



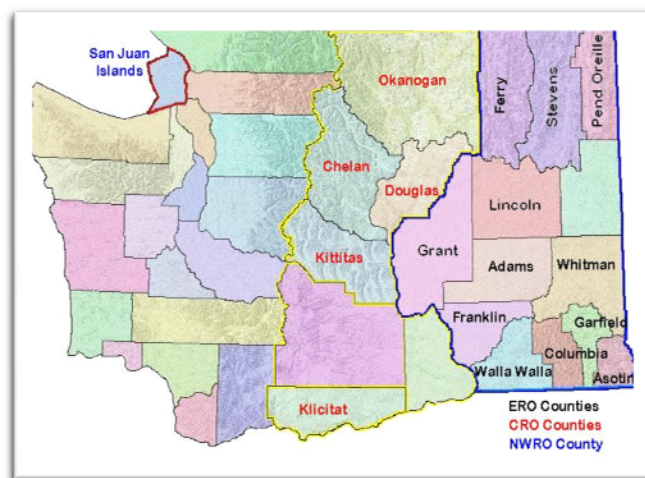
A Look at Smoke Management 2007

Smoke can cause bronchial problems, asthma flare-ups, and increased risk of dying from heart and lung disease. It also affects the environment by harming soil, water, crops, forest, wildlife, and visibility. The purpose of Ecology's Smoke Management Program is to reduce the toxic effects of smoke on Washington's citizens. This report describes Ecology's role in managing smoke from burning during 2007.

Regulating Burning

Ecology and local air quality agencies regulate agricultural, outdoor, and indoor burning in Washington through the use of permits. In western Washington, Ecology regulates burning in San Juan County, and local air quality agencies regulate the other 22 counties. For the area east of the Cascades, Ecology has a Burn Unit consisting of two "Burn Teams." In central Washington, Benton and Yakima counties have their own local air quality agencies, and Ecology's Central Regional Office

Burn Team regulates the other five counties. In eastern Washington, Spokane County has its own local air quality agency, and Ecology's Eastern Regional Office Burn Team regulates the other 12 counties.



In 2007, burn permits were issued for more than 192,000 acres of agricultural land and around 6,000 acres of non-agricultural land. Ecology and local air quality agencies manage this permitted burning while striving to protect citizens from the impacts of smoke. Members of the Burn Unit have built good working relationships with both the regulated community and the general public. We established these relationships through direct contact with citizens, meetings at a local government level, and education and outreach campaigns. The Burn Teams also work closely with conservation districts, fire departments, growers, and the interested public throughout the year. During agricultural burn season, the teams are responsible for helping growers get their permitted acres burned while protecting air quality.

Ecology strives to use the least aggressive tools available in regulating burning. However, when we encounter those who knowingly break the laws and rules, Ecology has the authority to issue penalties. These penalties carry a maximum fine of \$10,000 per day, per violation.

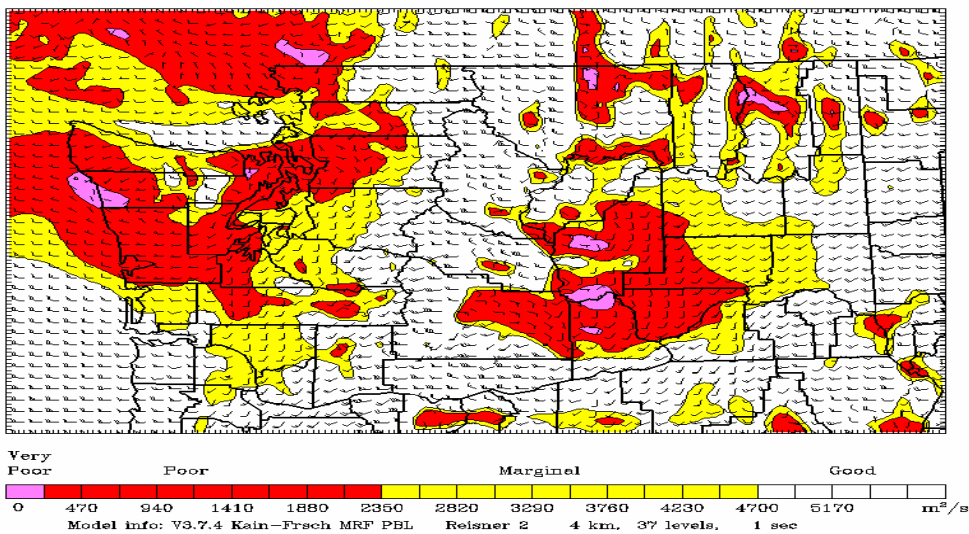
If you need this publication in another format, please contact the Air Quality Program at (360) 407-6800. If you have a hearing loss, call 711 for Washington Relay Service. If you have a speech disability, call 877-833-6341.

