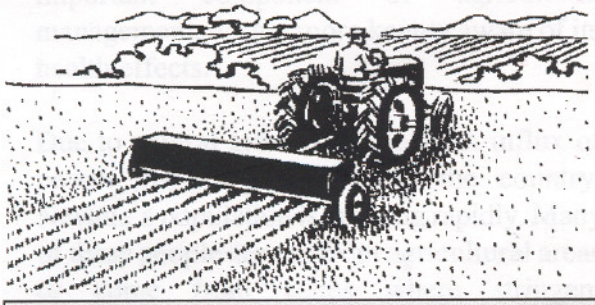
THE NEVADA HANDBOOK FOR AGRICULTURAL OPEN BURNING

Department of Conservation and Natural Resources
Division of Environmental Protection
Bureau of Air Quality Planning

Self-Instruction Handbook

- Air Pollutants In Smoke
- Burn With Less Smoke
- Manage Smoke



This handbook discusses the burning of agricultural materials on cultivated farmland, rangeland, and along ditches or fence lines. It does not cover forest management, wildland vegetation management, or wildlife habitat improvement projects, nor does it cover other open burning, such as for personnel training or residential cleanup. Contact your local fire protection district for more information about these types of burns.

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SMOKE MANAGEMENT FOR AGRICULTURE

You may wonder why there has recently been increased attention directed toward agricultural burning. In past years, the health effects of smoke resulting from agricultural burning were not always considered to be significant. The smoke was viewed more as an inconvenience than a potential health risk. Smoke was simply accepted by agrarian communities as a necessary part of successful agriculture. While smoke will always be an important component of agricultural management, we are more keenly aware of its health effects.

Due to natural growth rates and an influx of people from other parts of the country, Nevada's population is growing rapidly. Many of these people are not from agricultural areas or come from states where stringent regulations limit agricultural burning. They may consider your burning to be both a serious nuisance and a health risk.

In recent years, the U.S. Congress directed the Natural Resources Conservation Service to establish an agricultural air quality task force. The task force recommended that states adopt a smoke management program that reduces the health impacts of agricultural burning. The Nevada Bureau of Air Quality Planning (BAQP) developed voluntary guidelines in the Nevada Handbook for Agricultural Burners with the assistance of state and federal land management agencies, fire protection districts, and agricultural representatives.

The handbook has three main goals:

- Allow the continued use of fire as an accepted agricultural management practice.
- Protect public health and welfare by reducing the impacts of open burning on air quality and visibility.
- Encourage the use of non-burning alternatives.

We hope to achieve these goals by promoting good burning practices, improved communication, and the utilization of non-burning alternatives. All federal, state, and local agencies conducting open burns on public and private lands in Nevada have agreed to comply with smoke management practices similar to those provided in this handbook. We hope that this handbook will

help you appreciate the value of smoke management practices in your agricultural operations. By being a responsible burner, you help ensure we maintain good air quality for all Nevadans.

WHY SMOKE MANAGEMENT?

Industry, transportation, and open burning all affect the air quality in Nevada. The most common air pollutant in rural Nevada is particulate matter. Microscopic particulates that have an aerodynamic size less than or equal to 10 microns are called PM_{10}. By comparison, a human hair is about 70 microns in diameter. The small size and weight of PM_{10} allows some particles to remain airborne for weeks and to travel long distances. Toxins and gases readily absorb into or coat these tiny particles.

Smoke is a mixture of gaseous air pollutants and particulate matter. About 90% of smoke is PM_{10}. The particulate matter produced by burning consists of particles of soot (unburned carbon), ash (unburned minerals), condensed fumes (including toxic and cancer causing aerosols) and other products of incomplete combustion. When inhaled, PM_{10} particles and any sorbed toxins can travel past the protective linings of the airways and into the deepest part of the lungs. Not all the particles are expelled when you exhale. Those retained in the lungs can cause serious harm.

The gaseous pollutants include: carbon monoxide, hydrocarbons, and oxides of sulfur and nitrogen. Carbon monoxide reduces the blood's ability to supply oxygen. Those most at risk are infants, the elderly and those having heart, lung or anemic diseases. When oxides of nitrogen and sulfur mix with atmospheric moisture, the acid rain produced can damage plants and aquatic life. Ozone develops when oxides of nitrogen react with hydrocarbons in the presence of sunlight. Ozone aggravates allergies, asthma and emphysema and impairs overall lung function.

