Green Our City

Takoma Park Proposed Ban on Gasoline-Powered Leaf Blowers

Takoma Park advocacy

On October 13, 2008, Takoma Park resident Steve Davies presented a letter to Mayor Bruce Williams asking that he "schedule a City Council worksession as soon as practicable as a first step in city action to phase out the use of gasoline-powered leaf blowers in Takoma Park." The letter explained, "These devices rely on remarkably inefficient, two-cycle gas-oil engines. Their loud whine can be heard for blocks. But as annoying as their noise is, it is the machines' contribution to air pollution that leads us to conclude the city should ban them."

The letter was signed by 31 Takoma Park environmental professionals and activists —

> *Wendy Bell, Margaret Bowman, Franca Brilliant, Paul Chrostowski, Steve Davies, Jim Epstein, Melanie Fosnaught, Phil Friend, Susan Harris, Ann Hoffnar, Pat Howell, Bill Hutchins, Sat Jiwan Ikle-Khalsa, Marty Ittner, Joseph Klockner, Peter Lane, Diane MacEachern, Peter Marra, Alden Meyer, Brenda Platt, Dick Rice, Scott Schang, Bruce Sidwell, Greg Smith, Eileen Sobeck, Mike Tabor, Betsy Taylor, Mike Tidwell, Dave Tilford, Monique Tilford, Chris Victoria*

— and by co-organizer Seth Grimes. The letter elicted the following local coverage:

- NBC4 piece by reporter Chris Gordon includes interviews with Steve Davies, Public Works Director Daryl Braithwaite, Mayor Bruce Williams and local gardening guru and Tree Commission member (and leaf blower letter signer) Pat Howell.

  Here's the mayor's sound bite:

  > *"A ban on one thing that's a legal thing to sell and to use in general is just the kind of thing that people would expect from Takoma Park -- and I don't want to feed into that expectation."*

- Diane MacEachern, Big Green Purse, As Communities Ban Leaf Blowers, Homeowners Save Money by Raking
- Granola Park in the Takoma Voice, Ban the Blower?
- Takoma Park Coalition Targets Leaf Blowers, Washington Post, October 16, 2008. Excerpt:

  > *Takoma Park's citizen activists have a new, noisy target: pollution-producing leaf blowers. A group of resident environmentalists this week called on city leaders to ban gas-powered blowers. The machines are not just a loud nuisance, according to the coalition of about 30 residents, but are a major source of air pollution. In a letter to Mayor Bruce Williams, the coalition said the "costs -- to public health, the environment, and our quality of life -- far exceed real or perceived benefits."*

Mayor Williams agreed to schedule a work session, which has now been set for Wednesday, January 21 at 7:50 in the council chambers in Takoma Park. Here's the agenda page and the packet for the work session put together by the city.

Context

The city of Takoma Park currently has a noise ordinance that specifically exempts leaf blowers from the 65-decibel daytime limit. Here is the relevant section:

14.12.080 Leafblowers and other power lawn tools.

A. Except as provided in this section, a person must not sell, buy, offer for sale, or use a leafblower at any time that has an average sound level exceeding 70 dBA at a distance of 50 [feet]. This requirement is in addition to any other noise level or noise disturbance standard that applies under this chapter.

B. The City may inspect, and upon request, a person must produce, any leafblower that is sold, offered for sale, or used in the City, in order to determine whether the leafblower complies with this section. A person who relies in good faith on a manufacturer's written representation of the sound level of a leafblower that has not been modified is not subject to a penalty for violating this section.

C. No person shall use a leafblower or other power lawn tool outdoors during the daytime for more than 2 hours of accumulated time during any 24-hour period on any individual lot or parcel of property and no leafblower or other power lawn tool shall be used outdoors during the nighttime. (Ord. 2002-35 § 1(8), 2002/Ord. 2000-22 § 1(8), 2000)

"Daytime" is defined as 7 a.m. - 8 p.m. on weekdays and 9 a.m. - 10 p.m. on weekends and holidays.

The city, sometimes known as the "Berkeley of the East," differs markedly from that California municipality when it comes to leaf blowers. Whereas Berkeley passed a law in 1999 that prohibits the use of gas-powered leaf blowers, Takoma Park has no such restrictions. In fact, in contrast to the industry's own guidelines, which direct lawn care firms not to use more than one leaf blower at a time in residential areas, Takoma Park merely requires that *individual* blowers not exceed 70 dBA at a distance of 50 feet (meaning they can be louder than 70 dBA anywhere within the 50-foot radius). So, under the city's ordinance, there is no limit on the number of blowers that can be used at one time, even though it would seem logical to assume that two blowers make more noise than one (and three make more noise than two, and so on).

The industry also says blower operators should be at least 50 feet away from all bystanders (including other operators--see below). In densely developed and populated Takoma Park, that is well-nigh impossible most of the time.

Many people see a ban as too draconian. But given the complete lack of restriction on leaf blowers now and the difficulty of enforcing noise limits, a ban seems to be the only practical solution. The current restriction (no more than 2 hours of use over a 24-hour period) is difficult, if not impossible, to enforce. And operators, more than 90 percent of whom are untrained (according to an industry expert who spoke to Steve Davies for an article in the Takoma Voice), do not avoid sidewalks when using the machines. Two and sometimes three machines are used at a time to clear parking lots and sidewalks, as well as lawns right next to sidewalks, whether pedestrians are present or not. (The source for this information is years of personal observation by GreenOurCity.org's Steve Davies).

Pedestrian health and safety, and the general health, safety and well-being of the community, would certainly benefit from a prohibition, which could be implemented as an important first step toward a more sustainable, livable community, as envisioned by the city's strategic plan. That plan notes that residents "desire more places that they can walk to or ride a bike to for shopping, recreation, and/or work."

It also says that the city should "promote sustainable environmental policies and practices to significantly reduce energy use and the environmental footprint of city services. This would include vehicle use, fuel use, facility efficiency, purchasing preference for recyclable and green products, use of alternative, less environmentally damaging products, etc., as well as a review of alternative work schedules for city employees."

Sounds like a ban on leaf blowers would fit the bill nicely.

Positive steps

There are a number of actions that the city could take (either by itself or with non-governmental partners) to ease the effects of a ban. A trade-in program that would accept gas-powered leaf blowers and lawn mowers in return for steep discounts on electric equipment is one possibility. Others include: Getting composting bins from Montgomery County and distributing them here;

offering chicken wire or other materials to residents so they can easily mulch their leaves in place; offering free or cheap rakes; encouraging neighborhood "rake brigades" (see example here) that would empower residents to care for the city parks themselves; and the broadcast of instructional shows on the city's cable TV channel that would show folks how to rake and mulch leaves without breaking their backs.

The city itself could begin using mulching mowers at the parks and reduce the frequency of mowing. The use of mulching mowers would eliminate the current need to move leaves and grass clippings with leaf blowers.

Currently, the city uses blowers to clear leaves and grass clippings at city parks. But city employees or contractors also use them to clear "dust, wood chips, leaves, and other debris from paved surfaces during specific construction projects or tree removal," according to a memo prepared by Public Works Director Daryl Braithwaite for the worksession.

City practices would appear to conflict with the industry's admonition (in the OPEI pamphlet) to never use blowers to clean up "large amounts of gravel or gravel dust; construction dirt; plaster dust; cement and concrete dust; and dry garden topsoil." Instead, OPEI advises, "Use a vacuum or power broom with water."

Curiously, however, the industry group pamphlet also touts blowers as "extremely efficient for cleaning leaves, grass clippings, and debris from driveways, sidewalks, parking lots, sports arenas, parks and *construction sites*."

Here's OPEI's list of blower no-no's:

- Children should not use a leaf blower.
- Pay attention when using a leaf blower. Don't point an operating blower in the direction of people or pets.
- Make sure bystanders, *including other operators*, are at least 50 feet away. Stop blowing if you are approached.
- Do not use a leaf blower if you are tired or sick, taking medication, or if you have used drugs or alcohol.
- Do not use a blower indoors or in poorly ventilated areas.
- Inspect the blower before and during use to make sure controls, parts and safety devices are not damaged and are working properly.
- Never modify a blower in a way not authorized by the manufacturer.
- Do not operate while standing on a ladder, rooftop, tree or other unstable surface. Use nozzle attachments to reach high places.
- Work carefully. You need to be safe, courteous and responsible.

The city is now looking at updating its Local Action Plan for Reducing Greenhouse Gas Emissions, which has essentially been gathering dust since 2000. "Takoma Park not following the carbon diet set in 2000," a headline in The Takoma Voice said in December 2007, noting the city had not lived up to the plan's 10-year goal to cut emissions in the city to 80 percent of 1990 levels.

How bad a problem are leaf blowers? It's difficult to say precisely, but the Metropolitan Washington Council of Governments (of which Takoma Park is a member) reported that in 2002, gas-powered lawn and garden equipment emitted 81.6 tons per day of volatile organic compounds and 12.6 tons daily of nitrogen oxides.

Those numbers put the lawn care industry in second place in the region for VOCs and fourth for NOx. VOCs and NOx react with sunlight to produce ozone.

Here are the tables with that data, taken from COG's 2007 State Implementation Plan.

Newly issued federal regulations on non-road engines (see below) do not improve upon earlier regs when it comes to handheld blowers, so it's not clear how much those numbers will change, despite COG's predicted reductions (see the tables, which have estimates for 2009).

Links:

- Noise Free America
- Noise Pollution Clearinghouse
- Zero Air Pollution Los Angeles

    -
    - About the leaf blower ban and other laws
    - Leaf blower sites
    - 1998 Article on leaf blower controversy in California (1998)
- Cambridge, Mass., OKs partial blower ban (not much of one, it seems)
- Clean Houston page
- Ojai (Calif.) city code
- Citizens for a Clean, Better Lincoln (Mass.)
- Westchester County, New York, phasing out highest-emitting leaf blowers (April 2007)

Metropolitan Washington Council of Governments (MWCOG), EPA

- Air quality documents from MWCOG
- Metropolitan Washington Air Quality Committee - Archived Documents
- EPA's final ozone rule (March 27, 2008) and the proposed rule (May 18, 2007)
- EPA page on lawn and garden (small gasoline) equipment
- EPA regulations (from same page, lower), including its final rule (PDF) on small engines (Oct. 8, 2008)
- Lawsuit filed by NRDC, others over new EPA ozone standards (NRDC press release, May 27, 2008; Maryland has joined the suit)

Montgomery County

- May 15 news release, in which County Executive Ike Leggett says that "Maryland's suburban Washington region suffers from some of the worst air pollution in the nation -- and the failure to address this situation is impacting public health and our economy." He recommends that on air quality action days, homeowners and lawn care crews not use gasoline-powered equipment. In addition, the release notes that "[u]nder the new [ozone] standards, Air Quality Index (AQI) levels for Code Orange and Code Red days will now be reached at lower ozone concentrations.... Code Orange days will be determined when ozone levels reach the lower standard of 75 parts per billion (ppb) as opposed to 84 ppb under the previous standard, and Code Red days will now occur when the ozone level reaches 96 ppb instead of the previous level of 105 ppb.
- GreenOurCity has spoken with officials at the county's Dept. of Environmental Protection, who said the number of Code Orange and Code Red days in 2008 nearly doubled from 2007
- Mont. County announces that July 3 will be Code Orange Day (meaning "unhealthy air quality for sensitive groups")

More links

- Article on leaf blower use in Takoma Park by Steve Davies (prepublication version of piece that was published in the Takoma Voice in November 2007)
- Leaf blower reviews (from Consumer Search)
- Web page of Larry Will, former v.p., engineering, at leaf blower manufacturer Echo Inc.
- Outdoor Power Equipment pamphlet ("Leafblowers: A Guide To Safe & Courteous Use")

Sample language (seasonal ban)

Scarsdale, N.Y., city code (example of action taken)

§ 205-2. Outdoor power tools.

[Amended 1-8-1985 by L.L. No. 1-1985; 6-26-1990 by L.L. No. 3-1990; 6-14-1994 by L.L. No. 4-1994; 1-14-2003 by L.L. No. 3-2003]

A. It shall be unlawful for any person, firm, corporation or other entity to operate any engine-driven power tool or motorized equipment after the hour of 9:00 p.m. and before the hour of 8:00 a.m. on any weekday and before 10:00 a.m. and after 5:00 p.m. on Saturdays, Sundays and legal holidays.

B. No person, firm, corporation or other entity shall use a gasoline-powered blower in the Village during the period from June 1 through September 30 of each year.

C. Promulgation of additional rules and regulations. The Village Manager is authorized to promulgate rules, regulations and standards applicable to the operation of the above power tools and equipment in an effort to control such noise and lessen the effect of that noise on the quality of life in the Village. Such rules shall not become effective until approved by the Village Board of Trustees.

D. This section shall not apply to golf course operations or utility companies performing emergency repairs, and Subsection A shall not apply to municipal or school operations. The Village Manager may waive enforcement of Subsection B in the wake of a storm or other emergency situation.

The Honorable Bruce R. Williams
Mayor, City of Takoma Park
7500 Maple Avenue
Takoma Park, MD 20912

October 13, 2008

Dear Mayor Williams:

We write to request that you schedule a City Council worksession as soon as practicable as a first step in city action to phase out the use of gasoline-powered leaf blowers in Takoma Park. These devices rely on remarkably inefficient, two-cycle gas-oil engines. Their loud whine can be heard for blocks. But as annoying as their noise is, it is the machines' contribution to air pollution that leads us to conclude the city should ban them.