Daily Burn Decision

Ecology makes daily burn decisions for permit holders 365 days a year. The daily burn decision is based mainly on current weather conditions and ventilation forecasts, local permit numbers and the amount of smoke in the air detected by air monitors.

Current weather conditions and ventilation forecasts: Burn Team members check computer weather model forecasts for the region, and ventilation models that forecast smoke dispersion for specific burn zones and counties. Here is an example of a ventilation model from the University of Washington used for the daily burn decision (see <http://www.atmos.washington.edu/mm5rt/> for more information about ventilation models.):

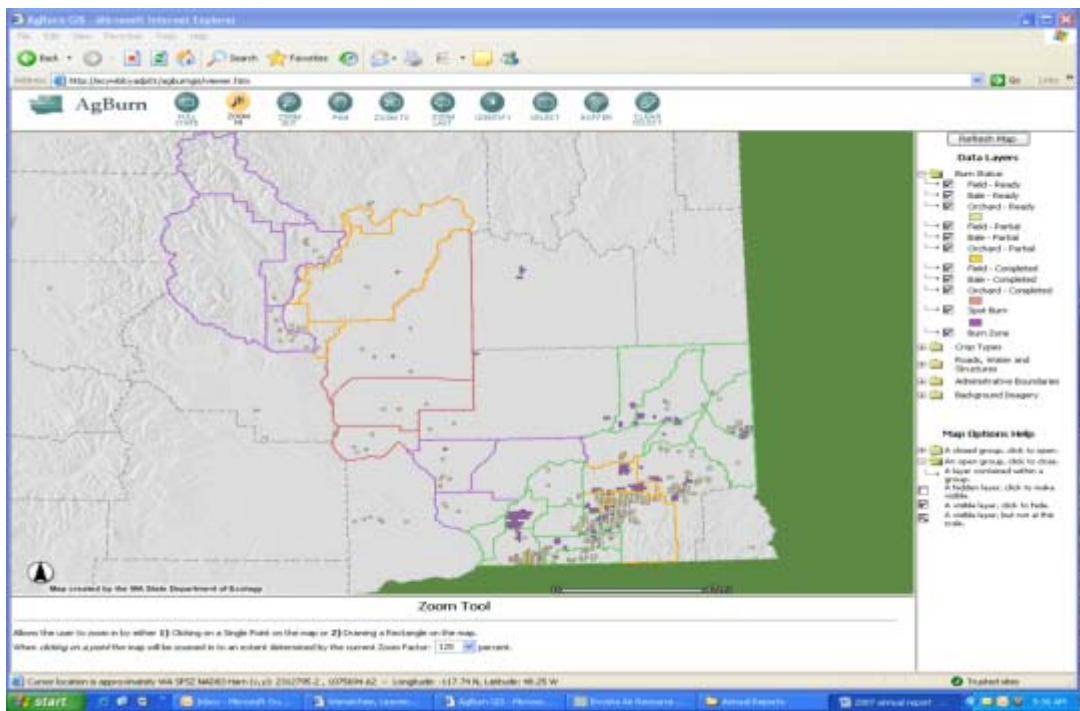
UW MM5-GFS 4km Domain Init: 00 UTC Fri 08 Feb 08
Fest: 25 h Valid: 01 UTC Sat 09 Feb 08 (17 PST Fri 08 Feb 08)
Ventilation Index (m^2/s)
Horizontal Wind at sigma .9975 (full barb = 10kts)



