the total acres burned and other crops accounted for 7%. In 2008, cereal grain stubble accounted for 97% of the total acres burned and other crops accounted for 3%.

The number of acres of cereal grain stubble burned has increased by 11% from 2009 and 346% from 2008. The number of acres of other crops burned has decreased by 38% from 2009 but has increased by 414% from 2008.

Table 15. Summary of acres burned in the Southern Magic Valley Burn Management Area

Burn season and crop type		Acres burned		
		2008 ^a	2009	2010
Winter^b				
	Cereal grain	0	0	0
	Other crops	<u>0</u>	<u>0</u>	<u>0</u>
	Subtotal	0	0	0
Spring^c				
	Cereal grain	0	365	71
	Other crops	<u>0</u>	<u>23</u>	<u>56</u>
	Subtotal	0	388	127
Fall^d				
	Cereal grain	599	2,047	2,603
	Other crops	<u>21</u>	<u>151</u>	<u>52</u>
	Subtotal	620	2,198	2,655
Grand total		620	2,586	2,782

a. The CRB program commenced September 2, 2008.

b. Winter season included January 1–February 28 and November 7–December 31.

c. Spring season is March 1–June 30.

d. Fall season is July 1–November 6.

4.6.9.2 Daily Burn Decisions and Air Quality

Table 16 shows the summary of burn decisions for the two counties in the Southern Magic Valley BMA for 2010. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and unsuitable meteorological conditions were also common reasons for no-burn decisions. Poor air quality was cited as the reason for a no-burn decision once in each county on August 23 as a result of wildfire smoke in the area.

The growing season in this BMA was affected by the wet and cool weather during the late spring and early summer. Therefore, many growers were ready to burn later in the summer or fall than normal. Because of the reduced atmospheric mixing and dispersion in the fall compared to the summer, it was a challenge to accommodate all grower requests to burn. Nonetheless, DEQ was able to accommodate most of the requests to burn. Most of the denied requests were those that were received just as the winter weather arrived in late October and early November.

Table 16. Summary of burn decisions for the Southern Magic Valley Burn Management Area

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons ^b
				Fuel moisture	Wind	Ventilation	
Cassia	15	174	1	5	8	6	0
Twin Falls	44	117	1	24	20	10	1

a. This summary includes all burn decisions issued for 2010. The majority of the no burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

b. Other reason was that ambient air quality monitoring equipment was not available.

Appendix L contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the Southern Magic Valley BMA. Only those weeks when burning occurred are included in Appendix L.

4.6.10 Northern Magic Valley Burn Management Area

The Northern Magic Valley BMA includes southeast Elmore County, all of Gooding, Lincoln, Jerome, and Minidoka Counties, and the Blaine County panhandle (Figure 1). Burning was conducted in all counties in the BMA except for the panhandle of Blaine County. The majority of the burning took place in Minidoka County. The primary crop burned was cereal grain stubble. Burning may occur year-round, but the typical burn seasons are spring (March through April) and fall (July through October). The Northern Magic Valley BMA has one PM_{2.5} air quality monitor located in the town of Paul.

The Northern Magic Valley BMA covers 2,542 square miles. The topography of the area is dominated by the Snake River Valley in the south, foothills in the north, and lava beds in the northeast. The cooling effect of water in the Snake River and several reservoirs has the potential to affect smoke dispersion and transport.

On September 16, the nephelometer (a type of PM_{2.5} monitor) in Paul malfunctioned. DEQ was unable to repair the monitor and sent it to the manufacturer for repair. In order to meet the monitoring requirements of the CRB program, an E-BAM (another type of PM_{2.5} monitor) was deployed to a site near the town of Acequia on September 18. Acequia is about 10 miles northwest of Paul and is in the general area where crop residue burning is conducted. DEQ operated the E-BAM until the end of the fall burn season. However, during the review of the monitoring data, DEQ determined that the E-BAM had not been operated in compliance with the Idaho DEQ Standard Operating Procedure for Met One E-BAM Particulate Monitor. The quality assurance and quality control requirements were not met. Therefore, the data collected with the E-BAM was invalidated and is not included in Appendix M. To ensure that this does not occur in the future, DEQ will update the CRB program Operating Guide with the requirement that it is the regional office's responsibility to ensure all monitoring used in support of the CRB program is conducted in compliance with all applicable standard operating procedures.