Montgomery County Executive Ike Leggett has recommended that residents stop using gasoline-powered lawn care equipment, one of the top contributors of ozone-causing pollutants. The county has described the harmful effects. Here is an excerpt from one county pamphlet:

> *"Emissions from lawn and garden equipment like lawnmowers, chain saws, leaf blowers, string trimmers and other gasoline-powered outdoor equipment are a significant source of pollution. The small engines that power today's lawn and garden equipment are not controlled or maintained in the same way that engines on cars are, so they emit high levels of carbon monoxide (CO), volatile organic compounds (VOCs) as well as nitrogen oxides (NOx) and particulate matter (PM). These pollutants have negative health effects, and VOCs and NOx are the primary contributors to the formation of ground-level ozone, a key component of smog. Ground-level ozone is a particular problem in this region."*

Numerous studies have documented the negative impact of the emissions on all types of vegetation, including trees, and on the wildlife that use the plants for food, shelter and breeding. Conversely, no studies or data demonstrate that leaf blowers are more efficient than rakes or brooms in gathering leaves.

We cannot delay addressing the problem of airborne emissions. Two recently promulgated federal regulations will require 1) that the D.C. metropolitan area significantly reduce harmful ozone levels, and 2) that manufacturers reduce emissions from small engines such as leaf blowers.

The first rule -- certainly the most nettlesome -- will force regional jurisdictions to search high and low for ways to cut VOC and nitrogen oxide emissions. The second offers a perfect opportunity to get people to switch to alternative methods of lawn care.

Takoma Park must ban gasoline-powered leaf blowers, whose costs -- to public health, the environment, and our quality of life -- far exceed real or perceived benefits. It is up to you and the City Council to act, hence our request that you schedule a worksession that will be a next step in formulating the right, environmentally friendly stance. We are at the Council's disposal to assist in that effort.

Sincerely,

Steve Davies, 6717 Poplar Avenue Seth Grimes, 7300 Willow Avenue

Takoma Park environmental professionals/activists: Margaret Bowman, Franca Brilliant, Paul Chrostowski, Jim Epstein, Melanie Fosnaught, Phil Friend, Susan Harris, Ann Hoffnar, Pat Howell, Bill Hutchins, Sat Jiwan Ikle-Khalsa, Marty Ittner, Joseph Klockner, Peter Lane, Diane MacEachern, Peter Marra, Alden Meyer, Brenda Platt, Dick Rice, Scott Schang, Bruce Sidwell, Greg Smith, Eileen Sobeck, Mike Tabor, Betsy Taylor, Mike Tidwell, Dave Tilford, Monique Tilford, Chris Victoria

Response to the letter from residents last week requesting that I schedule a worksession discussion to consider banning gas powered leaf blowers.

The short answer to the question is "Yes", I will schedule a discussion in January. There is no space on the agendas in the next few weeks before we break for the holidays.

I'd like it to be a broader discussion and to encompass at least the following points (this is by no means a comprehensive list) :

1. We haven't "banned" things–is that an effective course of action? Remember that our Nuclear Free Zone and our water bottle resolution, and past efforts regarding Burma and others, are really purchasing restrictions for the City government, and recent efforts on foie gras and cage-free chickens are advisory, and envisioned as educational.

2. We would need to explore the legal issues surrounding the authority for any action, and the enforcement of any potential ordinance.

3. We might need to consider the flexibility to address a number of issues including the ability of seniors and disabled residents to get work done on their properties, the impact on landscaping businesses and their customers, and the needs of large institutions–for example the hospital, private and public colleges and schools, and City and County parks and facilities.

4. Our draft Strategic Plan, which the Council discussed at length last week, and which will soon be out for comment, has a prominent goal of "making environmental improvements focused on reducing climate change and improving stormwater management". It includes a priority project to create, and *enact* a 5 year environmental plan with a budget that incorporates a greenhouse gas emission reduction plan for the entire City, and it also calls for expanding sustainable practices in coordination with the new regional Council of Governments' Plan, and with the Montgomery County plan.

5. This may be the opportunity to focus on the need for expanding the membership of the Committee on the Environment, and/or expanding the mission of the Committee, or replacing the Committee with a group with an expanded focus, or adding a new Committee. This will be an opportunity for the signers of the letter, and others, to step up to the task of helping to design and implement an action plan to address this and other concerns about the sustainability and livability of our City, and our environment.

14.12.080 Leafblowers and other power lawn tools.

A. Except as provided in this section, a person must not sell, buy, offer for sale, or use a leafblower at any time that has an average sound level exceeding 70 dBA at a distance of 50’. This requirement is in addition to any other noise level or noise disturbance standard that applies under this chapter.

B. The City may inspect, and upon request, a person must produce, any leafblower that is sold, offered for sale, or used in the City, in order to determine whether the leafblower complies with this section. A person who relies in good faith on a manufacturer’s written representation of the sound level of a leafblower that has not been modified is not subject to a penalty for violating this section.

C. No person shall use a leafblower or other power lawn tool outdoors during the daytime for more than 2 hours of accumulated time during any 24-hour period on any individual lot or parcel of property and no leafblower or other power lawn tool shall be used outdoors during the nighttime. (Ord. 2002-35 § 1(8), 2002/Ord. 2000-22 § 1(8), 2000)

Worksession

Agenda Item #	1
Meeting Date	January 21, 2009
Prepared By	Jessie Carpenter City Clerk
Approved By	Barbara B. Matthews City Manager

Discussion Item	Discussion of Residents' Request to Ban Leaf Blowers
Background	On October 13, 2008, a number of Takoma Park residents presented a letter to Mayor Williams requesting that a worksession be scheduled "as a first step in city action to phase out the use of gasoline-powered leaf blowers in Takoma Park." The letter states that harmful emissions, energy inefficiency, and noise results from the use of the leaf blowers. A copy of the residents' letter is attached. **Takoma Park Law** Chapter 14.12 of the *Takoma Park Code*, Chapter 14.12, Noise Control, addresses leaf blowers. ***14.12.080 Leafblowers and other power lawn tools.*** *A. Except as provided in this section, a person must not sell, buy, offer for sale, or use a leafblower at any time that has an average sound level exceeding 70 dBA at a distance of 50'. This requirement is in addition to any other noise level or noise disturbance standard that applies under this chapter.* *B. The City may inspect, and upon request, a person must produce, any leafblower that is sold, offered for sale, or used in the City, in order to determine whether the leafblower complies with this section. A person who relies in good faith on a manufacturer's written representation of the sound level of a leafblower that has not been modified is not subject to a penalty for violating this section.* *C. No person shall use a leafblower or other power lawn tool outdoors during the daytime for more than 2 hours of accumulated time during any 24-hour period on any individual lot or parcel of property and no leafblower or other power lawn tool shall be used outdoors during the nighttime. (Ord. 2002-35 § 1(8), 2002/Ord. 2000-22 § 1(8), 2000)* The Police Department is responsible for enforcement of the Noise Control Ordinance. **Communities With Leaf Blower Bans or Limitations** A number of communities have enacted bans or limitations on the use of leaf blowers. Many of these are in California. To illustrate the diversity of approaches that have been enacted, staff selected four communities to profile: Berkeley and Palo Alto in California; Township of Montclair, New Jersey; and Cambridge, Massachusetts. **City of Berkeley, California** Berkeley has a ban on use of gasoline powered machines to blow leaves, dirt, and

	other debris off sidewalks, driveways, lawns, or other surfaces within the City limits. **City of Palo Alto, California** In 2005, the City of Palo Alto banned the use of gas powered leaf blowers in residential zones and placed limits on their use in non-residential zones. Use is permitted in non-residential zones Monday - Friday, 8 a.m. to 6 p.m.; Saturday, 10 a.m. to 4 p.m., but is prohibited on Sundays and holidays. The City does not use leaf blowers. Electric leaf blowers may be used in residential zones, subject to noise and hour restrictions. **City of Cambridge, Massachusetts** As of March 1, 2008, the City of Cambridge restricts the dates and hours when electric and gas powered leaf blowers may be used. Leaf blowers must meet EPA emissions standards and cannot emit sound over 65 decibels. Commercial operators must submit an operations plan for approval by the City Manager if they wish to use leaf blowers of any kind. Limitations are placed on the number of leaf blowers that can be used at one time, depending on the size of the property. **Township of Montclair, New Jersey** In 2008, Montclair Township placed restrictions on leaf blower use by residents and landscapers. Operation is limited to use between March 1 and June 30 and between October 1 and December 15. The Township is phasing in decibel limitations as well as emissions regulations which comply with the EPA latest regulations "Standards for Small Spark Ignition Handheld Engines."
Policy	The City Council is the policymaking body for the City of Takoma Park.
Fiscal Impact	None–For Discussion Only
Attachments	• Letter from residents proposing leaf blower ban • Memo dated January 15, 2009 from Public Works Director Daryl Braithwaite regarding operational impact of proposed ban • Information on leaf blower regulations in other communities: City of Berkeley, City of Palo Alto, City of Cambridge, Township of Montclair
Recommendation	Discuss the proposed ban on leaf blowers and provide direction to staff.
Special Consideration	

MEMORANDUM

TO: Barbara Matthews, City Manager
FROM: Daryl Braithwaite, Public Works Director
SUBJECT: Impact of a Leaf Blower Ban on Public Works Operations
DATE: January 15, 2009

On October 13, 2008, Mayor Williams received a request that a worksession be scheduled "as a first step in city action to phase out the use of gasoline-powered leaf blowers in Takoma Park." This memo is in response to your request that I address the impact of the proposed ban on the operations of the Public Works Department.

The Public Works Department has five leaf blowers. Their primary uses are as follows:

- Clearing leaf debris from City gardens in the fall and spring.
- Clearing grass clippings from the street and sidewalk by the mowing crew in the spring and summer.
- Clearing dust, wood chips, leaves, or other debris from paved surfaces during specific construction projects or tree removal. This work is often performed by a contractor.

The vacuum leaf collection operation does not use leaf blowers for the curbside collection around the City. The number of staff hours engaged in the use of leaf blowers over the course of a year is estimated to be 500 to 750.

If the Public Works Department were not able to use leaf blowers for the aforementioned tasks, it would use rakes and tarps for garden leaf debris removal, brooms and grass catchers on the mowers for grass clipping collection, and brooms and street sweepers for surface clearing after construction projects. Use of these alternative means would likely require additional staffing hours to complete the tasks, which are performed by either City staff or temporary laborers.

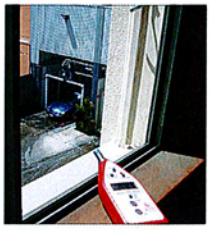
The increase in time required by City staff to complete a task would be absorbed in the work week and would result in a decrease in productivity. The largest impact of a blower ban would occur in garden leaf removal. The use of rakes and tarps would likely double the temporary laborer hours required for this task, resulted in an additional cost of $3,000 to $4,000. The extra time required to clean up a street or sidewalk after construction would extend the hours of the work crew or contractor. For those projects that are performed by a contractor, the change would likely to increase the cost of each project by a modest amount.

ENVIRONMENTAL HEALTH

Environmental Health Division

Community Noise Program

This program is mandated by the Berkeley Municipal Code (BMC) and sets forth standards by which noise is measured. The program is driven by requests for service from the public. Inspectors respond to complaints and enforce, interpret, and educate citizens about the noise ordinance. After-hours complaints are handled by the Berkeley Police Department on a priority basis.



Construction Noise Standards
Construction Noise (PDF Version)

Gasoline Powered Leaf Blowers

(Ordinance No. 5500-N.S.,Section 13.40.070)

"... it shall be unlawful for any person, including any city employee, to operate any portable machine powered with a gasoline engine used to blow leaves, dirt, and other debris off sidewalks, driveways, lawns, or other surfaces within the City limits."

Amplified Sound Permits

Fees partially support this BMC mandated program that requires generators of amplified sound to pay and apply for a permit prior to an event. Standards and procedures are used to determine if the permit can be issued to an applicant. Coordination with the Berkeley Police Department (BPD) and Recreation Division ensures that these events do not become a nuisance.

The Sound Permit Application Form (PDF Version) is available from this page but only as a PDF document. Print and complete the PDF version of the application form or obtain a form from Environmental Health at (510) 981-5310 and TDD (510) 981-6903. You can also request the form by sending an email to envhealth@ci.Berkeley.ca.us.

Submit the Sound Permit Application with your payment to the Environmental Health Division at 1947 Center Street, 3rd Floor, Berkeley, CA 94704. Use this link, Fees by Service Category, to navigate to information about current Environmental Health Division services and fee amounts.

Items that are followed by the phrase "PDF Version" will require the Adobe Acrobat Reader for viewing. To read PDF files, you can use this link to download Adobe Acrobat Reader for free.

Do you need assistance or wish to report a complaint?

Complete an on-line Request for Service form, or phone Environmental Health at (510) 981-5310 and TDD (510) 981-6903, or send an email to envhealth@ci.berkeley.ca.us.

The City of Palo Alto

Leaf Blower Ordinance - Frequently Asked Questions

On June 13, 2005, the Palo Alto City Council passed an ordinance prohibiting the use of a particular type of leaf blower in residential zones of the city. Following are some frequently asked questions regarding the ordinance:

Q. What exactly is banned?
A. Gas-powered leaf blowers may not be used in any residential zones by anyone including residents.

Q. How is "residential area" defined?
A. Residential zones are determined and defined in the Municipal Code.

Click on this link to see the map (use the back button on your browser to return to this page).
http://www.cityofpaloalto.org/civica/filebank/blobdload.asp?BlobID=8188

Q. What kind of leaf blowers may be used and when?
A.

- Residential zones
- Electric leaf blowers (no internal combustion engines) may be used only during the following hours:
  Monday – Friday 9 am – 5 pm
  Saturday 10 am – 4 pm
  Sundays and Holidays not allowed* (see * below for list of holidays)
- Non – residential zones
- Electric and gas-powered blowers may be used only during the following hours:
  Monday – Friday 8 am – 6 pm
  Saturday 10 am – 4 pm
  Sundays and Holidays not allowed*

*"Holiday" means and includes New Year's Day (January 1), Martin Luther King Day (the third Monday in January), Washington's Birthday (the third Monday in February), Memorial Day (the last Monday in May), Independence Day (July 4), Labor Day (the first Monday in September), Columbus Day (the second Monday in October), Veteran's Day (November 11), Thanksgiving Day (the fourth Thursday in November), and Christmas Day (December 25).

