



Banning Burn Barrels

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Fifty years ago, burning trash in the backyard burn barrel was commonplace and simple. A stroke of the match and the trash, mostly paper, went up in flames and seemingly vanished. Today, trash is composed of many different materials (including metal, yard trimmings, food, glass, plastics, and synthetics), little of which is actually paper. Changes in trash composition and neighbor proximity are fueling efforts to stop backyard burning. Annoyed with the nuisance of dirty soot, and frightened by the toxins of today's smoldering burn barrel, citizens are demanding that townships and municipalities do something. In turn, municipal officials are implementing local ordinances to ban open burning. This fact sheet provides a starting point for establishing a burning ordinance for communities that realize the dangers open burning poses to human health and our environment.

A Known Polluter

The Clean Air Act Amendments of 1990 give individual states authority to regulate air emissions from all major sources, or sources which emit more than 100 tons of a specific air pollutant per year. Collectively, backyard burn barrels exceed the federal limits of a major source. It is approximated that between 25 and 50 percent of rural residents and farms in the United States practice open burning. According to the University of Illinois Cooperative Extension Service, it was estimated that in Illinois alone, 5,000 tons of air pollution is emitted annually from the burn barrels of approximately 800,000 residents, or 7 percent of the population. Patrick Engineering research in Illinois found that 36 percent of households in communities of less than 2,500 people burn trash, and in rural areas about 70 percent of the households burn trash.

Polycyclic Aromatic Hydrocarbons

A family of pollutants that has received much attention is the polycyclic aromatic hydrocarbons (PAHs). Highly toxic, some of these compounds are carcinogenic, or cause the development of cancerous growths in living tissue. These pollutants are produced at low combustion temperatures, but slowly dissipate as the temperature rises. An oxygen-deficient fire is ideal for creating dioxins, which belong to the PAH family and are by-products of incomplete combustion. They are created by forest fires, lightning, volcanoes, metal smelting, incinerators, and open fires. Waste combustion is the largest contributor of 2,3,7,8-tetrachlorodibenzo-p-dioxin to the atmosphere. The Environmental Protection Agency (EPA) calls this compound the most lethal member of the dioxin family.

The most common and frequently measured PAH found in the incomplete combustion of waste is benzo [a] pyrene. One study revealed that open fire smoke contains 70 parts per million of carcinogenic benzo-pyrenes, about 350 times more than cigarette smoke. A breakdown of the different sources and the amounts of PAHs emitted can be found in Table 1. In Table 1, the term emission factor is the amount of PAHs emitted by a particular combustion technique compared to the amount of waste burned.



Table 1. Comparison of PAH emission factors for incineration and open fire.

Source	Typical PAH (mg/kg or ppm)
Incinerators (2-5 tons/day)	6.8
Open burning:	
Automobile tires	240
Municipal refuse	1.4
Forest fires	20
Agricultural burning	20

Adapted from: Bjorseth, A. and T., Ramdahl "Handbook of PAH Vol. 2" (1985), p. 12

Other Emissions

Every fire is different in terms of its fuel source but estimates suggest a ton of average garden waste gives off 30 kilograms of carbon monoxide, a contributor to global warming. The level of carbon monoxide in the area of such a fire can be as high as an urban street with heavy traffic. Incomplete combustion affects the chain of carbons that make up cellulose, which is the main ingredient of leaves and grasses. These carbon chains break down into short chain and cyclic compounds such as acetic acid and propenal. A powerful irritant, propenal is responsible for the red streaming eyes we experience near open waste fires.

When burned at temperatures below complete combustion, chlorine-containing materials, such as polyvinyl chloride (PVC), become a highly corrosive, toxic, source of dioxin. Phosgene, an odorless gas, is also emitted from the combustion of PVC and can penetrate into the lungs thus reducing oxygen intake.

Some plastics contain metal additives used in manufacturing mainly as heat stabilizers, antimicrobials, and colorants. When incinerated, these plastics may emit arsenic and heavy metals such as lead, mercury, cadmium,



and chromium. Human exposure to heavy metals can cause nausea, abdominal pain, anorexia, mood disturbances, or harmful effects on the neurological and reproductive systems.

Challenges to Bans on Burning

To develop effective methods of reducing this pollution, the motivations of individuals who burn their trash must be assessed. It was discovered during a survey conducted by the University of Illinois that people who burn in rural areas do so for convenience, cost savings, and reduced reliance on landfills. Many residents were burning trash before there was such a thing as a "sanitary" landfill and felt that burning trash was a better disposal option than landfilling. The study in Illinois revealed the perception that what people did on their land was their right and ordinances regulating such activities were intrusions on their lifestyle. Not surprisingly, local ordinances banning burning in these communities were frequently not enforced.