We look for marginal to good smoke ventilation when allowing permit holders to burn for that day. Three of the factors used in making the burn call are wind speed, wind direction, and the height of the mixed layer of the atmosphere. Ecology avoids allowing permit holders to burn on days of poor smoke ventilation so that the smoke does not stack up in valleys and populated areas. The photos below show smoke impacts from prescribed burning, and how smoke can stack up in steep valleys:



Local permit numbers/amount of smoke in the air: Burn Team members also look at the burn location and amount of acreage people want to burn using Ecology's Agricultural Burn Geographic Information System (GIS), shown below. This GIS system helps us track the position of burn permit holders in any given area. We can use this tool to understand the number of acres permit holders have ready to burn on any given day. We take that information and limit the amount of smoke going up in local airsheds on days with poor to marginal smoke ventilation.



Agricultural Burning in 2007

Permitted burning:

Ecology permitted 192,416 acres of agricultural burning in 2007 (see enclosed table), compared to 215,217 acres in 2006. These numbers include field burning, conservation reserve program (CRP) burning, spot burns, and orchard burning. Four types of agricultural burning are exempt from permitting requirements under Washington law, and are therefore not included in the permitted acreage totals in this report. These four exemptions are for burning of annual orchard prunings, fence lines, ditch banks, and windblown vegetation (tumbleweeds).



Effects of wildfires:

Wildfires can occur simultaneously with agricultural burning seasons in central and eastern Washington. This can affect the agricultural community's ability to burn if there is already too much smoke in local airsheds. Wildfire smoke did not have a significant effect on Washington's field burning season in 2007. However, in 2006, more than 285,000 acres burned in just two wildfires during the height of the season. These two wildfires prolonged the field burning season well into the fall of 2006. Orchard burning typically takes place after harvest in late fall and before spring planting, so orchardists may also compete with both wildfires and forest burning during their burn seasons.

During the heaviest part of the agricultural burning and wildfire seasons, the Burn Teams participate in conference calls with representatives from the National Forest Service, Department of Natural Resources, Idaho Department of Environmental Quality, and local tribes. The represented agencies and tribes realize smoke does not respect agency, tribal, or state boundaries, and that what we do may impact someone outside our jurisdictions.

07 Agricultural Burning Permitted Acres, By County

County	Spot Burns	Bale Burns	Cereal Grains	Other Crops	Orchard Tear Out	CRP	Total
Adams	150	7	4,424	30	0	568	5,179
Asotin	110	0	177	0	0	68	355
Chelan	0	0	0	58	79	0	137
Columbia	220	10	35,467	29	0	1,033	36,759
Douglas	0	0	100	0	122	0	222
Ferry	0	0	0	9	0	0	9
Franklin	24	22	5,093	197	319	3,968	9,623
Garfield	110	0	11,134	91	0	1,424	12,759
Grant	35	31	3,531	146	659	0	4,402
Kittitas	0	0	0	131	0	0	131
Klickitat	0	0	65	0	10	0	75
Lincoln	165	21	1,403	64	52	170	1,875
Okanogan	0	0	0	0	155	0	155
Stevens	0	0	0	0	0	0	0
Walla Walla	311	7	42,865	7,006	8	4,139	54,336
Whitman	1,126	14	61,301	182	0	3,776	66,399
TOTAL ACRES	2,251	112	165,560	7,943	1,404	15,146	192,416

Agricultural Burning Practices and Research Task Force

The Washington State Clean Air Act established the Agricultural Burning Practices and Research Task Force (Agricultural Task Force) in RCW 70.94.650. The goal of the task force is to work toward reducing air pollution emissions from agricultural burning. The Department of Ecology chairs the task force. Members of the task force represent many different interests. The representatives include eastern Washington local air quality agencies, the

agricultural community, the Department of Agriculture, local universities or colleges, public health agencies, and conservation districts.

The Agricultural Task Force generally meets three times a year and provides for stakeholder input into the state’s agricultural burn program. Members review and establish permit fees; identify and recommend funding for research on alternatives to burning; and review, develop, and adopt updated Best Management Practices (BMPs) for growers. The current task force members have adopted five basic types of BMPs:

- Cereal grains
- Non-Cereal Grains
- Orchard Tear-Out
- Bale Burning
- Spot Burning

All BMPs and other task force related documents can be found on the internet. The Agricultural Task Force web site is:

http://www.ecy.wa.gov/programs/air/aginfo/Task_force.htm .