Q. What about City maintenance of parks?
A. City staff will not be using leaf blowers. This will result in less frequent maintenance to the parks and a diminished level of cleanliness since work will be done using rakes/brooms.

Q. When does the ban become effective?
A. July 1, 2005

Q. How will the leaf blower ban be enforced?
A. Citizens who believe they observe a violation will be asked to call in to the Police Department on the non-emergency number or via the Police Department's web page. Citizens will be required to identify themselves, provide contact information, and answer a few questions about their observations. Anonymous complaints will not be investigated. Police officers will not normally respond to complaints in person, but information received from citizens will be directed to our Community Service Officer who will follow up with appropriate enforcement efforts.

Q. Besides their name and contact information, what other specific information does someone making a complaint need to provide?
A. Persons calling or reporting online should provide the location of the violation including the exact address whenever possible, as well as any vehicle license plate number or name of the gardening company on the truck (when applicable). All of this information will be very important if a citation is required.

Q. Will police officers be taking sound meter readings on suspected violations?
A. No, as officers usually will not be responding at the time of the violation.

Q. Is there a grace period?
A. Yes, there is a one-month grace period, the month of July 2005, before violators will be cited.

Q. How do I report a violation of the ban?
A. The best first step to take is to speak to the gardener or to the homeowner to see if they are aware of the ban. Reports of violations may be made by calling the Police Department at 329-2413 or violations can be reported on-line. Go to Police Online Reporting to report on-line.

Q. Where can I find the entire noise ordinance?
A. The entire ordinance is also made available online.

Q. Will there be any exemptions given to residents/homeowners?
A. No, all residents are also prohibited from using gas-powered leaf blowers.

Q. Are gas-powered generators permitted to provide current for electric blowers?
A. Yes, as long as they do not exceed the noise ordinance.

Q. Will gardeners still need to be certified to use electric blowers?
A. No.

Q. If the violator is not the resident (i.e., the gardener), who receive the citation, the violator or the resident?
A. If the violator is the resident/ homeowner they will receive the citation, but if the violator is the gardener then they will receive the citation.

Q. I have some concerns that are not covered in these FAQ's. To whom may I speak?
A. Call Community Service Officer Oscar Vilorio at 329-2210.

(leafblower complaint form)

Search:

Search

Choose search form

Links:

Go to ...

Document

Prev Chapter

Next Chapter

Contents

Sync TOC

Framed Version

Chapter 9.10
NOISE*

Sections:

* Editor's Note: Prior ordinance history: Ordinances 2664, 3609, 3640, 3751, 3763, 3790, 3881, 4453.

9.10.010 Declaration of policy.

It is hereby declared to be the policy of the city that the peace, health, safety and welfare of the citizens of Palo Alto require protection from excessive, unnecessary and unreasonable noises from any and all sources in the community. It is the intention of the city council to control the adverse effect of such noise sources on the citizen under any condition of use, especially those conditions of use which have the most severe impact upon any person.

(Ord. 4634 § 2 (part), 2000)

9.10.020 Definitions.

For the purposes of this chapter, certain terms are defined as follows:

(a) "Sound level," expressed in decibels (dB), means a

logarithmic indication of the ratio between the acoustic energy present at a given location and the lowest amount of acoustic energy audible to sensitive human ears and weighted by frequency to account for characteristics of human hearing, as given in the American National Standards Institute Standard S1.1, "Acoustic Terminology," paragraph 2.9, or successor reference. All references to dB in this chapter utilize the A-level weighting scale, abbreviated dBA, measured as set forth in this section.

(b) "Precision sound level meter" means a device for measuring sound level in decibel units within the performance specifications in the American National Standards Institute Standard S1.4, "Specification for Sound Level Meters."

(c) "Noise level" means the maximum continuous sound level or repetitive peak sound level, produced by a source or group of sources as measured with a precision sound level meter. In order to measure a noise level, the controls of the precision sound level meter should be arranged to the setting appropriate to the type of noise being measured.

(d) "Local ambient" means the lowest sound level repeating itself during a six-minute period as measured with a precision sound level meter, using slow response and "A" weighting. The minimum sound level shall be determined with the noise source at issue silent, and in the same location as the measurement of the noise level of the source or sources at issue. However, for purposes of this chapter, in no case shall the local ambient be considered or determined to be less than: (1) Thirty dBA for interior noise in Section 9.10.030(b); (2) Forty dBA in all other sections. If a significant portion of the local ambient is produced by one or more individual identifiable sources which would otherwise be operating continuously during the six-minute measurement period and contributing significantly to the ambient sound level, determination of the local ambient shall be accomplished with these separate identifiable noise sources silent.

(e) "Vehicle" means any device by which any person or property may be propelled, moved, or drawn upon a highway or street.

(f) "Property plane" means a vertical plane including the property line which determines the property boundaries in space.

(g) "Emergencies" mean essential activities necessary to restore, preserve, protect or save lives or property from imminent danger of loss or harm.

(h) "Leaf blower" means any portable machine used to blow leaves, dirt and other debris off sidewalks, driveways, lawns or other surfaces.

(i) "Residential power equipment" means any mechanically powered saw, sander, drill, grinder, generator, lawnmower, hedge trimmer, edger, or any other similar tool or device (other than leaf blowers).

(j) "Residential zone" means all lands located within the following zoning districts: RE, R1, R2, RMD, RM-15, RM-30, and RM-40; "residential zone" also means any lands located within Planned Community (PC) zoning districts actually used for authorized residential purposes. Any zoning district other than those defined as residential zones are classified as non-residential zones for purposes of this chapter.

(k) "Holiday" means and includes New Year's Day (January 1), Martin Luther King Day (the third Monday in January), Washington's Birthday (the third Monday in February), Memorial Day (the last Monday in May), Independence Day (July 4), Labor Day (the first Monday in September), Columbus Day (the second Monday in October), Veteran's Day (November 11), Thanksgiving Day (the fourth Thursday in November), and Christmas Day (December 25).

(Ord. 4634 § 2 (part), 2000)

9.10.030 Residential property noise limits.

(a) No person shall produce, suffer or allow to be produced by any machine, animal or device, or any combination of same, on residential property, a noise level more than six dB above the local ambient at any point outside of the property plane.

(b) No person shall produce, suffer or allow to be produced by any machine, animal, or device, or any combination of same, on multi-family residential property, a noise level more than six dB above the local ambient three feet from any wall, floor, or ceiling inside any dwelling unit on the same property, when the windows and doors of the dwelling unit are closed, except within the dwelling unit in which the noise source or sources may be located.

(Ord. 4634 § 2 (part), 2000)

9.10.040 Commercial and industrial property noise limits.

No person shall produce, suffer or allow to be produced by any machine or device, or any combination of same, on commercial or industrial property, a noise level more than eight dB above the local ambient at any point outside of the property plane.

(Ord. 4634 § 2 (part), 2000)

9.10.050 Public property noise limits.

(a) No person shall produce, suffer or allow to be produced by any machine or device, or any combination of same, on public property, a noise level more than fifteen dB above the local ambient at a distance of twenty-five feet or more, unless otherwise provided in this chapter.

(b) Sound performances and special events not exceeding eighty dBA measured at a distance of fifty feet are exempt from this chapter when approval therefor has been obtained from the appropriate governmental entity, except as provided in Section 22.04.180 of this code.

(c) Vehicle horns or other devices primarily intended to create a loud noise for warning purposes, shall not be used when the vehicle is at rest, or when a situation endangering life, health or property is not imminent.

(Ord. 4634 § 2 (part), 2000)

9.10.060 Special provisions.

The special exceptions listed in this section shall apply, notwithstanding the provisions of Sections 9.10.030 through 9.10.050.

Said exceptions shall apply only to the extent and during the hours specified in each of the following enumerated exceptions.

(a) General Daytime Exception. Any noise source which does not produce a noise level exceeding seventy dBA at a distance of twenty-five feet under its most noisy condition of use shall be exempt from the provisions of Sections 9.10.030(a), 9.10.040 and 9.10.050(a) between the hours of eight a.m. and eight p.m. Monday through Friday, nine a.m. and eight p.m. on Saturday, except Sundays and holidays, when the exemption herein shall apply between ten a.m. and six p.m.

(b) Construction. Except for construction on residential property as described in subsection (c) of this section, construction, alteration and repair activities which are authorized by valid city building permit shall be prohibited on Sundays and holidays and shall be prohibited except between the hours of eight a.m. and six p.m. Monday through Friday, nine a.m. and six p.m. on Saturday provided that the construction, demolition or repair activities during those hours meet the following standards:

(1) No individual piece of equipment shall produce a noise level exceeding one hundred ten dBA at a distance of twenty-five feet. If

the device is housed within a structure on the property, the measurement shall be made out-side the structure at a distance as close to twenty-five feet from the equipment as possible.

(2) The noise level at any point outside of the property plane of the project shall not exceed one hundred ten dBA.

(3) The holder of a valid construction permit for a construction project in a non-residential zone shall post a sign at all entrances to the construction site upon commencement of construction, for the purpose of informing all contractors and subcontractors, their employees, agents, materialmen and all other persons at the construction site, of the basic requirements of this chapter.

(A) Said sign(s) shall be posted at least five feet above ground level, and shall be of a white background, with black lettering, which lettering shall be a minimum of one and one-half inches in height.

(B) Said sign shall read as follows:

CONSTRUCTION HOURS
FOR NON-RESIDENTIAL PROPERTY

(Includes Any and All Deliveries)

MONDAY - FRIDAY.....8:00 a.m. to 6:00 p.m.

SATURDAY.....9:00 a.m. to 6:00 p.m.

SUNDAY/HOLIDAYS.....Construction prohibited.

Violation of this Ordinance is a misdemeanor punishable by a maximum of six months in jail, $1,000 fine, or both. Violators will be prosecuted. P.A.M.C. § 9.10.060(b).

(c) Construction on Residential Property. Construction, alteration, demolition or repair activities conducted in a residential zone, authorized by valid city building permit, shall be prohibited on Sundays and holidays and is prohibited on all other days except during the hours of eight a.m. and six p.m. Monday through Friday, nine a.m. and six p.m. on Saturday, provided that the construction, demolition or repair activities during those hours meet the following standards:

(1) No individual piece of equipment shall produce a noise level exceeding one hundred ten dBA at a distance of twenty-five feet. If the device is housed within a structure on the property, the measurement shall be made outside the structure at a distance as close to twenty-five feet from the equipment as possible.

(2) The noise level at any point outside of the property plane of the project shall not exceed one hundred ten dBA.

(3) The holder of a valid building permit for a construction project located within any residential zone shall post a sign at all entrances to the construction site upon commencement of construction, for the purpose of informing all contractors and subcontractors, their employees, agents, materialmen and all other persons at the construction site, of the basic requirements of this chapter.

(A) Said sign(s) shall be posted no less than three feet and no more than five feet above ground level, shall be visible from the adjacent street, and shall be of a white background, with black lettering, which lettering shall be a minimum of one and one-half inches in height.

(B) Said sign shall read as follows:

CONSTRUCTION HOURS

FOR RESIDENTIAL PROPERTIES

(includes any and all deliveries)

MONDAY-FRIDAY.....8:00 a.m. to 6:00 p.m.

SATURDAY.....9:00 a.m. to 6:00 p.m.

SUNDAY/HOLIDAYS.....Construction Prohibited.

Violation of this Ordinance is a misdemeanor punishable by a maximum of six months in jail, $1,000 fine, or both. Violators will be prosecuted. P.A.M.C. § 9.10.060(b).

(d) Other Equipment. Equipment used by city employees, city contractors, or public utility companies or their contractors, not covered by subsections (b) and (c) of this section, shall be allowed during the same hours as the exception set forth in subsection (b) of this section, providing no piece of equipment shall produce a noise level which exceeds one hundred ten dBA, measured at a distance of twenty-five feet from the equipment.

(e) Residential Power Equipment. Residential power equipment shall be allowed during the hours of eight a.m. and eight p.m. Monday through Friday, nine a.m. and six p.m. Saturday, and ten a.m. and six p.m. on Sundays and holidays, providing it does not produce a noise level that exceeds ninety-five dBA measured at twenty-five feet from the equipment and is not being operated for construction regulated in subsections (b) or (c) of this section.

(f) Leaf Blowers.

(1) No person shall operate any leaf blower which does not bear an affixed manufacturer's label indicating the model number of the leaf blower and designating a noise level not in excess of sixty-five dBA when measured from a distance of fifty feet utilizing American National Standard Institute methodology. Any leaf blower which bears such a manufacturer's label shall be presumed to comply with any noise level limit of this chapter provided that it is operated with all mufflers and full extension tubes supplied by the manufacturer for that leaf blower. No person shall operate any leaf blower without attachment of all mufflers and full extension tubes supplied by the manufacturer for that leaf blower.