Because of the health and environmental risks associated with PM_{10}, both Nevada and the federal government have established standards to control ambient concentrations. In addition, these pollutants have caused a noticeable deterioration in visibility. Consequently, it has become a priority to minimize pollutants in order to maintain or improve visibility in and around our nation's most impressive vistas.

Applicability. This handbook outlines voluntary guidelines that are useful tools for successful smoke management in Nevada. The voluntary guidelines contained within this handbook apply to all agricultural fires and are good practices to follow anywhere in the State. In addition, counties, cities and fire departments may have local ordinances that restrict open burning. Therefore, you should always check with local officials before burning to ensure compliance.

WHAT IS AGRICULTURAL BURNING?

Agricultural burning can be defined as the burning of materials that are wholly produced from growing and harvesting crops or raising animals for the primary purpose of providing a livelihood. In this handbook, we have divided agricultural burning into four categories.

Crop Residue Burning. Crop residue burns remove vegetative debris from farming operations. Fires used to clear fields for planting or seeding, control disease or pests, and/or improve crop propagation are examples of crop

residue burns.

Ditch and Fence Line Burning. Ditch and fence line burns are initiated to remove weeds and other plants that collect along ditches, drains, and fence lines. Burning reduces the fire hazard and can improve water management efficiency.

Rangeland Burning. This type of open burning includes grasses, shrubs, trees, or other vegetative matter burned to improve rangeland. The Nevada Division of Forestry conducts many rangeland burns and may be able to assist you.

Land Clearance and Upkeep. Brush piles, branches, stumps and other vegetative debris removed while clearing new land or while maintaining the property are included in this category.

Burning that is not covered in this program. We prohibit the burning of garbage, tires, and any material containing plastics. When burned, plastics are a major source of air pollution, and much of the resulting pollutants can have serious health consequences. Bringing these types of materials to a municipal dump is the preferred option.

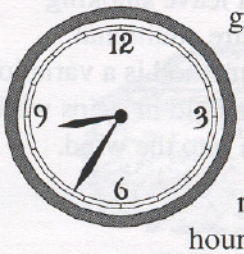
SMOKE MANAGEMENT

There are several methods of smoke management most techniques involve minimizing smoke production and burning in conditions that allow smoke dispersal. In this section we outline these methods and tell you how to achieve good results with specific types of burning (i.e. crop residue, ditch and fence line, rangeland, and land clearance and upkeep).

Smoke Reduction. The most effective method of smoke reduction is the use of a non-burning alternative. However, if you decide that burning is necessary to achieve your objectives, the vegetation will burn hotter, more completely and produce less smoke if it is dry, loosely stacked and contains very little soil. Fuel moisture has the biggest influence on combustion efficiency and the amount of smoke generated. This moisture must be boiled off before the fire is hot enough to burn efficiently. Because of its high moisture content, green wood smokes more and burns cooler. Loosely stacked material smokes less because the flame is exposed to more air. Conversely, dirt keeps air away from the fuel causing it to smolder and generate additional smoke.

Burning Hours. For best smoke dispersion, it is preferable to start the burn after 10 am and make sure it is completely out by 4 pm. You probably have noticed a breeze moving up hill in the morning and down hill in late afternoon. The breeze is caused by thermal updrafts that develop after the sun warms the earth in the morning. The air near the ground is warmer and less dense than the overlying air causing it to rise like a hot air balloon. When air cools, it becomes denser causing it to flow down the side of the mountain in the evening.

Late-morning ignition allows the ground to heat up and the dew to evaporate, producing less smoke and allowing the smoke produced to rise. If you ignite late in the day, cooling temperatures will hold the smoke close to the ground and keep it there until the following morning when the sun starts the thermal lift process again. Following recommended burning hours is one of the easier



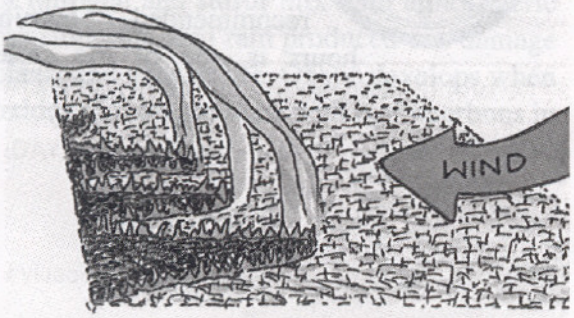
methods to minimize smoke impacts on yourself and the surrounding community.