Agricultural Task Force Meetings are open to all interested persons. Anyone with an agricultural burn concern is welcome to come and present their concern during a meeting. Only task force members can vote on decisions.

2007 Agricultural Task Force Membership

Representative	Organization	Seat
Karen Wood	Dept. of Ecology	Chair
Dave Lauer	Benton Clean Air	Local Air Authorities
Michael Ingham	Alfalfa Seed Growers	Agricultural Community
John Cornwall	Grass Growers Assoc.	Agricultural Community
Jay Penner	WA Assn. of Wheat Growers	Agricultural Community
Bill Johnston	WSU Crop & Soil Science	Universities or Colleges
Michael Bush	WSU Cooperative Extension	Universities or Colleges
Bob Gore	Dept. of Agriculture	Dept. of Agriculture
Dr. Sverre Vedal	University of Washington	Public Health
Larry Cochran	WA State Conservation Dist.	Conservation Dist.

Monitoring

Ecology's air monitoring network is a very important tool for evaluating air quality. Our monitors are nephelometers, which determine the level of particles in the air by measuring the amount of light scattered by the particles. Regional and headquarters staff ensure the monitors are working correctly and provide timely and accurate information about air quality throughout central and eastern Washington.

Ecology makes daily burn decisions based on monitored hourly and daily PM_{2.5} (smoke) values. Our goal is to keep 24-hour PM_{2.5} values at less than 20 micrograms per cubic meter of air. We also use the monitors to look for seasonal and local trends in air pollution. For example, we see high nighttime PM_{2.5} values in areas with high wood stove use.

In addition to the permanent monitors, we have three mobile monitors. These monitors are transported to areas where we think there are air pollution problems. The monitors gather data used to help Ecology figure out ways to address air quality problems in those areas.

Ecology operated two mobile particulate monitors in Cle Elum and Dayton (shown above) during parts of 2007. These monitors were located to help Ecology could learn more about these air sheds and residents learn more about the air they breathe. The mobile monitors can be deployed to remote areas to help track smoke impacts during burn season, and local wood smoke levels during home heating season.

Information about monitored air pollution levels is available to the public on the Ecology website

<https://fortress.wa.gov/ecy/enviwa/Default.htm> . This information can help people plan their activities for the day.