(2) No person shall operate any leaf blowers within a residential zone except during the following hours: nine a.m. and five p.m. Monday through Friday and ten a.m. and four p.m. Saturday. No person shall operate any leaf blower within any non-residential zone except during the following hours: eight a.m. and six p.m. Monday through Friday, and ten a.m. to four p.m. Saturday. No person shall operate any leaf blowers on Sundays and holidays. No person shall operate any leaf blower powered by an internal combustion engine within any residential zone after July 1, 2005. Commercial operators of leaf blowers are prohibited from operating any leaf blower within the city if they do not prominently display a certificate approved by the Chief of Police verifying that the operator has been trained to operate leaf blowers according to standards adopted by the Chief of Police. In addition to all authorizations and restrictions otherwise provided in this chapter, public streets, sidewalks, and parking lots in business districts and at the Municipal Golf Course and all city parks may be cleaned between 4:00 a.m. and 8:00 a.m. using leaf blowers which bear an affixed manufacturer's label indicating the model number of the leaf blower and designating a noise level not in excess of sixty-five dBA when measured from a distance of fifty feet utilizing American National Standard Institute methodology.

(g) Street Sweeping. Street sweeping activities are allowed between the hours of ten p.m. and eight a.m. daily, provided they do not produce a noise level in excess of ninety dBA, when measured at a distance of twenty-five feet from the street sweeper.

(h) Refuse Collection. Refuse collection activities shall be permitted between the hours of four a.m. and nine p.m. daily, provided they do not produce a noise level in excess of ninety-five dBA measured at a distance of twenty-five feet from the activity.

(i) Safety Devices. Aural warning devices which are required by law to protect the health, safety and welfare of the community shall not produce a noise level more than three dBA above the standard or minimum level stipulated by law.

(j) Emergencies. Emergencies are exempt from this chapter.

(k) Public Parking Lot Cleaning. Cleaning equipment (other than leaf blowers), when used in public parking lots, shall be allowed during the hours of ten p.m. and eight a.m. daily, providing no such piece of equipment shall produce a noise level that exceeds ninety dBA measured at a distance of twenty-five feet.

(l) Business District Street Cleaning. Cleaning equipment (other than leaf blowers), when used in public streets and public sidewalks within the public right-of-way in business districts shall be allowed during the hours of ten p.m. and eight a.m. daily, providing no such piece of equipment shall produce a noise level that exceeds ninety dBA measured at a distance of twenty-five feet.

(Ord. 4778 §§ 2, 3, 2003: Ord. 4754 § 2, 2002: Ord. 4727 § 2, 2002: Ord. 4634 § 2 (part), 2000)

9.10.070 Exception permits.

If the applicant can show to the city manager or his designee that a diligent investigation of available noise abatement techniques indicates that immediate compliance with the requirements of this chapter would be impractical or unreasonable, a permit to allow exception from the provisions contained in all or a portion of this chapter may be issued, with appropriate conditions to minimize the public detriment caused by such exceptions. Any such permit shall be of as short duration as possible up to six months, but renewable upon a showing of good cause, and shall be conditioned by a schedule for compliance and details of methods therefor in appropriate cases. Any person aggrieved with the decision of the city manager or his designee may appeal to the city council pursuant to Section 16.40.080 of this code.

(Ord. 4634 § 2 (part), 2000)

9.10.080 Violations.

Any person who violates Section 9.10.060(e) or 9.10.060(f) shall be guilty of an infraction. Any person who violates any of the other provisions of this chapter shall be guilty of a misdemeanor.

(Ord. 4634 § 2 (part), 2000)

Leaf Blowers

Leaf Blowers: What Every Cambridge Property Owner and Contractor Needs to Know

In response to the community's desire to balance the benefits and drawbacks of leaf blowers, the Cambridge City Council enacted an ordinance (Cambridge Municipal Code Section 8.16.081, effective March 1, 2008) that governs the operation of this equipment.

Who does this ordinance apply to?

This Ordinance applies to all residents, businesses, and property owners in Cambridge. However, commercial operators and large property owners should be aware of particular sections that apply only to them.

Commercial operators (any entity or organization that employs 2 or more employees, excluding municipal operators and contractors) are prohibited from use of leaf blower equipment unless they submit an operations plan, which is approved by the City Manager.

Owners of large properties may be eligible for an exemption to operate leaf blowers during summer months and on Sundays and Holidays under certain circumstances.

What counts as a leaf blower?

Any portable, handheld or backpack-style power equipment, powered by fuel or electricity, and used in landscape or property maintenance for blowing, removing or redistributing leaves, dust, dirt, clippings, litter and any other debris.

What equipment is permissible?

The Ordinance seeks to address concerns about air quality and noise produced by leaf blowers. As such, leaf blowers must meet current EPA emissions standards and the sound they emit cannot exceed 65 decibels (per manufacturer's rating).

How many leaf blowers can operate on a property at a time?

Only one leaf blower may be used in parcels of 10,000 square feet or smaller. Larger parcels may only use one leaf blower within each 10,000 square foot area.

When can leaf blowers legally operate?

The following schedule has been developed in consideration of both landscaping needs and neighborhood quality of life.

Dates Permitted
March 15 – June 15;
September 15 – December 31

Dates Prohibited
January 1 – March 14;
June 16 – September 14;
all Sundays and Legal holidays, except for Columbus Day and Veterans Day

Hours of Use (during permitted dates)
Monday – Friday: 8:00 a.m. – 5:00 p.m.
Saturday: 9:00 a.m. – 5:00 p.m.
Columbus Day: 12 noon – 5:00 p.m.
Veteran's Day: 1:00 p.m. – 5:00 p.m.

Beyond this Ordinance, what are some recommended leaf blower best practices?

Please consider the following guidelines before operating a leaf blower

- Be safe
  - Always use ear, eye, and respiratory protection.

Contact Information

» Please contact the City Manager's Office
617-349-4300
leafblowers@cambridgema.gov

For Enforcement

» During City office hours:
License Commission
617-349-6140

» Outside of City office hours:
Police Department
617-349-3300

Brochures

Leaf Blower Regulations: A Guide for Property Owners, Residents, Businesses & Employees

Additional Information

» Leaf Blower Use Best Practices

» Operation Plan Application

» Approved Operation Plans

    - Avoid leaf blowing near others, particularly children. Remember: for many people, dust and debris can trigger allergies, asthma, or other respiratory illness.
- Be considerate
    - Talk to your neighbors about your maintenance plans, and try to balance those with their need for quiet time.
    - Do not blow toward open windows or doors. If possible, do not use within 10 feet of windows or doors.
    - Do not blow debris onto adjacent property, the street, catch basins, gutters, vehicles, people or pets.
- Use the right tools for the right job
    - Do not use blower to move large mounds of debris.
    - Do not use for construction dust, plaster dust, or dry soil. Spray dusty areas with water before using blower.
    - Use rakes or brooms for heavier debris and to loosen debris from corners and edges.
- Operate efficiently
    - Use the lowest possible speed/throttle to accomplish task.
    - Use the full nozzle extension so that the air stream can work close to the ground.

Click here to view a more extensive list of best practices.

What if I have a concern about an apparent violation?

Reports of violations should be directed to the License Commission (during City office hours) at 617-349-6140, or to the Police Department (after hours) at 617-349-3300.

For additional information or assistance

Please contact the City Manager's Office at 617-349-4300 leafblowers@cambridgema.gov.

City of Cambridge
License Commission
831 Massachusetts Avenue, Cambridge, MA 02139
617-349-6140(telephone); 617-349-6148(fax); 617-349-6112 (TTY)

Commercial Operator Application for
Leaf Blower Operations Plan *pursuant to*
Section 8.16.081 of the Cambridge Municipal Code

Instructions for Commercial Operators: Complete this application and return to above address for review and approval.

Company Name: _____

Owner's Name: _____

Address: _____

Contact Name: _____ Email : _____

Business Phone: _____ Fax: _____ Cell phone: _____

Number of Employees: _____

Section A

☐ I certify that I have reviewed and agree to comply with the provisions of 8.16.081 of the Cambridge Municipal Code regarding the use of leaf blowers and agree to its requirements.

☐ I certify that all Leaf blowers used by me/my company meet current EPA emissions standards and the sound emitted from any leaf blower shall be rated by the manufacturer to be no greater than 65 decibels.

☐ I certify that only one leaf blower will be used by me/my company in parcels of 10,000 square feet or smaller. Larger parcels may use only one leaf blower within each 10,000 square foot area.

☐ I certify that I/my company will use leaf blowers only within permitted dates:
March 15-June 15
September 15-December 31

☐ I certify that I/my company will use leaf blowers only in permitted times:

Monday-Friday:	8:00 a.m. -5:00 p.m.
Saturday:	9:00 a.m. – 5:00 p.m.
Columbus Day:	12 noon-5:00 p.m.
Veterans Day:	1:00 p.m. – 5:00 p.m.

Owner Signature: _____

Section B

Companies must agree to follow the best management practices below, and to train all employees who use leaf blowers on the following best management practices. If there are proposed revisions to the best management practices, please attach to plan.

General Courtesy

- Be aware of neighbors, pedestrians and others nearby. Some may have respiratory illness or allergies that could be triggered by flying dust and debris.
- Be aware of surroundings. Do not use in close proximity to children playing, people reading, school groups gathering, or others nearby.
- When using equipment do not point blower at people or pets.
- Do not blow toward open windows or doors, and if possible, do not use within 10 feet of windows or doors.
- Do not blow debris onto adjacent property, the street, catch basins, gutters, vehicles, people or pets.
- Abide by time-of-day, day-of-week and seasonal of use restrictions.
- Adjust hours/times of use to accommodate residents, institutions, abutters (within time restrictions).

Sound Reduction

- Use portable leaf blowers rated 65 decibels or lower, as specified by manufacturer.
- Use at lowest possible speed/throttle to accomplish task
- Use longest possible nozzle for equipment.
- Orient nozzle to reduce sound.
- Check equipment regularly for proper operation (i.e. muffler, filters, motor).

Reduction of Dust/Particulate Matter

- Spray dusty areas with water before using blower.
- Use the full nozzle extension so that the air stream can work close to the ground.
- Do not use for construction dust, plaster dust or dry garden topsoil.
- Do not use blower to move large mounds of debris from one location to another.
- Use rakes or brooms to loosen heavier debris.

Environmental Use

- Use equipment that meets current (2006) EPA emissions standards for leaf blowers.
- Leaf blowers should be run at half throttle most of the time. Low throttle speeds not only significantly reduce noise but also provide operator with maximum control.
- Use equipment at lowest power level to accomplish job.
- Learn to control air velocity to lift leaves without lifting dust.
- Use rakes or brooms to loosen heavier debris.

Worker Safety

- Leaf blower operators will be provided with ear protection and will be offered eye protection and face masks.

Operator Training

- Provide training in proper use to all employees.
- Observe time of use restrictions (months/days/hours).
- Limit use of leaf blowers to no more than one within a lot of 10,000 square feet or smaller.
- Use rakes and brooms to supplement cleanup and to loosen debris from corners and edges.
- Develop/provide brochure on proper use - post on website, provide in workplace, make print versions available to public (e.g. English, Spanish, Portuguese, Haitian Creole).

I certify that I have reviewed and hereby agree that I/my company will follow the best management practices above, and that I/my company will train all of my company's employees who use leaf blowers on the listed best management practices.

Owner Signature: _____

Please describe below or attach the following information:

Inventory of all leaf blowers used. Include manufacturer's name and model number:

_____
_____
_____
_____
_____

Training Plan:

_____
_____
_____
_____
_____
_____

List of properties maintained in Cambridge as of date of plan submission:

_____
_____
_____
_____
_____
_____

Attach additional information as may be necessary for unique circumstances.

FOR CITY OF CAMBRIDGE USE ONLY

☐ APPROVED ☐ APPROVED WITH CONDITIONS (SEE ATTACHED) ☐ DENIED

FEE:_____

SIGNED:_____DATE:_____

ORDINANCE NUMBER 1311

Final Publication Number 3152. First Publication in the Chronicle on August 2, 2007.

City of Cambridge

In the Year Two Thousand and Seven

AN ORDINANCE

In amendment to the Ordinance entitled "Municipal Code of the City of Cambridge"

Be it ordained that Cambridge Municipal Code Chapter 8.16 entitled "Noise control" is hereby amended by adding a new section 8.16.081 entitled "Leaf Blowers" as follows:

A new Section 8.16.081 entitled Leaf Blowers shall be added to Chapter 8.16:

8.16.081 Leaf Blowers ("Leaf Blower Ordinance")

8.16.081.1 Statement of purpose. The City Council hereby finds that the reduction of noise and emissions of particulate matter resulting from the use of leaf blowers is a public purpose that protects the public health, welfare and environment of the City of Cambridge and its citizens. The City Council recognizes that a total ban on the use of such equipment would have a severe adverse impact on the ability of the City to effectively remove leaves, dust, dirt, grass clippings, cuttings and trimmings from trees, shrubs and other types of litter and debris from streets, sidewalks, cemeteries and large recreational facilities and other open spaces and to clean and maintain such facilities without relaxing restrictions on the use of such equipment for maintenance operations of such facilities.

8.16.081.2 Use Regulations. The use of leaf blowers shall be regulated as follows:

1. *Definitions.*

   a. *Definition of leaf blower.* Leaf blowers are defined as portable, handheld or back pack style power equipment that is powered by fuel or electricity and used in any landscape maintenance, construction, property repair, or property maintenance for the purpose of blowing, moving, removing, dispersing or redistributing leaves, dust, dirt, grass clippings, cuttings and trimmings from trees and shrubs or any other type of litter or debris.

   b. *Definition of commercial leaf blower operator.* Any entity or organization that employs two (2) or more employees that receives income, remuneration or compensation of any kind, whether as a fee, a charge, a salary, wages or otherwise, for operating a leaf blower, except that municipal operators and municipal contractors are excluded from this definition.