4.6.10.1 Acres Burned

Table 17 shows the acres burned during the winter, spring, and fall burn seasons for each crop type during the 2008–2010 burn seasons. A total of 4,630 acres were burned in the BMA during

2010, a 3% increase from 2009 and a 15% increase from 2008. Most burning occurred during the fall burn seasons.

For the 2010 burn season, cereal grain stubble accounted for 82% of the total acres burned, CRP accounted for 12%, and other crops accounted for 6%. In 2009, cereal grain stubble accounted for 95% of the total acres burned, CRP accounted for 1%, and other crops accounted for 4%. In 2008, cereal grain stubble accounted for 93% of the total acres burned and other crops accounted for 7%.

The number of acres of cereal grain stubble burned has decreased by 11% from the 2009 but has increased by 1% from 2008. The number of acres of CRP has increased by 972% from the 2009 amount, while no CRP was burned in 2008. The number of acres of other crops burned has increased by 44% from 2009 but has decreased by 8% from 2008.

Table 17. Summary of acres burned in the Northern Magic Valley Burn Management Area

Burn season and crop type		Acres burned		
		2008 ^a	2009	2010
Winter^b				
	CRP	0	23	0
	Cereal grain	0	0	0
	Other crops	<u>0</u>	<u>0</u>	<u>0</u>
	Subtotal	0	23	0
Spring^c				
	CRP	0	30	0
	Cereal grain	0	0	254
	Other crops	<u>0</u>	<u>0</u>	<u>0</u>
	Subtotal	0	30	254
Fall^d				
	CRP	0	0	568
	Cereal grain	3,739	4,268	3,535
	Other crops	<u>298</u>	<u>190</u>	<u>273</u>
	Subtotal	4,037	4,458	4,376
Grand total		4,037	4,511	4,630

a. The CRB program commenced September 2, 2008.

b. Winter season included January 1–February 28 and November 7–December 31.

c. Spring season is March 1–June 30.

d. Fall season is July 1–November 6.

4.6.10.2 Daily Burn Decisions and Air Quality

Table 18 shows the summary of burn decisions for each county in the Northern Magic Valley BMA for 2010. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and unsuitable meteorological conditions were also common reasons for no-burn decisions. Poor air quality was cited as the reason for a no-burn decision once in each county on August 23 as a result of wildfire smoke. On three days, no-burn decisions were due to the unavailability of DEQ resources.

The growing season in this BMA was affected by the wet and cool weather during the late spring and early summer. Therefore, many growers were ready to burn later in the summer or fall than normal. Because of the reduced atmospheric mixing and dispersion in the fall compared to the summer, it was a challenge to accommodate all grower requests to burn. Nonetheless, DEQ was able to accommodate most of the requests to burn. Most of the denied requests were those that were received just as the winter weather arrived in late October and early November.

Table 18. Summary of burn decisions for the Northern Magic Valley Burn Management Area

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons ^b
				Fuel moisture	Wind	Ventilation	
Gooding	8	190	1	1	4	2	0
Jerome	16	163	1	12	5	8	3
Lincoln	11	183	1	3	8	2	0
Minidoka	24	169	1	3	8	3	0

a. This summary includes all burn decisions issued for 2010. The majority of the no burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

b. Other reasons were DEQ resources were unavailable.

Appendix M contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the Northern Magic Valley BMA. Only those weeks when burning occurred are included in Appendix M.