Discussion of a burning ban by a local government body such as a borough council or township board of supervisors usually meets with loud vocal opposition. The challenges emerging prior to ordinance passage normally come from citizens who routinely burn trash and do not want to change old habits.

Although many townships and boroughs pass burning ordinances, frequently the funding and enforcement are absent. Identifying smoke sources in a rural area quickly enough to enforce a burn ban is difficult. Arriving at the site after the smoke has cleared and the fire is out does not provide a straightforward opportunity for enforcement and as a result there is minimal compliance.

What can you do to reduce these pollutants?

Open burning can release a variety of pollutants in amounts that exceed the maximum allowable emissions set by the U.S. EPA for modern incinerators. Leaving the fire to burn and smolder for hours or days is not environmentally sound and is detrimental

to human health. Low burning temperatures in open fires can result in products of incomplete combustion, including particulate emissions, heavy metal vapors, acid gases, black smoke, and carcinogenic tars. Though difficult, achieving high temperatures can reduce the amount of harmful emissions associated with open fires.

Although this fact sheet does not condone burning in burn barrels, performing the following steps can reduce the health risks and pollutants associated with open burning. However, this does not mean that the fire is burning cleanly or achieving complete combustion:

★ **Strive for highest temperature possible.** Using grates or heavy expanded wire mesh, expose the waste to air, allowing the fire to burn hotter and more efficiently. Movable grates work well for agitating the waste while burning to assure all material is incinerated.

★ **Keep black smoke from forming.** Less black smoke means less PAHs, and a hotter fire means less pollutants. Remove ashes regularly, and do not burn on wet ashes.

Devising Local Campaigns and Restrictions for Limiting Open Burning



Do your homework: find out commonly practiced waste handling activities in your area and determine the public perceptions of these practices. Investigate the depth of knowledge held by the public concerning air pollution and toxins from open burning.



Analyze the issue: identify barriers to banning open burning and develop strategies to overcome them. Create a plan to demonstrate the need to stop burning and to gain support for implementing alternate waste disposal programs. Convince community role models of the merits of the program and the rest of the community will follow.



Develop a public awareness campaign: define the desired change for the public. Discuss social aspects of open burning to foster the perspective that it is inconsiderate of one's neighbors and is socially taboo. Make sure community government offices, hospitals, schools, and all new buildings are practicing the 3-R's: Reducing, Reusing, and Recycling. Encourage school districts to teach environmental education programs covering the problems of open burning and the requirements for successful waste management.



Draft a waste management plan: a good plan restricts burning, dumping, and littering. Encourage adoption of reducing, reusing, recycling, and composting. Start brush and leaf collection and compost bin distribution. Consider establishing a mandatory trash removal program that requires all residents to have a trash hauler or face a hefty fine for non-compliance. Require recycling pick-up and low usage rates to be provided by the trash hauler.



Seek feedback and use follow-up: keep people motivated and informed. Consider having citizens sign a contract with the community stating the changes they will make.

A Model Ordinance

Most burning ordinances have the following format and sections:

Title, purpose, and scope: identifies the ordinance with a title, states the name and location of the municipality enacting the ordinance, and defines the scope of what activities the ordinance addresses.

Authority: cites what government entity...in what jurisdiction...under what section of the appropriate code...is enacting the ordinance. It should also state who to contact for questions or to report a violation.

Policy: states the goal of the ordinance. For example, a township may view their policy as regulating fires and open burning for the purpose of controlling air pollution and protecting buildings, housing, property, and well-being of its citizens.

Definitions: defines all words, terms, and phrases used in the ordinance to avoid misinterpretation.

Regulations: specifies what the ordinance is regulating and states the regulation. An all-encompassing waste disposal regulation not only addresses burning, but also requires each household to have a solid waste hauler contracted. The regulation would prohibit dumping and littering, while establishing mandatory recycling.

Exceptions: lists exemptions that typically allow certain burning, such as campfires, outdoor cooking, and firefighter training.

Enforcement: defines who has authority to enforce the ordinance and under what jurisdiction the enforcement falls.

Penalties: states the fines and/or penalties associated with the first and subsequent violations. Penalties must be substantial enough to promote compliance.

Legal terms of ordinance and date of implementation: includes closing statements describing severability (the division of the ordinance into legally independent obligations), along with notification of when the ordinance will take effect.

Final Points

When common respiratory health problems can be specifically attributed to air pollution, it is likely that the federal government will introduce an anti-burning campaign. Until then, the burden of reducing open burning of trash lies with local and state efforts to provide workable options to the backyard burn barrel. Additionally, efforts must be directed at changing citizen outlooks on longstanding disposal habits, presenting open burning as a fire hazard, health concern, and environmental pollutant. The most successful rural and community waste handling programs offer options to burning that are environmentally sound, convenient, and economically viable. When goals are achieved by motivation and commitment from all involved, a governing authority will experience victory in curtailing burning.

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