By lighting a test fire, you will be able to see how well the material burns and where the smoke is going. Wait a day if the fuel is too damp, the smoke is not lifting or is blowing towards a sensitive area such a school, hospital, nursing home, airport, or recreational area.

Burning days. Consider rescheduling your burn if there is a high risk of wildfire or there is a lot of smoke in the air. Additionally, it is always a good idea to evaluate non-burning alternatives. Ask yourself if you can economically achieve similar results with methods that do not require fire.

You may wish to limit burning activity on weekends, holidays or when nearby sporting activities are scheduled. Limited burning on these days can enhance the quality of life, reduce nuisance complaints and may enhance tourism if near a popular recreational area.

Ignition Techniques. Your ignition technique has a big influence on the amount of smoke produced. If burning a field, light the fire at the downwind edge. Backfires force the fire to creep into the wind allowing greater fire control and more complete combustion. This method produces fewer particulates and does not leave smoking patches behind that require additional attention. The strip-fire method is a variation of the backfire. Light the field in strips while walking straight through into the wind.



Use an ignition device that does not produce black smoke, such as butane, propane or diesel oil burners. A burning tire is a poor choice for an ignition device – this method generates excess smoke and is dangerous.

Crop Residue Burning. Allow the crop residue to dry as much as possible before burning to reduce the amount of smoke. You might allow 3 days for spread straw or 10 days for rowed straw depending on conditions. The preferred ignition methods are backfiring and strip-firing.

Ditch/Fence-Line Burning. Kill the grass and/or weeds first and allow them to dry. Once the material is dry and conditions are favorable, use one of the preferred ignition techniques discussed above if possible.

Rangeland Burning. Nevada Division of Forestry regularly performs burns on rangeland – they may be able to assist with your burn. If you would like to perform the burn yourself, ensure the fuels are dry, control measures are in place and local authorities are notified. Use one of the preferred ignition techniques discussed above.

Land Clearance and Upkeep. Stack the material and allow it to dry. Prunings and small branches may take three weeks. Allow six weeks for large branches and stumps. Arrange stacked material to allow air to freely circulate. Allow the pile to breathe by making smaller piles. Avoid pushing soil into the pile.

BURN NOTIFICATION

Letting other burners know when you are going to burn is key to effective smoke management. The primary goal is not to reduce the number of fires during the year, but

to reduce those on a single day. Burning activities can be coordinated through the Bureau of Air Quality Planning or a local coordination network. When neighbors cooperate, you improve air quality and reduce complaints. Regardless of whether you coordinate your burning activity, it is helpful to notify local fire officials before you burn. Effective notification will prevent an unnecessary emergency response to your smoke plume.

Effective methods of notifying the public include fliers at grocery stores and the local Post Office, and press releases with the local newspapers or television stations. These notification actions can help prevent various inconveniences and dangers on the part of the public and local fire department.

Too frequently, people are injured or killed due to reduced visibility when a dense smoke plume drifts across the highway. Posting signs and monitoring smoke on the roadway will warn motorists of reduced visibility ahead.

Most agricultural burns in Nevada are less than 50 acres per day[1]. Smoke impacts are relatively small, but as with all open burns, you should contact local authorities before ignition. Local authorities may have additional requirements and notification will prevent a needless response from the fire department.

For larger burns of 50 to 500 acres, or burns that are closer to populated areas, a completed one-page notice of your intent to burn is appropriate. Notification will be most useful if it precedes the projected burn date(s) by at least two weeks.

A copy of the Bureau's Notice of Open Burn Activity and instructions are included with this handbook. Please follow the instructions and submit the notice via mail or fax to the location provided with the Notice. Additional copies of the notice of Open Burn Activity are available at ndep.nv.gov/baqp/smoke1.html or you may call the Smoke Management Coordinator at (775) 687-9358 to have a copy mailed or faxed to you.