4.6.11 Southeast Idaho Burn Management Area

The Southeast Idaho BMA includes Bingham, Power, Bannock, Caribou, Oneida, Franklin, and Bear Lake Counties (Figure 1). Burning was conducted in each of these counties during the year; however, Franklin and Bear Lake Counties had only a minimal amount of burning. The primary crops burned in the BMA were cereal grain stubble and CRP. Burning may occur year-round, but the typical burn seasons in the BMA are spring (March through April) and fall (July through October). Ambient air quality monitors that measure PM_{2.5} are located in Pocatello and Soda Springs.

The Southeast Idaho BMA covers 9,428 square miles. The area is topographically complex with the exception of the relatively flat lowlands of the Snake River Plain. The mountainous terrain, with its ridges and valleys, can strongly influence wind flow patterns and affect smoke dispersion. Two large water supply reservoirs in the region, as well as the Snake River, can also influence smoke dispersion and transport due to the cooling effect of the water.

4.6.11.1 Acres Burned

Table 19 shows the acres burned during the winter, spring, and fall burn seasons for each crop type during the 2008–2010 burn seasons. A total of 13,783 acres were burned in the BMA during 2010, a 60% increase from 2009 and a 264% increase from 2008. The majority of burning occurred during the fall burn seasons.

For the 2010 burn season, cereal grain stubble accounted for 69% of the total acres burned and CRP accounted for 30%. In 2009, cereal grain stubble accounted for 79% of the total acres burned and CRP accounted for 20%. In 2008, cereal grain stubble accounted for 88% of the total acres burned and CRP accounted for 12%.

The number of acres of cereal grain stubble burned has increased by 40% from 2009 and by 187% from 2008. The number of acres of CRP burned has increased by 144% from 2009 and by 832% from 2008. The number of acres burned of other crops has remained negligible.

Table 19. Summary of acres burned in the Southeast Idaho Burn Management Area

Burn season and crop type		Acres burned		
		2008 ^a	2009	2010
Winter^b				
	CRP	0	1,532	0
	Cereal grain	0	620	0
	Other crops	<u>0</u>	<u>35</u>	<u>0</u>
	Subtotal	0	2,187	0
Spring^c				
	CRP	0	0	286
	Cereal grain	0	62	1,289
	Other crops	<u>0</u>	<u>22</u>	<u>4</u>
	Subtotal	0	84	1,579
Fall^d				
	CRP	448	179	3,891
	Cereal grain	3,335	6,131	8,270
	Other crops	<u>0</u>	<u>15</u>	<u>43</u>
	Subtotal	3,783	6,325	12,204
Grand total		3,783	8,596	13,783

a. The CRB program commenced September 2, 2008.

b. Winter season included January 1–February 28 and November 7–December 31.

c. Spring season is March 1–June 30.

d. Fall season is July 1–November 6.

4.6.11.2 Daily Burn Decisions and Air Quality

Table 20 shows the summary of burn decisions for each county in the Southeast Idaho BMA for 2010. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and unsuitable meteorological conditions were also common reasons for a no-burn decision. Poor air quality was the reason behind a no-burn decision only once in the BMA, on August 23 in both Bannock and Bingham Counties as a result of wildfire smoke in the area.

The growing season in this BMA was affected by the wet and cool weather during the late spring and early summer. Therefore, many growers were ready to burn later in the summer or fall than normal. Because of the reduced atmospheric mixing and dispersion in the fall compared to the summer, it was a challenge to accommodate all grower requests to burn. Nonetheless, DEQ was able to accommodate most of the requests to burn. Most of the denied requests were those that were received just as the winter weather arrived in late October and early November.