2. *Limitations on use.*

   a. The use of leaf blowers is prohibited except between March 15 and June 15 and between September 15 and December 31 in any year. The provisions of this subsection 8.16.081.2.2(a) do not apply to the use of leaf blowers in accordance with the provisions

of this Leaf Blower Ordinance and regulations promulgated hereunder by municipal operators and municipal contractors performing leaf blower operations in Mayor Thomas W. Danehy Park, Fresh Pond Reservation, Thomas P. O'Neil, Jr. Municipal Golf Course at Fresh Pond, Cambridge Municipal Cemetery, Old Burial Ground or performing emergency operations and clean-up associated with storms, hurricanes and the like or by operators performing leaf blower operations on one or more adjoining parcels of land in common ownership that together comprise a total of two (2) acres or more, so long as the owners of such land comply with the provisions of subsection 8.16.081.2.2(c).

b. The use of leaf blowers is further prohibited on Sundays and legal holidays except Columbus Day and Veterans' Day and prohibited on other days except between the hours of 8:00 a.m. and 5:00 p.m. Mondays through Fridays and 9:00 a.m. and 5:00 p.m. Saturdays, Columbus Day and Veterans' Day. Commercial leaf blower operators may operate leaf blowers between the hours of 12:00 noon and 5:00 p.m. only on Columbus Day and between the hours of 1:00 p.m. and 5:00 p.m. only on Veterans' Day, consistent with the provisions of G.L. c. 136, §13 as it may be amended. The provisions of this subsection 8.16.081.2.2(b) do not apply to the use of leaf blowers in accordance with the provisions of this Leaf Blower Ordinance and regulations promulgated hereunder by municipal operators and municipal contractors performing leaf blower operations in Mayor Thomas W. Danehy Park, Fresh Pond Reservation, Thomas P. O'Neil, Jr. Municipal Golf Course at Fresh Pond, Cambridge Municipal Cemetery, Old Burial Ground or performing emergency operations and clean-up associated with storms, hurricanes and the like or by operators performing leaf blower operations on one or more adjoining parcels of land in common ownership that together comprise a total of two (2) acres or more, so long as the owners of such land comply with the provisions of subsection 8.16.081.2.2(c).

c. Commercial leaf blower operators and owners of one or more adjoining parcels of land in common ownership that together comprise a total of two (2) acres or more seeking to operate leaf blowers on such land shall not be permitted to operate leaf blowers, but may be exempted from the prohibition of this subsection 8.16.081.2.2(c) if they submit an operations plan to the City Manager or his or her designee for review and approval. At a minimum, the operations plan shall: address the owner's or operator's efforts to mitigate the impacts of noise and emissions upon citizens and the occupants and owners of nearby property, include an inventory of all leaf blowing equipment owned and to be used by the owner or operator in its operations program, which shall comply with the noise and emission restrictions set forth in this Leaf Blower Ordinance and regulations promulgated hereunder, and include the owner's or operator's plan for educating users of its equipment on the proper use of equipment as well as the need to mitigate impacts upon others. The operations plan shall be reviewed by the City Manager or his or her designee, who shall ensure that it complies with the applicable provisions of this Leaf Blower Ordinance and regulations promulgated hereunder, and shall impose any conditions that may be required in order for the owner or operator to comply with the provisions of this Leaf Blower Ordinance and regulations promulgated hereunder. . No operations plan submitted by owners of one or more adjoining parcels of land in common ownership that together comprise a total of two (2) acres or more seeking to operate leaf blowers on such land shall be approved by the City Manager unless there has been a showing of significant hardship.

d. Leaf blower operations shall not cause leaves, dirt, dust, debris, grass clippings, cuttings or trimmings from trees or shrubs or any other type of litter or debris to be blown or deposited on any adjacent or other parcel of land, lot, or public right-of-way/property other than the parcel, land, or lot upon which the leaf blower is being operated. Leaves, dirt, dust, debris, grass clippings, cuttings or trimmings from trees or shrubs or any other type of litter or debris shall not be blown, swept or raked onto or into an adjacent street or gutter, except by municipal employees or municipal contractors or leaf blower operators placing leaves, dust, dirt, grass clippings, cuttings and trimmings from trees and shrubs on a municipal street or sidewalk for collection and pick-up, during municipal street and sidewalk sweeping and cleaning operations. In no event shall leaves, dirt, dust, debris, grass clippings, cuttings or trimmings from trees or shrubs or any other type of litter or debris be blown, swept or raked onto or into catch basins or onto vehicles, persons or pets. Deposits of leaves, dirt, dust, debris, grass clippings, cuttings or trimmings from trees or shrubs or any other type of litter or debris shall be removed and disposed of in a sanitary manner which will prevent dispersement by wind, vandalism or similar means.

e. All leaf blowers shall satisfy the emissions standards of the United States Environmental Protection Agency and noise level standards as follows: the sound emitted from any leaf blower shall be rated by the manufacturer to be no greater than 65 decibels.

f. On parcels of 10,000 square feet or less, only one leaf blower at a time may be used, and on parcels larger than 10,000 square feet, only one leaf blower may be used within each 10,000 square foot area.

3. *Fees.* A fee for the City to recover all costs connected with emission or sound testing and enforcement may be charged in an amount set by the License Commission and approved by the City Manager.

4. *Regulations.* The License Commission and the Commissioner of Public Works shall have the authority to promulgate regulations to implement the provisions of this Leaf Blower Ordinance.

5. *Enforcement Officials.* In addition to the Police Commissioner, the Commissioner of Inspectional Services Department and the Chairperson of the License Commission as provided in section 8.16.040 of this Chapter, the Commissioner of Public Works and his or her designee shall be authorized enforcement personnel charged with the enforcement of this section pursuant to the provisions of section 8.16.040 of this Chapter.

6. *Severability.* The provisions of this Chapter are severable. If any section, provision or portion of this Chapter is determined to be invalid by a court of competent jurisdiction, the remaining provisions of this Chapter shall continue to be valid.

7. *Effective Date.* The provisions of this Leaf Blower Ordinance shall be effective commencing on March 1, 2008 except as to City of Cambridge contracts now in effect, as to which the provisions of this Leaf Blower Ordinance shall be effective commencing on September 15, 2008.

In City Council December 10, 2007.
Passed to be ordained as amended by a yea and nay vote:-
Yeas 7; Nays 0; Absent 2.
Attest:- D. Margaret Drury, City Clerk.

Leaf Blower Use – Best Practices

The City's leaf blowing ordinance outlines the minimum requirements for leaf blower use. Why not take the extra step to be considerate of your neighbor and ensure the safest possible use of your equipment? The best practices outlined below will get you started. ***Thanks for being a good neighbor!***

Courtesy

- Speak with your neighbors regarding the use of leaf blower equipment, within permissible dates and hours, so that needs for quiet time can be balanced with needs for accomplishing maintenance work.
- Be considerate of neighbors, pedestrians and others nearby. Some may have respiratory illness or allergies that could be triggered by flying dust and debris.
- Be aware of surroundings. Do not use in close proximity to children playing, people reading, school groups gathering, or others nearby.
- Do not blow toward open windows or doors. If possible, do not use within 10 feet of windows or doors.

Use

- Check equipment regularly for proper operation.
- Use leaf blowing equipment at the lowest possible speed/throttle to accomplish task.
- Use the full nozzle extension so that the air stream can work close to the ground.
- Do not use for construction dust, plaster dust or dry soil. Spray dusty areas with water before using blower.
- Do not use blower to move large mounds of debris from one location to another.
- Use rakes or brooms for heavier debris and to loosen debris from corners and edges.
- You may not blow debris onto adjacent property, the street, catch basins, gutters, vehicles, people or pets.

Safety

- Use ear and eye protection as well as face masks.

Visit **www.cambridgema.gov/leafblowers** for more information.

Printed on recycled paper.

This brochure is available en Español and Português.

795 Massachusetts Avenue
Cambridge, MA 02139
617.349.4300 / TTY 617.349.4242
www.cambridgema.gov/leafblowers

www.cambridgema.gov/leafblowers

Leaf Blower Regulations

A Guide for Property Owners, Residents, Businesses and Employees

Convenience and Responsibility

Leaf blowing is a convenience that brings with it certain responsibilities. A combination of regulation, courtesy and planning will help Cambridge residents, property-owners, businesses and employees peacefully coexist.

A new leaf blower ordinance was recently passed by the Cambridge City Council. If you wish to use a leaf blower within the City of Cambridge, it is essential that you familiarize yourself with the ordinance in effect.

Ordinance Requirements

Effective Date

The ordinance takes effect on March 1, 2008

Equipment Affected

Portable, handheld or backpack-style power equipment, powered by fuel or electricity, and used in landscape or property maintenance for blowing, removing or redistributing leaves, dust, dirt, clippings, litter and any other debris.

Equipment Standards

Leaf blowers must meet current EPA emissions standards and the sound emitted from any leaf blower shall be rated by the manufacturer to be no greater than 65 decibels.

Number of Leaf Blowers Permitted

Only one leaf blower may be used in parcels of 10,000 square feet or smaller. Larger parcels may only use one leaf blower within each 10,000 square foot area.

Commercial Operators

Commercial Leaf Blower Operators are prohibited from use of leaf blower equipment unless they have sought and obtained an exemption from the City Manager. This category includes any entity or organization that employs two (2) or more employees to operate leaf blowers. Municipal operators and municipal contractors are excluded from this definition.

Large Property Owner Exemptions

Owners of large properties may be eligible to operate leaf blowers during summer months and on Sundays and Holidays under certain circumstances.

Dates and Times

Dates Permitted

March 15 – June 15;
September 15 – December 31

Dates Prohibited

January 1 – March 14;
June 16 – September 14;
all Sundays and Legal holidays,
except for Columbus Day and Veterans Day

Hours of Use (during permitted dates)

Monday – Friday:	8:00 a.m. – 5:00 p.m.
Saturday:	9:00 a.m. – 5:00 p.m.
Columbus Day:	12 noon – 5:00 p.m.
Veteran's Day:	1:00 p.m. – 5:00 p.m.

For further details about ordinance requirements, visit www.cambridgema.gov/leafblowers

Enforcement

Leaf blower operators are required to be in compliance with the regulations outlined in this brochure at all times. Reports of violations should be directed to the appropriate department as listed below.

During City office hours
License Commission
617-349-6140.

After-hours
Police Department
617-349-3300.

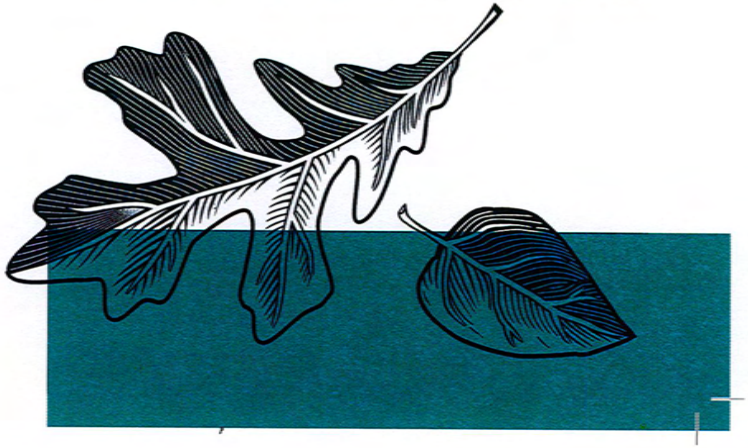
E-mail If you prefer, you may send questions or comments by e-mail to leafblowers@cambridgema.gov

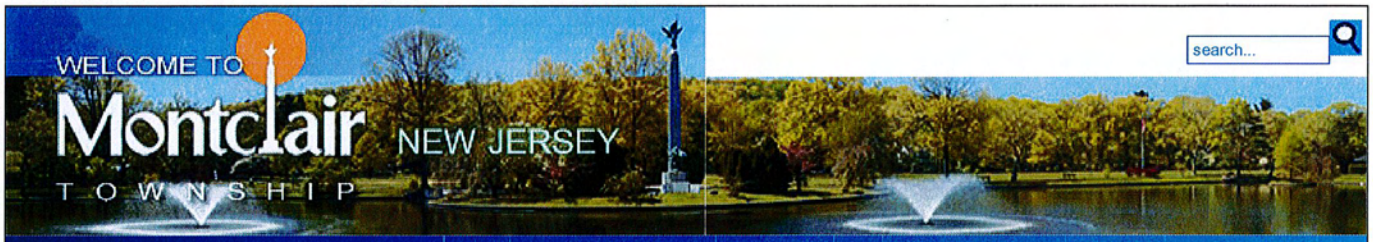
Questions

Visit www.cambridgema.gov/leafblowers or contact the City Manager's Office at 617-349-4300 or leafblowers@cambridgema.gov

More Information

For additional information, including the full ordinance (Cambridge Municipal Code Section 8.16.081), visit www.cambridgema.gov/leafblowers





NOTICE REGARDING LEAFBLOWERS FROM THE DEPARTMENT OF CODE ENFORCEMENT

The Township of Montclair has determined that unlimited use of leafblowers powered by internal combustion engines impairs the economic and social welfare, health, peace and quality of life of persons residing in Montclair. Therefore, restrictions have been put in place to minimize the adverse impact of such equipment by restricting its use within the Township.

The operation of leafblowers in the Township of Montclair is limited to between March 1 and June 30, inclusive, and between October 1 and December 15, inclusive.

Leafblowers may only be used by landscapers on weekdays between 8:00 a.m. and 6:00 p.m., and by an occupant or owner of the premises between 8:00 a.m. and 8:00 p.m.

Leafblowers may only be used by landscapers on Saturdays between 9:00 a.m. and 6:00 p.m., and by an occupant or owner of the premises between 9:00 a.m. and 8:00 p.m.

Leafblowers may only be used on Sundays, Good Friday, and Thanksgiving between 10:00 a.m. and 5:00 p.m.