To alert the Bureau of your plans, please notify the Bureau the day preceding the burn. When notifying the Nevada Bureau of Air Quality Planning, contact the Smoke Management Coordinator at (775) 687-9358. If no one is available, leave a message that includes:

- The date
- Burner's name
- Your phone number
- Burn location
- Date of burning
- The burn number – as shown on the notice of burn activity
- Estimated acreage to be burned

1 The Nevada Farm Bureau and Nevada Cattleman's Association helped the Bureau of Air Quality Planning complete a survey of open burning on private lands. This allowed us to assess the amount of burning conducted each year by agriculture and what impact it has on Nevada's air quality. Based on the survey response, a typical agricultural open burn is around 5 acres and emits less than 1 Ton of PM_{10} per day. A small percentage of the burns emit over 10 Tons PM_{10} per day.

There may be rare instances when we will ask you to postpone your burn until conditions improve if you have poor air quality in the area, a large burn is planned, or the weather conditions will not dissipate the smoke. If you do not receive a response by 5 pm on the day before your burn, proceed with your burn.

For burns of 500 – 1500 acres per day, or burns close to population centers and roadways, a burn plan may be necessary. A burn plan contains more detailed information, such as:

1. The specific location and description of the area to be burned;
2. The responsible personnel;
3. An emergency telephone number;
4. The property owner;
5. The agency/contractor conducting the burn;
6. The burn prescription;
7. The number of acres to be burned, the type of fuel, fuel loading estimates and the ignition technique to be used;
8. A list of agencies and private parties involved;
9. A map depicting the potential impact of the smoke for 15 miles from the burn site. Please delineate the daytime and nighttime smoke path and smoke sensitive areas on a map at a scale that allows identification;
10. A discussion of your public notification procedures; and
11. An evaluation of alternative treatments.

For burns larger than 1500 acres or burns with smoke sensitive receptors nearby, (such as hospitals and schools) additional plans should be made, including:

1. A smoke management plan that includes actions taken to minimize emissions before, during and after the fire;
2. An emissions estimate including the models, methods and emission factors;
3. Safety and contingency plans;
4. A list of potentially impacted jurisdictions and the names and telephone numbers of the respective regulators; and
5. The type of air monitoring proposed.

We recommend contacting the air district officer in Washoe or Clark County, an adjacent state, or Indian Tribal Lands the day before the burn, if the burn is within 15 miles of the border. You also may wish to include nearby agricultural burners. If the open burn is coordinated through the Bureau, we will notify the appropriate regulator for you.

ADDITIONAL INFORMATION

If you have any questions about the program, health and environmental issues, burning techniques, or you are interested in establishing a local coordination network please call the Nevada Bureau of Air Quality Planning at (775) 687-9358, or visit our web site at www.ndep.state.nv.us/baqp.

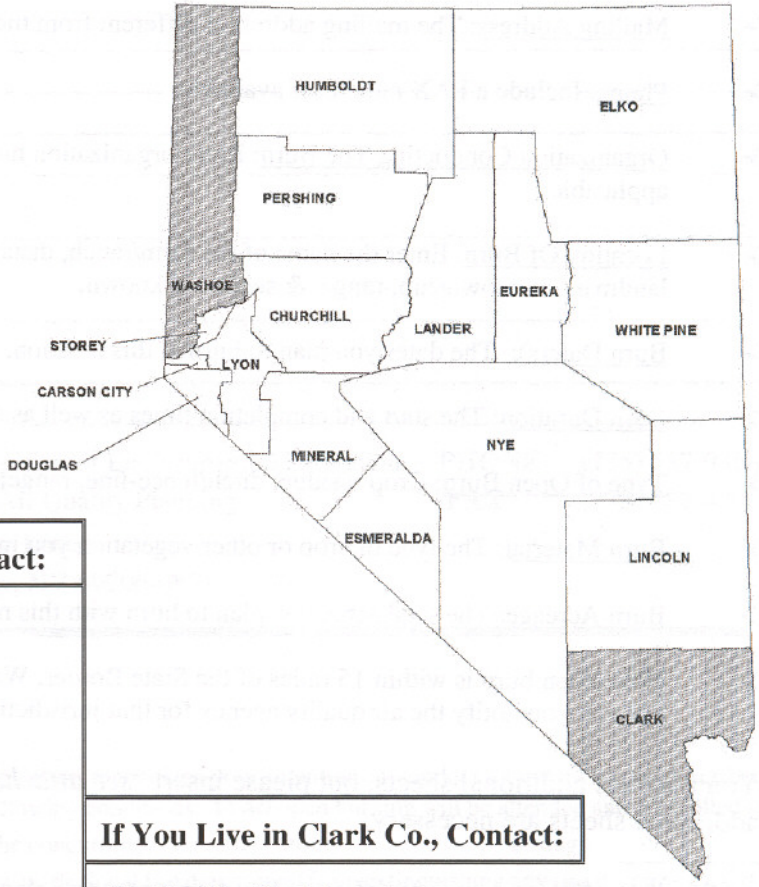
NDEP wishes to thank the Nevada Cattleman's Association, Nevada Farm Bureau, Lovelock Smoke Management Committee, the Nevada Department of Agriculture and the Nevada Conservation Districts for their assistance and cooperation in preparing this handbook.