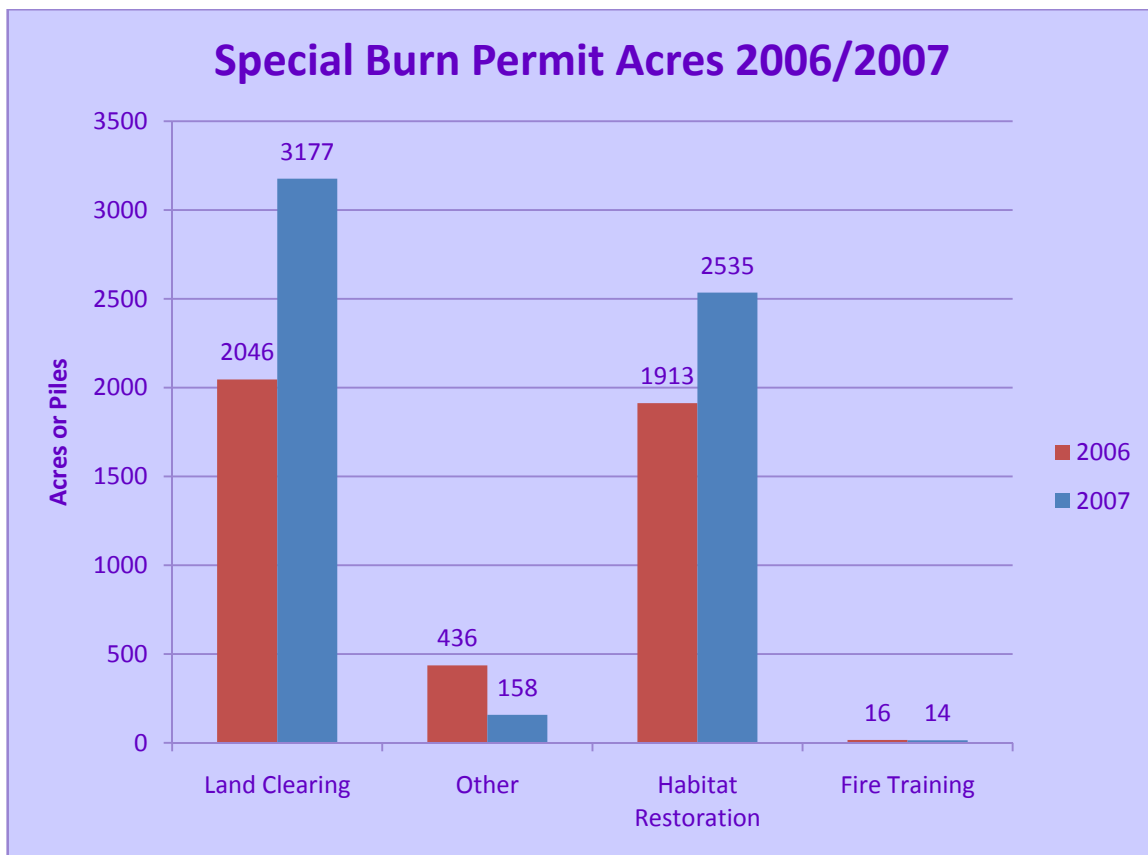


Special Burn Permits in 2007

Special burn permits are issued for land clearing, habitat improvement, fire training, weed control, and fire safety. The amount of acreage and number of piles receiving special burn permits continues to grow as citizens become more aware of the need for a permit. In 2007, 5,884 acres were permitted, while in 2006, 4,408 acres were permitted. Before 2006, the number of acres permitted was almost doubling each year. We believe the amount of burning has remained roughly constant, but compliance with permitting requirements has increased.

Alternatives are always considered before special burn permits are issued. The way smoke disperses varies depending on the weather, what is being burned, and the location of the burn. Because special burns take place in areas with diverse local terrain, Ecology Burn Team members spend valuable time in the field to get a better understanding of how burns behave in different terrains. Like agricultural burners, special burn permit holders are required to follow local fire safety laws.

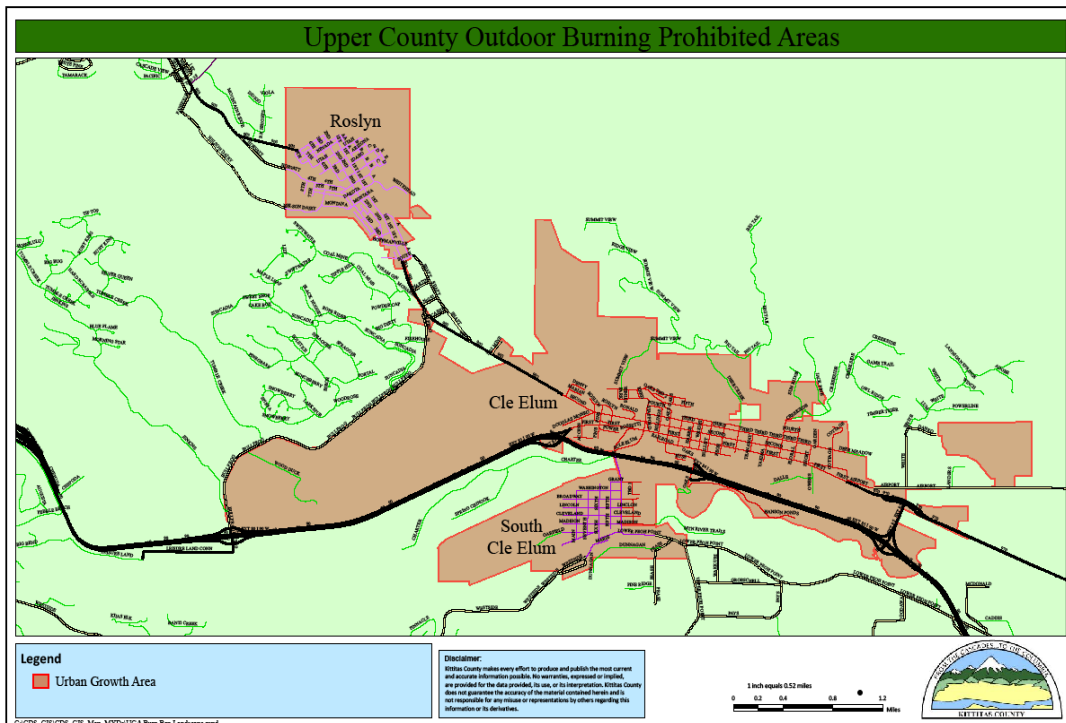
For a detailed comparison of the different types of burning that require a special burn permit, see the chart below. There are currently no fees for special permits.