It is a violation to operate any leafblower powered by an internal combustion engine in the Township of Montclair without a properly functioning muffler.

< Prev

[Back]

Event Calendar

January 2009

Su	Mo	Tu	We	Th	Fr	Sa
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

08-51

TOWNSHIP OF MONTCLAIR

ORDINANCE AMENDING SECTION 217-6 OF THE TOWNSHIP CODE TO PROVIDE REVISED REGULATIONS REGARDING THE OPERATION AND USE OF LEAF BLOWERS IN THE TOWNSHIP OF MONTCLAIR

December 9, 2008

BE IT ORDAINED by the Council of the Township of Montclair, in the County of Essex, that Section 217-6 of the Township Code, entitled "Internal Combustion Leafblowers," be and is hereby amended to read as follows:

§217-6. Leaf blowers.

A. Purpose and intent. The Township of Montclair hereby finds that unlimited use of leaf blowers impairs the economic and social welfare, health, peace and quality of life of persons residing in Montclair. The purpose of this section is to minimize the adverse impact of such equipment by restricting its use within the Township.

B. Decibel Rating. Effective March 1, 2010, it shall be unlawful for any person to operate a leaf blower in the Township of Montclair which does not have a decibel rating of 65 decibels (dB(a)) or lower, except as set forth in subsection I below.

C. Internal combustion leaf blowers. Effective March 1, 2010, in order to control harmful emissions, it shall be unlawful for any person to operate a leaf blower powered by an internal combustion engine which does not comply with the latest "Standards for Small Spark Ignition Handheld Engines" promulgated by the U.S. Environmental Protection Agency (currently the "Phase 2 2007 standards"), except as set forth in subsection I below.

D. Hours of use. Leaf blowers shall not be operated in the Township of Montclair except as follows:
(1) On weekdays between 8:00 a.m. and 6:00 p.m., except that leaf blowers may be used by an occupant or owner of the premises between 8:00 a.m. and 8:00 p.m. on weekdays.
(2) On Saturdays between 9:00 a.m. and 6:00 p.m., except that leaf blowers may be used by an occupant or owner of the premises between 9:00 a.m. and 8:00 p.m.
(3) On Sundays, Thanksgiving Day and Good Friday between 10:00 a.m. and 5:00 p.m.

E.. Dates of use. . The operation of leaf blowers shall be limited in each calendar year to the time period between March 15 and April 30, inclusive, and between October 1 and December 15, inclusive. The Emergency Management Coordinator shall have the

authority to extend or modify such dates when extreme or unusual weather conditions warrant.

F. Mufflers. It shall be a violation hereof for any person to operate in the Township of Montclair a leaf blower powered by an internal combustion engine without a properly functioning muffler.

G. Responsibilities of property owners, business operators, landlords and tenants. Property owners, business operators, landlords and tenants of a property shall each have all the duties and responsibilities prescribed in this chapter, and no property owner, business operator, landlord or tenant shall be relieved from such duties or responsibilities by reason of the fact that the other of them or the occupant is also responsible therefor and in violation thereof.

H. Emergencies. The Emergency Management Coordinator is authorized to suspend any one or more of the provisions of this section for a period of 24 hours or more whenever such Coordinator determines that an emergency situation exists in the Township. Such suspension may be renewed each day during the continuance of such emergency.

I. Exceptions.
(1) Commercial landscapers. Notwithstanding the above, for commercial landscapers the requirements of subsections B and C of this ordinance shall be effective as of October 1, 2009.
(2) Public Property. This ordinance shall not apply to the use of leaf blowers for maintenance of any public property located in the Township of Montclair.

J. Enforcement. The provisions of this ordinance shall be enforced by the Department of Administration, Code Enforcement and Environmental Affairs and the Montclair Police Department.

K. Violations. Any person who violates any provision of this ordinance shall, upon conviction thereof, be punished by a fine of not less than $100 for a first offence, not less than $250.00 for a second offense, and not less than $500.00 for a third or subsequent offense. The Municipal Court may impose a maximum fine of $2,000.00, imprisonment in the county/municipal jail for a term not exceeding 90 days, or a period of community service not exceeding 90 days, or any combination thereof as determined by the Municipal Court Judge. In addition to the above, upon conviction of a third or subsequent violation of this ordinance, the Township Clerk shall revoke for a period of one year the license issued to any "landscaper" pursuant to Chapter 200 of the Township Code.

[NEW LANGUAGE UNDERLINED; DELETED LANGUAGE STRICKEN]

RECORD OF COUNCIL VOTE											
	YES	NO	ABS	N.V.	AB		YES	NO	ABS	N.V.	AB
Councilor Africk						**Councilor Murnick**					
Councilor Baskerville						**Deputy Mayor Terry**					
Mayor Fried						**Councilor Weller**					
Councilor Lewis											
X - Indicate Vote ABS - Abstain N.V. - Not Voting AB - Absent											

I HEREBY CERTIFY the foregoing to be a true copy of an ordinance adopted as introduced by the Council of the Township of Montclair, in the County of Essex, at its meeting held on _____, 2008.

_____
Linda S. Wanat
Clerk of the Township of Montclair, N.J.

Table 2-1
TOP TEN SOURCES OF MAN-MADE VOLATILE ORGANIC COMPOUNDS (VOCs) IN THE WASHINGTON AREA IN 2002 and 2009 EMISSIONS LEVELS

#	SOURCE CATEGORY	SOURCE	VOCs* TONS/ DAY	
			2002	2009
1	On-Road Mobile	CARS, BUSES, TRUCKS	116.9	66.7
2	Non-Road	LAWN & GARDEN EQUIPMENT	81.6	52.2
3	Area	SURFACE COATING	62.7	57.5
4	Area	COMMERCIAL CONSUMER SOLVENT USE	58.5	57.3
5	Area	PORTABLE FUEL CONTAINERS	25.6	17.9
6	Nonroad	PLEASURE CRAFT	20.7	15.0
7	Area	GASOLINE STORAGE	13.7	15.0
8	Stationary	UTILITIES AND OTHER SOURCES	12.9	14.3
9	Area	PESTICIDES	11.8	9.7
10	Area	SURFACE CLEANING	11.6	10.3

**The emissions estimates above are rounded to the nearest whole number, listed in order for 2002 emissions. They are MWAQC's best estimates. Total VOC emissions in the Washington area were 448.28 tons per day in 2002 and 348.74 tons per day in 2009. Biogenic emissions account for 314.74 tons/day of VOC emissions in the Washington region. The 2009 inventories include the final attainment control strategy.*

Table 2-2
TOP TEN SOURCES OF NITROGEN OXIDES (NOx) IN THE WASHINGTON AREA IN 2002 and 2009 EMISSIONS LEVELS

#	SOURCE CATEGORY	SOURCE	NOx* TONS/ DAY	
			2002	2009
1.	On-Road Mobile	ALL VEHICLES	266.7	146.5
2.	Stationary	UTILITIES AND OTHER SOURCES	220.6	113.0
3.	Non-Road	CONSTRUCTION AND MINING	45.8	38.3
4.	Non-Road	LAWN AND GARDEN EQUIPMENT (RES)	12.6	10.6
5.	Area	INDUSTRIAL FUEL COMBUSTION	9.3	11.1
6.	Non-Road	RAILROAD LOCOMOTIVES	7.2	5.7
7.	Non-Road	INDUSTRIAL EQUIPMENT	6.7	4.6
8.	Area	COMMERCIAL/INSTITUTIONAL FUEL COMBUSTION	6.4	7.1
9.	Area	RESIDENTIAL FUEL COMBUSTION	4.8	5.3
10.	Area	AIRCRAFT EMISSIONS	3.8	5.9

**The emissions estimates above are rounded to the nearest whole number. They are MWAQC's best estimates. The total emission of NOx in the Washington area was 597.22 tons per day in 2002 and 362.05 tons per day in 2009. The 2009 inventories include the final attainment control strategy.*

Health effects on children (EPA final ozone rule, 3/27/08)

"The National Cooperative Inner-City Asthma Study (Mortimer *et al.*, 2002) evaluated air pollution health effects in 846 asthmatic children in 8 urban areas. The pollutants evaluated included O_3, PM_{10}, SO_2, and NO_2. Three effects were evaluated: (1) Daily percent change in lung function, measured as peak expiratory flow rate (PEFR); (2) incidence of (≥ 10% reduction in lung function (PEFR); and, (3) incidence of symptoms (i.e., cough, chest tightness, and wheeze). EPA notes that in this study, O_3 was the only pollutant associated with reduction in lung function. Nitrogen dioxide had the strongest effect on morning symptoms, and the authors concluded it ‘‘*** may be a better marker for the summer-pollutant mix in these cities’’ but had no association with morning lung function. In a two-pollutant model with NO_2, the O_3 effect on morning symptoms remained relatively unchanged. Sulfur dioxide had statistically significant effects on morning symptoms but no association with morning lung function. Particulate matter (PM_{10}), which was measured daily in 3 cities, had no statistically significant effect on morning lung function. In a two-pollutant model with O_3, the PM_{10} estimate for morning symptoms was slightly reduced and there was a larger reduction in the O_3 estimate, which remained positive but not statistically significant. A more general discussion and response to this issue concerning confounding by copollutants is presented in the R esponse to Comments document.

"The effect of air pollution on inner-city children with asthma" (Mortimer, et al., European Respiratory Journal 2002)

http://www.erj.ersjournals.com/cgi/content/full/19/4/699

"In conclusion, summer-time air pollution is associated with increased asthma morbidity and decreased pulmonary function among inner-city children with asthma in the USA. These findings from generalized estimating equations and mixed models support previously published reports from time-series analysis, and those reported from less urban populations. The impact of pollution was not immediate, but developed over several days, with the largest effects seen on morning outcomes. Nitrogen dioxide, sulphur dioxide, and particles with a 50% cut-off aerodynamic diameter of 10 µm were associated with increases in symptoms, with nitrogen dioxide exhibiting the strongest influence. Ozone was most influential on peak expiratory flow rate. Adverse respiratory effects were observed in all cities, at levels below proposed USA air quality standards."

"How Exposure to Environmental Tobacco Smoke, Outdoor Air Pollutants, and Increased Pollen Burdens Influences the Incidence of Asthma" (Gilmour, et al., Environmental Health Perspectives 2006 April; 114(4): 627–633.)

http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1440792

asthmapaper_ehp_ets_pollen.pdf

Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution

Committee on Estimating Mortality Risk Reduction Benefits from Decreasing Tropospheric Ozone Exposure, National Research Council

ISBN: 0-309-11995-2, 206 pages, 6 x 9, (2008)

PREPUBLICATION COPY

Estimating Mortality Risk Reduction and Economic Benefits from Controlling Ozone Air Pollution

Committee on Estimating Mortality Risk Reduction Benefits from Decreasing Tropospheric Ozone Exposure

Board on Environmental Studies and Toxicology

Division on Earth and Life Studies

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES PRESS
Washington, D.C.
www.nap.edu

Summary

Increased concentrations of ozone in the lower atmosphere are formed from pollutants emitted by such human activities as the combustion of fossil fuels. Natural sources of emissions, such as vegetation, also contribute to ozone formation. Because human exposure to ozone in the lower atmosphere at the increased concentrations that result from precursor emissions can cause respiratory problems and other health effects, ozone is one of the six criteria pollutants regulated by the U.S. Environmental Protection Agency (EPA) under the Clean Air Act.[1]

Studies published since 1990 have yielded mixed evidence of a relationship between short-term exposure to ozone and premature death. According to analyses of evidence published in recent years, the risk of death in the population increases slightly but consistently as exposure to ozone increases. However, at the same time, interpretation of this evidence by EPA and scientists outside the agency has been complicated by ozone's occurrence in mixtures with other pollutants that have similar effects and by uncertainties including those which result from using outdoor-ozone measurements to estimate exposures of people who spend most of their time indoors.

The Clean Air Act requires EPA to review periodically the National Ambient Air Quality Standards (NAAQS) for the criteria pollutants.[2] Each time NAAQS are reviewed, the EPA administrator must weigh the most recent evidence and current uncertainties and make a public-health policy judgment about whether the existing standards are adequate to protect the public health with an adequate margin of safety or should be lowered or raised.

After the NAAQS are determined, EPA must address any mitigation measures needed to reduce emissions. When deciding on mitigation actions expected to cost more than $100 million per year, EPA, like other federal agencies, is required to carry out a cost-benefit analysis of alternative regulatory strategies, such as those to attain the ozone NAAQS. However, EPA is not allowed to consider monetary costs when setting NAAQS.

To assess the benefits portion of its cost-benefit analysis of the ozone NAAQS, EPA uses results of epidemiologic studies to estimate the number of premature deaths avoided by the expected reduction in ozone concentration for the population at risk (that is, the number of deaths postponed to some future year and generally with a different cause of death). It then assigns a monetary value to the avoided deaths by using a concept known as the value of a statistical life. That value is derived from studies of adults (mostly of working age) who indicate or reveal, through choices in the labor market or in other ways, the amount that they would be willing to pay to change their risk of death in a given period by a small amount. EPA applies the same value to all premature deaths avoided regardless of the age or health status of the population experiencing the potential change in risk of death. However, the willingness to pay for a reduction in the risk of death hypothetically depends on the characteristics (for example, life expectancy or health status) of the individuals affected or on the nature of the risk (for example, accident vs illness).

---

[1]Most ozone in the lower atmosphere is formed by a complex series of photochemical reactions in the presence of sunlight involving nitrogen oxides and volatile organic compounds. *Ozone* is used here to refer to the broad array of photochemical oxidants in ambient air, of which ozone is the primary component.