Table 20. Summary of burn decisions for the Southeast Idaho Burn Management Area

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons
				Fuel moisture	Wind	Ventilation	
Bannock	27	135	1	29	13	9	0
Bear Lake	8	192	0	3	4	1	0
Bingham	23	151	1	16	12	11	0
Caribou	42	123	0	32	11	6	0
Franklin	3	199	0	2	3	0	0
Oneida	37	144	0	18	8	4	0
Power	13	180	0	5	7	3	0

a. This summary includes all burn decisions issued for 2010. The majority of the no burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix N contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the Southeast Idaho BMA. Only those weeks when burning occurred are included in Appendix N.

4.6.12 Eastern Idaho Burn Management Area

The Eastern Idaho BMA includes Clark, Fremont, Butte, Jefferson, Madison, Teton, and Bonneville Counties (Figure 1). Burning was mainly conducted in Jefferson and Bonneville Counties. The primary crop burned was cereal grain stubble. Burning may occur year-round, but the typical burn seasons are spring (March through April) and fall (July through October). Two ambient PM_{2.5} monitors are located in the Eastern Idaho BMA, one in Rexburg and one in Idaho Falls.

The Eastern Idaho BMA covers 9,826 square miles. The topography of the area consists of mountains and valleys to the west, north, and east. The large central area of the BMA consists of the Snake River Valley and is relatively flat. The cooling effect of water in the Snake River, as

well as several smaller waterways and reservoirs, has the potential to influence smoke dispersion and transport.

4.6.12.1 Acres Burned

Table 21 shows the acres burned during the winter, spring, and fall burn seasons for each crop type during the 2008–2010 burn seasons. A total of 16,743 acres were burned in the BMA during 2010, a 44% increase from 2009 and a 688% increase from 2008. Most burning occurred during the fall burn seasons.

For the 2010 burn season, cereal grain stubble accounted for 96% of the total acres burned and CRP and other crops accounted for 4%. In 2009, cereal grain stubble accounted for 99% of the total acres burned and CRP and other crops accounted for 1%. In 2008, cereal grain stubble accounted for 100% of the total acres burned.

The number of acres of cereal grain stubble burned has increased by 39% from 2009 and by 656% from 2008. The number of acres of CRP burned has increased by 1,541% from 2009, while no CRP was burned in 2008.

Table 21. Summary of acres burned in the Eastern Idaho Burn Management Area

Burn season and crop type		Acres burned		
		2008 ^a	2009	2010
Winter^b				
	CRP	0	39	0
	Cereal grain	0	354	0
	Other crops	<u>0</u>	<u>0</u>	<u>0</u>
	Subtotal	0	393	0
Spring^c				
	CRP	0	0	0
	Cereal grain	0	1,364	1,642
	Other crops	<u>0</u>	<u>0</u>	<u>0</u>
	Subtotal	0	1,364	1,642
Fall^d				
	CRP	0	0	640
	Cereal grain	2,125	9,867	14,419
	Other crops	<u>0</u>	<u>41</u>	<u>42</u>
	Subtotal	2,125	9,908	15,101
Grand total		2,125	11,665	16,743

a. The CRB program commenced September 2, 2008.

b. Winter season included January 1–February 28 and November 7–December 31.

c. Spring season is March 1–June 30.

d. Fall season is July 1–November 6.

4.6.12.2 Daily Burn Decisions and Air Quality

Table 22 shows the summary of burn decisions for each county in the Eastern Idaho BMA for 2010. The most common reason for a no-burn decision was that no requests to burn were received. Fuel moisture and unsuitable meteorological conditions were also common reasons for a no-burn decision. Poor air quality was the reason behind a no-burn decision once in Clark, Jefferson, and Madison Counties on August 23 as a result of wildfire smoke in the area.

The growing season in this BMA was affected by the wet and cool weather during the late spring and early summer. Therefore, many growers were ready to burn later in the summer or fall than normal. Because of the reduced atmospheric mixing and dispersion in the fall compared to the summer, it was a challenge to accommodate all grower requests to burn. Nonetheless, DEQ was able to accommodate most of the requests to burn. Most of the denied requests were those that were received just as the winter weather arrived in late October and early November, and some

requests were in areas near ISPs that required specific wind conditions that did not occur late in the season.