2007 Urban Growth Area Burn Ban

Since January 1, 2007, residential and land clearing outdoor burning is no longer allowed in any Urban Growth Area (UGA) in Washington. This change affects nearly 50 communities in eastern Washington. In 2007, Ecology increased its field presence in UGAs to educate the public on and enforce the ban. Ecology has a web site where citizens can download a map of their area to check if they are inside a UGA:

<http://www.ecy.wa.gov/programs/air/aginfo/ugamaps.htm>.



Storm and Flood Debris Permits in 2007

Storm and flood debris permits may only be issued in areas where an emergency has been declared by local or state authorities. These permits are used as a last resort for citizens and local authorities affected by major storm or flood events. This type of burning may take place with a permit in areas where burning is not usually allowed.

A series of strong wind storms, combined with saturated ground conditions, left Washington residents and municipalities with large volumes of organic debris in 2007. During 2007, Ecology issued 74 permits for storm and flood debris from the Central Regional Office and 12 from the Eastern Regional Office. The timing of the windstorm was challenging because it coincided with the implementation of the UGA burn bans for smaller communities, and much of the storm damage took place inside the UGAs.

Ecology always explores alternatives to burning for the community before storm and flood debris permits are issued. The photo on the next page shows an example of a community chipping program for storm and flood debris.

Ecology increases its field presence and education and outreach efforts during storm and flood debris events. This allows us to “ground truth” the availability of resources, such as human power, chippers, disposal options, and arborists. Ecology always encourages beneficial end use of this valuable organic material. For example, many communities use large trees for fire wood, and chipped material for projects like mulch in parks or on pathways.



Tracking Smoke Complaints

Another important function of the Burn Unit is to track and respond to smoke complaints. Below is a summary of the complaints Ecology received in 2007. Ecology receives smoke complaints by e-mail, regular mail, or phone calls directly to the team; through an 800 complaint line set up by Ecology; and in person. All Washington residents have access to the Ecology 800 phone number for complaints: 1-800-406-5322.

The trend in the past several years has been a decline in agricultural burning complaints and an increase in other complaints, mainly about outdoor burning. This trend continued in 2007, with complaints about general outdoor burning outnumbering complaints about agricultural burning by almost seven to one (140 to 21).

Ecology continues to work at reducing complaints through continued education and trust building with communities, fire districts and the public. We use radio and newspapers and do public outreach such as visiting seasonal fairs to inform the public about outdoor burning laws and alternatives. We have found most

Type of Complaint	2007 Total	2006 Totals
Agricultural	21	28
Indoor/woodstove	8	11
Outdoor Burning	140	130
Dust	67	48
Other	28	4
Total	264	221

people are willing to follow the law if someone takes the time to explain why the law exists and what it means to them. When we discover a chronic violator, we begin an investigation that could lead to enforcement action. This could take the form of anything from a Notice of Correction to a Notice of Violation leading to a Notice of Penalty.

Outdoor Burning Rules Enforcement

Ecology uses many tools to implement the state's outdoor burning rules, one of which is enforcement. Additional tools include permitting, technical assistance, and collaborating with local agencies to control smoke impacts and investigate illegal burning. The Burn Teams expect that most people will voluntarily comply with the regulations if they know what the rules are. This is the main reason we invest money and staff time in outreach programs and media campaigns aimed at educating the public.