Need More Information?

If you live outside Clark or Washoe County, and are not on Indian lands, call:

The Nevada Division of Environmental Protection
Bureau of Air Quality Planning

(775) 687-9358



If You Live in Washoe Co., Contact:

Air Quality Management Division
District Health Department
PO Box 11130
Reno, NV 89502
(775) 784-7214

If You Live in Clark Co., Contact:

Air Quality Division
Clark County Health District
PO Box 3902

Instructions for the Notice of Open Burn Activity

1. Please fill out the notice completely.

2. Each burn incident will require its own notice. Burn plans may include all burns anticipated for long term planning but each phase of the plan will need its own notice.

Line-by-Line Instructions:

- Name: The business name and responsible person.
- Mailing Address: The mailing address if different from the street address.
- Phone: Include a FAX number if available.
- Organization Conducting The Burn: Enter organization name, contact person & phone number if applicable.
- Location Of Burn: Enter the name of the farm/ranch, distance and direction from town or landmark and township, range, & section if known.
- Burn Date(s): The dates you plan to burn at this location.
- Burn Duration: The start and completion times as well as total burn hours.
- Type of Open Burn: Crop residue, ditch/fence-line, rangeland or land clearance.
- Burn Material: The type of crop or other vegetation you intend to burn.
- Burn Acreage: The total acres you plan to burn with this notice.
- If the open burn is within 15 miles of the State Border, Washoe/Clark Counties or BIA Lands we ask that you notify the air quality agency for that jurisdiction of your burn.

You may use additional sheets, but please insert "*see attached*" at the bottom of the first page if additional sheets are necessary.

Notify this office or your local coordination network one working day before burning.

To Notify the Smoke Management Coordinator:
Call: (775) 687- 9358 (leave a message)
Monday through Friday 8:00 am to 5:00 pm

Nevada Division of Environmental Protection
Bureau of Air Quality Planning

NEVADA BUREAU OF AIR QUALITY PLANNING
NOTICE OF OPEN BURN ACTIVITY

Name: _____

Mailing Address: _____

City, State, Zip Code: _____

Phone: (775) _____ **Fax:** (775) _____

Organization Conducting Burn: _____

Location of Burn: _____
(Be Specific)

Burn Date(s): _____

Burn Duration (hrs): _____
(Both Flame and smoldering phases)

Type of Burn: _____
(Crop Residue, Ditch/Fence-line, Rangeland, Land Clearance)

Burn Material: _____
(Crop or Other Vegetation)

Burn Acreage: _____

Return application to: Nevada Division of Environmental Protection
Bureau of Air Quality Planning
333 W. Nye Lane
Carson City, NV 89706-0851

PHONE (775) 687-9358
FAX (775) 687-6396

To be completed by BAQP **No. 04-**

CONCURRENCE

The Nevada Division of Environmental Protection recognizes your intention to conduct an open burn as described above. This concurrence is limited by the following conditions: 1) All open burning will be attended and controlled at all times to eliminate fire hazards; and 2) The concurrence is in effect from _____ through _____

This authorization does not prohibit, in any way, the local fire department from extinguishing any fire if a hazard exists or develops during the course of burning. The applicant may be required to comply with additional state and local laws regarding air pollution and fire safety including obtaining required permits or approvals. Prudence requires reasonable safety and air-pollution-control precautions before ignition. Please notify the Bureau of Air Quality Planning one (1) working day before **each** burn. The fire department or fire warden may require prior notification of the time and place of each fire.

Date: _____ By: _____

Smoke Management Coordinator
Nevada Bureau of Air Quality Planning

March 13, 2003