Table 22. Summary of burn decisions for the Eastern Idaho Burn Management Area

County	Approved burn days	Days with no requests to burn ^a	No-burn days due to air quality	No-burn days due to meteorological conditions			Days with no burning for other reasons
				Fuel moisture	Wind	Ventilation	
Butte	10	190	0	3	3	0	0
Clark	16	181	1	3	7	0	0
Fremont	13	182	0	9	3	2	0
Jefferson	33	154	1	8	11	6	0
Madison	11	173	1	16	3	0	0
Bonneville	38	127	0	26	15	8	0
Teton	4	194	0	3	5	0	0

a. This summary includes all burn decisions issued for 2010. The majority of the no burn decisions due to no requests occurred outside the typical burn seasons (i.e., summer and winter).

Appendix O contains a comparison of the acres burned versus the 1-hour, 4-hour, and 24-hour average PM_{2.5} concentrations recorded and collected by DEQ monitors for the Eastern Idaho BMA. Only those weeks when burning occurred are included in Appendix O.

5. Recommendations Approved by the Director to be Implemented in 2011

The CRB Advisory Committee met on February 23, 2011. DEQ presented four recommended improvements to the committee. During the meeting, the Committee identified 3 additional recommendations and slightly modified DEQ's recommendations. This final set of recommended improvements was submitted to the Director for final decision on implementation. The recommendations that were approved by the Director to be implemented in 2011 are listed below.

1. Evaluate implications of allowing burning on the weekends and holidays. Present evaluation and any recommendation to CRB Advisory Committee at 2012 meeting
2. Modify guidelines in the Operating Guide for observing burns
 - DEQ staff will observe burns on approved burn days
 - DEQ staff will observe burns within 1 mile of ISP
 - DEQ staff will observe burns over 20 acres that are 1-3 miles from ISP
 - DEQ staff must justify and document when they will not observe burns less than 20 acres that are 1-3 miles from ISP
 - The north and south Idaho Smoke Analysts can grant exceptions to the above items – the exception must be documented and include an evaluation of the following:

- Person conducting the burn – experience with burning and the program
 - Forecasted meteorological conditions
 - Field conditions
 - Terrain and local meteorological conditions
 - Availability of monitoring network
 - If DEQ staff does not observe fields within 3 miles of an ISP, then DEQ will notify the ISP(s) within 3 miles that a burn(s) is approved and that DEQ will not be in the area, then ask that the ISP contact DEQ if they observe smoke at their location.
3. Define what is not considered an adverse impact to an ISP
- Below $20 \mu\text{g}/\text{m}^3$ (visibility is at least 10 miles)
 - Conclude that no adverse impact occurred
 - No additional documentation needed unless DEQ received complaint from ISP
 - If complaint received from ISP, short evaluation will be documented.
 - $20 \mu\text{g}/\text{m}^3 - 26.25 \mu\text{g}/\text{m}^3$
 - Conclude adverse impact unlikely
 - Short evaluation needed to determine whether an adverse impact occurred
 - If complaint received from ISP, full enhanced documentation and evaluation will be documented.
 - Greater than $26.25 \mu\text{g}/\text{m}^3$ (visibility is less than 10 miles)
 - Adverse impact possible
 - Full enhanced documentation needed to determine whether an adverse impact occurred
 - DEQ will explore how delayed health effects might be taken into account in the evaluation of a possible adverse impact to an ISP by June 1, 2011.
 - DEQ will evaluate the procedure for measuring visibility and correlating that to $\text{PM}_{2.5}$ concentration during the 2011 burn season.
4. Define a procedure to ensure burns do not create a hazard for travel on public roadway
- Ultimately, this is a Growers responsibility
 - General permit requirement developed by DEQ – “The permittee is responsible to ensure that adequate measures are taken such that the burn does not create a hazard for travel on a public roadway. (per IDAPA 58.01.01.621.02.c)
 - The following procedure will be used to ensure that smoke from an approved burn does not create a hazardous condition for travel on a public roadway.
 - Evaluate the field location during the field registration review process to determine if restrictions on allowable wind direction and wind speed are warranted to maintain public roadway safety.
 - Document any observations of smoke on a public roadway while field staff observe crop residue burns. DEQ staff will not observe all burns that are near public roadways. DEQ staff will observe burns that have been determined to pose a risk of creating a hazardous condition for travel on a public roadway.