[2]As this report was being prepared, EPA was reviewing the NAAQS for ozone. EPA's final decision on the ozone NAAQS based on its review was announced in March 2008.

In light of recent evidence on the relationship of ozone to mortality and questions about its implications for benefit analysis, EPA asked the National Research Council to establish a committee of experts to evaluate independently the contributions of recent epidemiologic studies to understanding the size of the ozone-mortality effect in the context of benefit analysis. The committee was also asked to assess methods for estimating how much a reduction in short-term exposure to ozone would reduce premature deaths, to assess methods for estimating associated increases in life expectancy, and to assess methods for estimating the monetary value of the reduced risk of premature death and increased life expectancy in the context of health-benefits analysis. The charge to this National Research Council committee focused on benefit analysis; it did not include considering how evidence is used to set the ozone NAAQS.[3]

OVERALL CONCLUSIONS AND RECOMMENDATIONS

The committee concludes from its review of the health-based evidence that short-term exposure to ambient ozone is likely to contribute to premature deaths. Despite some continuing questions about the interpretation of the evidence, the committee concluded that the evidence is strong enough to be used in the estimation of the expected mortality-reduction benefits of a decrease in exposure to ozone. Human chamber and toxicologic studies have yielded strong evidence that short-term exposure to ozone can exacerbate lung conditions, causing illness and hospitalization, and can potentially lead to death. The available evidence on ozone exposure and exacerbation of heart conditions, which is less abundant, points to another concern. Epidemiologic studies have also found that exposure to ozone is associated with adverse lung and heart effects.

> **Recommendation: The committee recommends that ozone-related mortality be included in future estimates of the health benefits of reducing ozone exposure. The committee further recommends that the greatest emphasis be placed on estimates from new systematic multicity analyses that use national databases of air pollution and mortality, such as in the National Morbidity, Mortality, and Air Pollution Study, without excluding consideration of meta-analyses of previously published studies. Emphasis should also be placed on risk estimation based on analyzing data on multiple days so that delayed acute effects estimates can be included. The health-benefits estimates should be accompanied by a broad array of analyses of uncertainty but should give little or no weight to the assumption that there is no causal association between estimated reductions in premature mortality and reduced ozone exposure.**

Because older persons appear to be at high risk of health-related effects from ozone pollution, it is appropriate to consider whether the willingness to pay for mortality risk reductions should and could reflect the number of years of life by which life would be extended by reductions in ozone. **The committee concludes that the evidence is insufficient to support a specific adjustment of the aggregate willingness to pay for reduction in annual mortality risk on the basis of differences in remaining life expectancy.**

> **Recommendation: Although there are many concerns about the accuracy of a willingness-to-pay (WTP) value and the corresponding value of a statistical life (VSL) that does not vary with population or risk characteristics, the committee recommends the use of a constant WTP and corresponding VSL as the most scientifically supportable approach to monetary valuation of ozone-related mortality risk given the information available in the epidemiologic and economics literature.**

[3]A full statement of the committee's change is presented in Box 1-1 of Chapter 1.

INTERPRETATION OF RESULTS OF HEALTH STUDIES

The associations between ozone exposure and premature mortality in the recent health studies appear robust, but several factors create considerable uncertainty about them. Those factors can affect estimates of risk of ozone-related mortality in various ways. In some cases, the factors would cause an underestimation of risk; in other cases, an overestimation. On balance, the committee considers the evidence from the studies to be strong enough for use in deriving risk estimates, but the various factors and their potential effects on the estimates should be fully acknowledged.

Short-Term Exposure to Ambient Ozone

Time-series epidemiologic studies of short-term effects of ozone typically characterize human exposure by using ambient concentrations measured at fixed outdoor monitoring sites. Exposure is characterized by applying an averaging period to the daily ambient monitoring data. Changes in the average values are then linked with changes in mortality. When averaged over 24 h, ambient concentrations are at best weakly associated with corresponding personal ozone exposure, although the association is stronger in the summer than in winter. For shorter averaging periods, such as the afternoon (when both personal outdoor activity and ozone concentration can be at their highest), results from one study suggest that hourly or daily peak ambient ozone concentration may be an appropriate proxy for corresponding hourly or peak personal exposure. Whether observations from that study are relevant for people at risk for ozone-related death warrants further examination.

The choice of averaging period to characterize short-term ozone exposure in linking ambient ozone concentration with mortality risk can have a large effect on estimates of benefits of emission-control programs. For example, under some conditions, efforts to lower emissions of oxides of nitrogen could reduce the daily peak ozone concentration but raise daily average concentrations (see Chapter 3). Thus, a cost-benefit analysis of an emission-control program that examines mortality and daily average concentrations of ozone could appear to have a negative effect, whereas an analysis that examines mortality and peak concentrations could appear to show a benefit. It is not known which averaging period reflects personal exposure more accurately or is more closely related to mortality risk.

> **Recommendation: Future studies of the effects of short-term ozone exposure should determine whether and how much daily peak exposures, such as 1-h or 8-h exposures, and longer-term average exposures, such as over 24 h, are associated with ozone-related mortality. Benefits assessors at EPA and elsewhere should use the results to identify the appropriate exposure averaging periods so that they can estimate how efforts to attain the ozone NAAQS will affect ozone exposure and health. Regulators should take into account the possibility that the effects of ozone-control strategies averaged over 24 h may be quite different from those averaged over shorter periods.**

Potential Confounding by Other Pollutants

Studies have not been sufficient to control fully for potential confounding by or ozone interaction with constituents of airborne particulate matter that has a diameter equal to or less than 2.5 μm ($PM_{2.5}$). Such constituents include sulfates, acids, elemental and organic carbon, and metals. The potential for confounding of ozone health effects by $PM_{2.5}$ constituents differs by region and season. For example, in the eastern United States, confounding is most likely in the summer months, when ozone and $PM_{2.5}$ are strongly correlated in many locations. In the winter, the potential for confounding is likely to be less. It will be difficult to address such confounding with currently available data, however, because data on

$PM_{2.5}$ components at many sites have only recently begun to be routinely collected and because winter ozone concentrations (see next section) are often not measured.

Recommendation: Epidemiologic research on associations between air pollution and health outcomes should investigate regional and seasonal associations between ambient (outdoor) concentrations and human exposures to ozone and $PM_{2.5}$. It should also investigate how data on pollutants can be used to control for confounding and correlations between the various pollutant measures. When possible, researchers should address those issues by focusing on groups of people who are sensitive to ozone and by using data on the chemical and physical components and size distribution of ambient particles.

Recommendation: EPA and the scientific community should account for seasonal and geographic variability in the relationship between ozone and its potential confounders and should increasingly include the growing database on $PM_{2.5}$ constituents in analyses of confounding of ozone associations. The most relevant particle-component data should be collected frequently enough to improve understanding of the potential for confounding.

Ozone-Mortality Relationships During Winter Months

There is a lack of observed association between ozone and mortality during periods when ozone is low, such as winter. Reasons for the lack of association are not well understood in part because of the decrease in monitoring during those periods. Better understanding of ozone-mortality relationships in the winter is important for full exploration of effects at low concentrations. Although ambient ozone is one of the best-characterized pollutants in the United States, ozone monitors are usually operated only during the so-called ozone season—the warmer period of the year, which varies from city to city.

Recommendation: EPA and states should extend operation of ozone monitoring into winter and report the results. The winter program should be sufficient to allow researchers to examine seasonal differences in risk, how these seasonal differences vary spatially between communities with warmer and cooler winters, and ozone-mortality relationships at lower ozone concentrations. Ozone is a regional pollutant, so winter measurements need not be collected at all the summer locations; but if measurements are collected in winter, they should be collected with the same frequency as summer measurements.

Frailty and Ozone Mortality

Benefits assessors seek information on whether the mortality risk associated with acute ozone exposure is attributable to short-term displacement (in this case, advancement) of deaths that would have occurred in a few days or more without acute ozone exposure. If it is so attributable, they can focus their efforts on estimating the value that frail people would place on reducing their ozone-mortality risk.

On the basis of available evidence, the committee concludes that deaths related to exposure to ozone are not restricted to people who are at high risk of death within a few days. For example, a recent study of data collected from several U.S. cities reports that short-term ozone exposure is likely to contribute to shortening life and not only among people who are near death. However, because the evidence comes from only one study, it warrants confirmation by other studies.

Recommendation: EPA and the scientific community should conduct additional studies to investigate whether and how much ozone-related mortality is restricted to people who are already at high risk of death within a few days and how much ozone-related mortality

occurs in people who are not already at risk of death in a few days. The studies should include use of various methods, for example, focus on investigating subjects who have diseases, such as diabetes or heart disease, that are known to be associated with air-pollution-related mortality risk.

Susceptibility

Preliminary results indicate that the effect of acute ozone exposure on mortality is likely to be larger than average in persons with pre-existing disease, especially lung and heart diseases. The list of factors that plausibly modify effects is rather long and still insufficiently investigated (see Chapter 4). Although susceptibility factors are important, the distribution of ozone-mortality-effect estimates among the categories of susceptibility is not adequately known. Consequently, the overall (population-weighted average) mortality effect in the total population is the only currently available basis of risk assessments; this approach is a source of an unknown amount of uncertainty in calculating the overall benefit of an ozone reduction in reducing mortality risk.

Recommendation: EPA and the scientific community should identify personal characteristics that are important in understanding ozone-mortality relationships. They should develop a distribution of ozone-mortality effect estimates among the categories of susceptibility; this will enable benefits assessment to include quantitative details of the heterogeneity of effects in the total population.

Presence or Absence of a Threshold for Ozone-Related Mortality

The association between short-term variations in ambient ozone concentrations and fluctuations in mortality rates is usually characterized as linear. Because the association is based on epidemiologic studies that can only approximate exposure on the basis of ambient monitoring data, the assumption of linearity should be viewed with caution. At low ozone concentrations, the question arises whether the association is linear or more accurately characterized as having a "threshold"—a concentration of ozone below which exposure poses no risk of death. Individuals have their own susceptibility, which is characterized by a unique exposure-response association; this association may include a unique threshold value that can vary with susceptibility of the individual at any given moment and with the averaging period used to assess exposure.

On the basis of its review of the evidence, the committee concludes that the association between short-term changes in ozone concentrations and mortality is generally linear throughout most of the concentration range, although uncertainties make it difficult to determine whether there is a threshold for the association at the lower end of the range. If there is a threshold, it is likely to be below the current NAAQS.

Recommendation: EPA and the scientific community should explore further how personal thresholds may vary and the extent to which one's threshold depends on one's frailty at any given moment. Because it is not clear whether there is an association between ozone and mortality in the cooler months, warmer months should be examined separately. The research should involve panel studies of individuals considered to be susceptible to premature death from ozone exposure, such as those with impaired lung or heart function. A sensitivity analysis is needed to assess how different thresholds in exposure-response relationships may affect ozone-mortality risk estimates that are based on results of epidemiologic studies.

Accounting for a Lag in Mortality Response to Ozone

Deaths related to short-term ozone exposure may not occur until several days after the exposure or may be associated with multiple short-term exposures. Many studies of short-term effects investigate a change in death rates for only one or a few days, but distributed-lag models can be used to look further ahead to capture delayed mortality, often referred to as a subacute response. **Distributed-lag analyses appear to capture the overall effects of ozone better than do single-day models, but there have been relatively few such analyses.**

> **Recommendation: EPA and the scientific community should develop appropriate databases and conduct distributed-lag analyses in future epidemiologic investigations to improve understanding of the statistical distribution of time between an increase in the ambient ozone concentration and the occurrence of deaths.**

Chronic Exposures

EPA benefits assessments have not included estimates of mortality risk due to long-term (chronic) exposure to ozone, because evidence does not directly demonstrate a causal relationship when the period between exposure and death is longer than a few days. However, the observed associations between ozone exposure and decreased small-airway lung function during childhood and adolescence suggest that ozone-related mortality is at least partially attributable to exposures that last more than a few days. The general association between poor lung function and shortened life expectancy is strong and well established, so evidence of an effect of ozone exposure on lung function increases the plausibility of mortality from chronic exposure. **The weak current evidence from cohort studies of an association of premature mortality with chronic exposure to ozone suggests that risks may be larger than those observed in acute effects studies alone.**

The standard approach to investigating effects of cumulative ozone exposure on life expectancy is the cohort study, in which large numbers of subjects are followed for several years. After taking into account all other factors that are likely to affect mortality, cohort studies can test the null hypothesis that mortality is the same among populations that have different ozone-exposure histories. However, none of the cohort studies available was designed to investigate chronic effects of ozone, and differences in ozone exposure among subjects in each study tended to be rather small. **If further confirmed, the weak current evidence from cohort studies of an association of premature mortality with longer-term exposure would support the notion that effects seen in time-series studies reflect only a portion of the total effect.**

> **Recommendation: EPA, the National Institutes of Health, and the scientific community should encourage additional studies of the association between long-term ozone exposure and mortality. They should also encourage development of models of long-term ozone exposures that can account for variations in exposure at the individual level and between and within cities. As new cohort evidence of effects of chronic exposures becomes available, EPA should consider including it in its benefits assessments.**

Effect of Ozone Exposure on Life Expectancy

Effects of long-term cumulated exposure are, by design, not addressed in short-term time-series studies. Distributed-lag models integrate the distribution of the time between exposure and death, but they focus on a short window (several days to weeks) after exposure. **It is appropriate to use time-series results to estimate changes in life expectancy due to acute exposures by using cohort life-table**

methods if it is assumed that all members of the population at risk for death from ozone exposure have the same life expectancy as others in the same age and sex cohort (see Chapter 4). However, the committee finds that that assumption is questionable because people at greatest risk for death from short-term ozone exposure are likely to be those who have pre-existing diseases and thus life expectancy lower than average for their age.