When efforts to achieve voluntary compliance are unsuccessful, enforcement is the appropriate action. The goal of our outdoor burn program enforcement is to influence the behavior of both the violator and the general regulated community. Types of enforcement actions the Burn Teams generally take include:

- **Notice of Correction (NOC):** Written warning to the violator including information on what they must do to comply with the law (no fines).
- **Notice of Violation (NOV):** Formal notice to the violator that a specific violation has occurred and that Ecology is considering a penalty action for the violation. Offers the violator a 30-day window of opportunity to meet with Ecology to provide more information about the violation.
- **Civil Penalty (NOP):** Monetary fine. After the 30-day Notice of Violation process is completed, a Notice of Penalty may be issued. Violators may receive penalties of up to \$10,000 per day/ per violation. Actual penalty amounts are calculated from a matrix that considers violation gravity and economic benefit criteria. Violators can appeal penalties to the Pollution Control Hearings Board: <http://www.eho.wa.gov/>.
- **Compliance Orders:** May accompany a Notice of Violation, and require the violator to take necessary corrective action or submit a plan for corrective action. Must include a date when such action will be initiated.

2007 Agricultural and Outdoor Burn Enforcements

Notices of Correction	Notices of Violation	Civil Penalties (amount)
42	17	18,000

Wood Stove Exchange Program in 2006-2007

Ecology helped initiate three wood stove change-out programs in northeastern Washington, starting in 2006. The goal of all three programs is to remove old, uncertified, polluting wood stoves from the airsheds in Ferry, Stevens, and Pend Oreille counties. These old wood stoves account for a substantial part of the often elevated wintertime levels of PM_{2.5} in these counties.

In the first program, Ecology helped exchange or replace 128 wood stoves in Ferry and Steven counties. Of these:

- 93 were replaced with certified wood stoves or fireplace inserts,
- 27 were replaced with pellet stoves, and
- 8 were replaced with either gas or propane stoves.

Of the total grant amount of \$52,000, \$51,200 was spent directly on wood stove change-outs. The remainder paid for transportation of the old wood stoves to the recycling facility and Ecology personnel transportation costs. Just over 100 hours of Ecology personnel time was used in this program, including follow-up phone interviews and data processing. No Ecology or grant funds were used for advertising this program. This was left up to the retailers, who had an interest in helping the program be successful because the more stoves that were exchanged, the more stoves they sold.

The second wood stove change-out program in northeastern Washington is helping low-income households change out old, uncertified wood stoves to new, cleaner burning heating devices. This program in Pend Oreille County is being managed by Rural Resources Community Action, a local non-profit. It is using \$80,000 from a Supplemental Environmental Project. The program should be completed by the spring of 2008, with approximately 28 wood stoves replaced.