- Use the stopping sight distance as a function of speed information (Table 23) to determine if smoke is creating a hazardous condition for travel on a public roadway. If visibility is greater than the appropriate stopping sight distance, crop residue burning did not result in a hazardous condition.
- Determine whether the grower has an approved traffic control plan for burning and has followed that plan if visibility is less than the stopping sight distance. If the grower has an approved traffic control plan and followed the plan, the grower will be deemed to be in compliance with the permit requirement. If the grower did not have an approved traffic control plan or did not follow the plan, the grower will be deemed to be in violation of the permit requirement.

Table 23. Stopping sight distance as a function of speed

Speed (miles per hour)	Distance (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

Source: From the *Manual on Uniform Traffic Control Devices for Streets and Highways: 2009 Edition*, Table 6C-2 (page 555), published by the U.S. Department of Transportation, Federal Highway Administration. Available at <http://mutcd.fhwa.dot.gov/>.

- DEQ will train growers on requirement before burn season (specifically stopping distance requirement) and work with ITD and local highway districts to help get growers the information needed.
5. Evaluate the program concentration limit for ozone
- Evaluation will include
 - Meteorological data on those days where ozone concentration is between 56.25 ppb (75% of NAAQS) and 67 ppb (AQI of 75)
 - Determine whether DEQ is not allowing burning on good or marginal burn days due solely to ozone concentration
 - Other options for addressing this ozone issue
 - Review and summarize the health effects of ozone from EPA documents:
 - Integrated Science Assessment for Ozone and Related Photochemical Oxidants (First External Review Draft) (EPA/600/R-10/076a) (March 2011)
 - The most recent Clean Air Scientific Advisory Committee (CASAC) recommendations for ozone.

- Determine if change to 75% of the ozone NAAQS is needed, and if so, propose new value at the CRB Advisory Committee meeting in 2012
 - Evaluation, health effects summary, and any recommendation will be presented to the CRB Advisory Committee in 2012
6. Use of different methods to reach ISPs, track and evaluate outreach to determine best method(s)
 7. Add history and why Idaho has a CRB program onto DEQ's website (training – education), especially for the benefit of South Idaho where program history is so new.

6. Conclusions

Overall, DEQ considered the 2010 CRB season a success. Although DEQ air quality monitors recorded values above the CRB program concentration limits for 8-hour ozone and 1-hour and 24-hour average PM_{2.5}, just one of these occurrences was likely a direct result of crop residue burning approved by DEQ. DEQ operated the CRB program during 2010 without any adverse impacts to ISPs and with two possible public roadway safety impacts.

In this third year of operating the CRB program, DEQ has observed a continuing trend: registered crop residue burning in southern Idaho is becoming a larger portion of the statewide crop residue burning activity. In 2008, the first year (fall burn season only) of the CRB program under DEQ, acres burned in southern Idaho accounted for approximately one-third of the statewide total. In 2009, the first full year of the CRB program, acres burned in southern Idaho accounted for slightly more than half of the statewide total. In 2010, southern Idaho accounted for almost two-thirds of the acres burned statewide.

DEQ recommends several improvements to the program implementation and DEQ procedures to help ensure continuing compliance with the Rules for the Control of Air Pollution in Idaho and the SIP and to improve overall program effectiveness and efficiency.