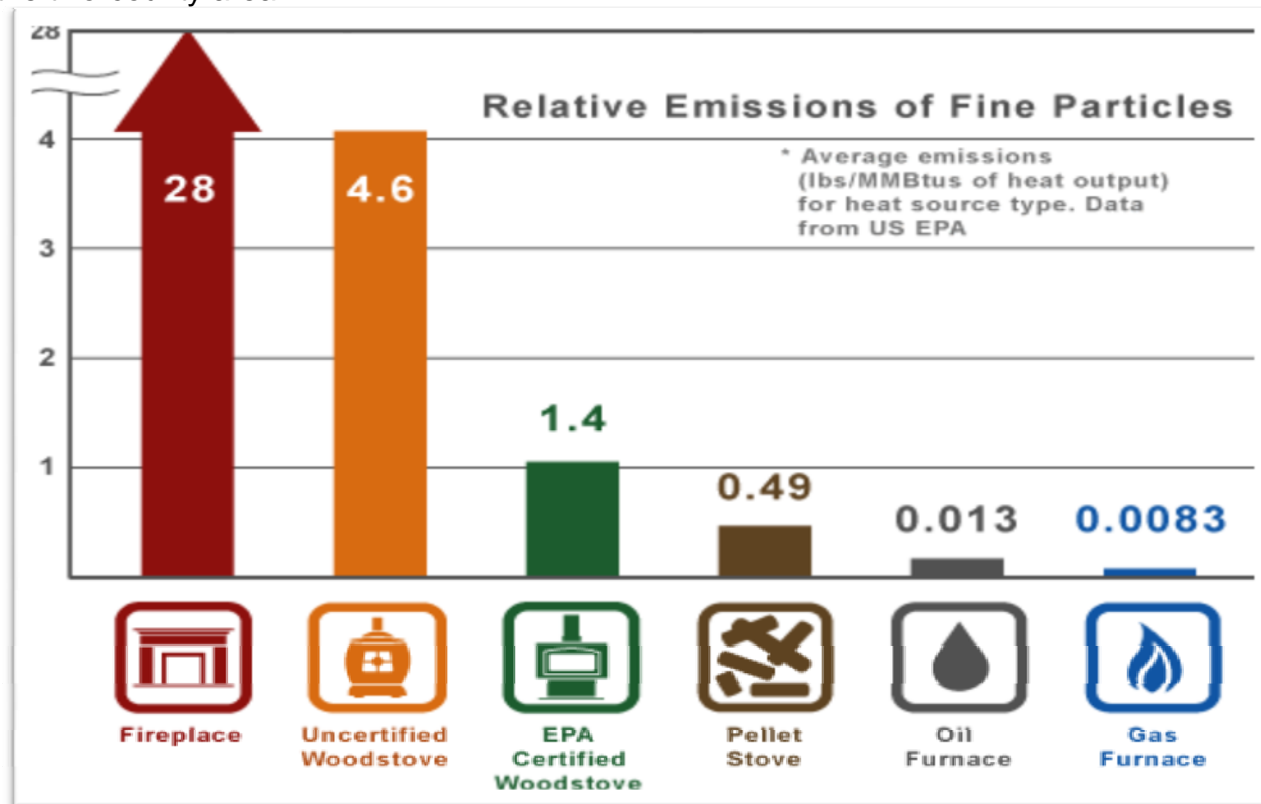
The latest (third) wood stove change-out program in northeastern Washington is designed to replace uncertified wood stoves in and around the city of Colville, which is the largest city in the Tri-county area and the county seat of Stevens County. This program has both an incentive-based portion and a low-income (full cost) portion. The incentive-based portion helps households replace wood stoves by paying the following amounts toward purchase of a new heating device:

- \$500 if the stove is replaced with a certified wood stove,
- \$600 if it is replaced with a pellet stove, or
- \$750 if it is replaced with a gas or propane stove.

In addition, the participating retailers offer incentives ranging from \$100 to \$300 off the Manufacturer's Suggested Retail Price of appliances purchased. They offer an extra \$50 to those people using a coupon Ecology distributed as an insert in the local newspaper. The retailers have done the majority of the advertising for the program, spending an estimated \$1,000. Ecology's Eastern Regional Office "contributed" approximately \$9,000 in administrative costs. Stevens County Public Works contributed \$750 in waived tipping fees and transportation costs for the collected wood stoves.

A total of eight wood stoves were replaced in 2007 in the Colville stove exchange. The program (initially slated to conclude at the end of 2007), has been extended into the spring of 2008. It is expected that approximately 80 wood stoves will be changed-out by the conclusion of this program.

Emissions Reduction Estimates: To estimate the amount of emissions reduced by the described wood stove change-out programs, Ecology used data from the draft 2005 Washington State emissions inventory, along with EPA emission factor data for the various heating appliances. According to this data, the annual PM_{2.5} emissions from the 128 appliances traded out decreased from 12.2 tons before the trade-out to 4.9 tons after the trade-out. This amounts to a 60 percent decrease for those appliances traded out under this program. For the two-county area, the total estimate of PM_{2.5} generated annually decreased from 154 tons before the trade-out to 146.7 tons after the trade-out, a decrease of 4.7% over the two-county area.



All participants surveyed so far were happy with the program. Most believed the new stoves were more efficient (if wood) or more convenient (if pellet). Most used the appliance as their primary source of heat. At the conclusion of these three programs, no further wood stove change-out programs are planned in eastern Washington in the immediate future.