> **Recommendation: Additional studies are needed to assess the extent to which differences in susceptibility in a general population affect the variability associated with mortality risk estimates. To the extent that data are not available, models and assumptions can be used for sensitivity analysis to assess how risk estimates might vary with susceptibility.**

Characterizing Mortality Risk by Using Studies of Acute and Chronic Exposure

Ozone-mortality risk is often expressed as the expected number of deaths attributable to ozone air pollution or lives saved by reducing ozone pollution by some amount. However, reductions in ozone exposure are expected to increase life expectancy and decrease age-adjusted annual death rates (for example, number of deaths per 100,000 of population). Thus, the number of older people would increase, the absolute number of deaths at higher ages would increase, and the annual number of deaths would return to normal in future years, although they would occur at higher ages and probably with different causes. Alternative approaches to the expression of ozone-mortality effects, such as death rates, will have similar results if one is concerned only with short-term effects of pollution changes. However, when one includes subacute and chronic effects estimates on mortality, the discrepancies between the results of the different approaches increase, and the conceptual flaws of the "attributable-cases" model become more pronounced.

> **Recommendation: EPA should evaluate alternative approaches for expressing ozone-mortality risk associations and consider the implications of using them in benefits assessments. EPA should consider placing greater emphasis on reporting changes in age-specific death rates in the relevant population and develop models for consistent calculation of changes in life expectancy and changes in numbers of deaths at all ages.**

VALUATION

Willingness-to-Pay Estimates

Estimates of the value of a statistical life (VSL) are derived from estimates of an individual's willingness to pay (WTP) for changing his or her mortality risk by a small amount in a given period (usually annual). The objective of an economic-benefits assessment is to develop an aggregate estimate of the welfare gain for everyone who benefits from a policy or program that is intended to reduce risk. Both economic theory and available empirical evidence are inconclusive about how people's WTP values vary with two important individual characteristics: age, as a proxy for remaining life expectancy, and health status. The evidence is also inconclusive about how WTP varies with cause of death, but there is greater clarity that reducing the risks of latent mortality response should be valued less than reducing risks of immediate death. **The committee concludes that the empirical evidence is insufficient to support a specific quantitative adjustment of WTP estimates to account for differences in remaining life expectancy, but it does not reject the general concept that such adjustments may be appropriate.** It is plausible that people with shorter remaining life expectancy would be willing to devote less of their resources to reducing their mortality risk than those with longer remaining life expectancy. In contrast, if the condition causing the shortened life expectancy can be treated and improved and an acceptable quality

of life can be preserved or restored, people may put a high value on extending life, even if they have other health impairments or are quite elderly.

> **Recommendation: Researchers should continue to explore how WTP for reduction in mortality risk may vary with individual characteristics (such as age and health status), type of risk (such as accident vs illness), and time between changes in air quality and changes in risk. Efforts to obtain better information about the preferences of the older population regarding reductions in mortality risk will probably entail greater use of surveys in which subjects respond to hypothetical situations.**

Value of a Statistical Life, Individual Characteristics, and Risk Contexts

To estimate VSL, EPA mostly uses WTP values that are based on a context (for example, traffic accidents or workplace accidents) and a population that differ from the context and population relevant to the pollution-related risks that EPA is assessing. Two general approaches are available for measuring WTP for changes in mortality risk. The revealed-preference approach analyzes actual human behavior from which WTP for mortality-risk reductions may be estimated, for example, a wage-risk study of people's decisions on tradeoff between income and job-related mortality risk. The stated-preference approach surveys subjects' responses to hypothetical situations designed to reveal their WTP. **EPA's use of average WTP values in different risk contexts and for different population characteristics introduces considerable uncertainty about how these factors affect estimates of benefits. However, the current literature is inconclusive about how and how much the WTP values may vary with those factors. Although it is difficult to say how much the WTP values may differ, it is apparent that wage-risk studies cannot focus on the population and the risk context for ozone mortality.**

> **Recommendation: EPA should ensure that estimates of average WTP selected from the literature reflect results of both revealed-preference studies and stated-preference studies. EPA should consider the strengths and weaknesses of each study approach and consider how closely the available studies match the policy context in population at risk and type of risk. EPA should give less weight to wage-risk studies in selecting estimates of the WTP than in the past.**

The Value of a Statistical Life Year

Given that the committee recommends the development of models for estimating life years saved (in addition to estimating changes in annual death rates and reductions in premature deaths), is it feasible to assign a monetary value directly to changes in life expectancy? Use of a constant value per life year in the valuation of increases in life expectancy assumes that WTP values for mortality-risk reductions are consistently declining with increasing age. **Available empirical evidence does not support that assumption, so it does not support the use of a *constant* value of a statistical life year (VSLY) for benefits assessment. However, the economics literature does not reject the use of a *non-constant* VSLY. There is likely to be good reason to use a non-constant VSLY, but available studies do not provide robust estimates to assign to a non-constant VSLY.**

> **Recommendation: Unless future research produces empirical support for the assumptions that underlie a constant VSLY, EPA should not attempt to make valuation adjustments for changes in remaining life expectancy by estimating life years saved and applying a constant**

VSLY. More research is needed on appropriate ways to measure the values that people attach to changes in life expectancy.

Sensitivity Analyses

Use of the average VSL obtained from the literature may overestimate the WTP to reduce ozone-related risk of premature death. That is because the population of older people appears to have greater mortality risk associated with ozone. Because older people have average remaining life expectancy that is substantially less than that of the whole population, the WTP to reduce the risk of death in the older population might be less than the WTP of the population as a whole. However, the effect of shorter life expectancy on older people's WTP may be offset to some extent by a higher WTP for a reduction in risk because of their poorer health status or their higher baseline risk compared with those of the general population. Results in the empirical literature are not consistent, but several studies suggest that WTP to reduce mortality risk is constant or declines slightly with age. **That implies that a proportional adjustment of the VSL for remaining life expectancy (that is, using a constant VSLY) would result in using too low a value of WTP for reducing ozone-related mortality.**

Recommendation: Given the uncertainty in the accuracy of available estimates of the VSL for ozone-related mortality, EPA should conduct sensitivity analyses that use a range of estimates or assumptions to see how the overall conclusions of the cost-benefit comparison might change. The selection of alternative assumptions for the sensitivity analyses could be based on either theory or evidence. However, when there is less confidence in the alternative assumptions used in sensitivity analyses, their results should not be given equal weight in the presentation of results.

Recommendations for Future Research on Valuation

There is a fundamental need to understand better how age and remaining life expectancy affect WTP for reductions in mortality risk or increased life expectancy. An important next step is to ask that researchers report total age effects (WTP by age cohort) in addition to effects of age alone on WTP for a small reduction in mortality risk in a given period. Given the correlation of age with some of the other factors, there may be less uncertainty in the estimates of a total age effect. However, age-related income differences, sex differences, health differences, and the like would then be embedded in the estimates of WTP, and it might not be appropriate to use different VSLs that have these effects embedded.

Several recent economic studies have attempted to assess the effects of age and other factors on valuation. However, the efforts have been hampered by the lack of availability of the datasets produced for the published studies. EPA should urge researchers whom it funds for WTP studies to make their datasets available for future meta-analyses in addition to providing their published results.

EPA and the scientific community should explore and develop methods for characterizing and valuing changes in mortality risk that reflect the full life cycle. Studies to date have focused on WTP for annual changes in mortality risk, but the risk change of interest in most pollution-control assessments is more comprehensively described as a shift in survival probabilities across a large part of the human life span.

Environmental-benefits assessments rely primarily on estimates of WTP for reductions in risks of accidental death to estimate values for reducing risks of illness-related deaths. It is unknown how risk context (such as illness vs. a work-related accident) affects a valuation estimate. EPA and the scientific community should seek to learn more about how mortality-risk characteristics affect the valuation of reducing risks.

FUTURE REGULATORY-IMPACT ANALYSES INVOLVING OZONE MORTALITY

Because short-term exposure to ambient ozone is likely to contribute to premature deaths, future regulatory-impact analyses (RIAs) concerning ozone- control measures should include the benefits of reduced mortality risk. As in EPA's RIA for the recently finalized ozone NAAQS, emphasis should be on using estimates from new systematic multicity analyses that used national databases of air pollution and mortality, such as in the National Morbidity, Mortality, and Air Pollution Study, without excluding consideration of meta-analysis of previously published studies. Future RIAs should give little or no weight to the assumption that there is no causal association between estimated reductions in premature mortality and reduced ozone exposure. Health-benefits estimates should be accompanied by a broad array of analyses of uncertainty.

Distributed-lag models over several days appear better than single-day models at capturing the acute and subacute mortality effects of ozone exposure and should be part of future benefits assessments to the extent that they are supported in the literature.

Future RIAs should incorporate research results on the mortality effects of chronic ozone exposure and research that addresses key uncertainties related to potential confounding factors, exposure measures, and susceptibility as appropriate.

Despite many concerns about the accuracy of any specific WTP value and a corresponding VSL that does not vary with population or risk characteristics, the committee recommends a single VSL as the most scientifically supportable approach at present for monetary valuation of ozone-related mortality. Before making a substantial change in its approach for valuation of mortality-risk reductions, EPA should have fairly conclusive empirical evidence to support the change. It is the committee's judgment that the available evidence is not now sufficient to support such a change, but sensitivity analyses should explore alternative approaches and further research should be conducted to answer the questions raised about the validity of EPA's current approach. Benefits-assessment methods may need to be revised as new information emerges on characteristics of populations susceptible to an ozone-mortality risk and on variations in WTP for mortality-risk reductions (or increases in life expectancy) based on different population characteristics.

EPA should consider placing greater emphasis on reporting changes in age-specific death rates and changes in life expectancy in the relevant populations than on reporting estimates of lives saved or premature deaths avoided.

In this report, the committee has identified major gaps in knowledge about methods for assessing benefits of ozone-related mortality risk reduction and has recommended research strategies to close those gaps. The committee recognizes that many of the recommended research activities are complex and will be difficult to undertake, and that sufficient resources may not be available to undertake them all in the near term. Therefore, EPA and other agencies that might carry out the recommended research will need to set priorities and develop a strategy for addressing the various information needs.

April 2008

AMERICAN LUNG ASSOCIATION®

Ozone (O_3) is a highly reactive gas that is a form of oxygen. Ozone forms in the atmosphere, primarily from the action of sunlight on two products of fuel combustion—hydrocarbon vapors and nitrogen oxides.[1]

- Ozone reacts chemically ("oxidizes") with internal body tissues causing inflammation, like a "sunburn," of the lung. Ozone acts as a powerful respiratory irritant at the levels frequently found across the nation during the summer months. Breathing ozone may lead to serious health consequences, including:
    - premature death;[2]
    - shortness of breath[3] and chest pain; [4]
    - wheezing and coughing;[5]
    - inflammation of the lining of the lungs;[6]
    - increased susceptibility to respiratory infections;[7]
    - increased risk of asthma attacks; and
    - increased need for medical treatment and hospitalization for people with lung diseases, such as asthma or chronic obstructive pulmonary disease (COPD) [8]
- Children who regularly must breathe high levels of ozone may face reduced lung function in adulthood.[9] Reduced lung function increases the risk of lung disease later in life.
- The U.S. Environmental Protection Agency (EPA) estimates one out of every three people in the United States is at a higher risk of experiencing problems from ground-level ozone.[10] Five groups of people are at particular risk:
    - people with lung diseases such as asthma, chronic bronchitis and emphysema;[11]
    - children -- because their airways are smaller, their respiratory defenses are not fully formed, and their higher breathing rates increase their exposure;[12]
    - people who work or exercise outdoors;[13]
    - senior citizens;[14] and
    - "responders"-- otherwise healthy individuals who experience health effects at lower levels of exposure than the average person.[15]
- Ozone levels typically rise between May and October when higher temperatures, increased sunlight, and stagnant atmospheric conditions transform air pollutants into ozone.
- Ozone is such a risk to human health that the EPA is required to establish official limits, called national ambient air quality standards, on the level of ozone that can be in the nation's air. The Clean Air Act requires that EPA set the standard at a level that protects public health with an adequate margin of safety. The Act also requires that states must clean up the ozone in their communities to meet that standard .In March 2008, the EPA set a more protective ozone standard of 0.075 ppm averaged over an eight-hour period. [16]
- To reduce ozone air pollution, the American Lung Association supports stringent control*s* to reduce the emissions of hydrocarbon compounds and nitrogen oxide that help create ozone. These measures include:
    - stricter pollution control requirements for power plants and industrial boilers, including requirements for older plants to meet current emissions standards;
    - stronger pollution control requirements for new motor vehicles and small engines, including lawn and garden equipment;

Facts About Ozone

April 2008

- retrofitting of existing diesel engines including trucks, buses and heavy equipment, to make them cleaner; and
- greater use of lower emitting chemicals, including paints and finishes.

- The ground-level ozone in the lower atmosphere (troposphere) should not be confused with the natural protective layer of ozone in the upper atmosphere (stratosphere). Although both are made of the same chemical, the ozone in the upper atmosphere protects us from the sun's harmful ultraviolet rays, while the ozone in the lower atmosphere harms us.
- Ozone is a powerful greenhouse gas. Reducing ozone can help reduce global warming and climate change.[17]

For more information, call the American Lung Association at 1-800-LUNG-USA (1-800-586-4872), or visit our web site at http://www.lungusa.org.

---

[1] U.S. Environmental Protection Agency. *Air Quality Criteria for Ozone and Related Photochemical Oxidants*, 2006.
[2] Bell ML, Dominici F, Samet JM. A meta-analysis of time-series studies of ozone and mortality with comparison to the National Morbidity, Mortality, and Air Pollution Study. *Epidemiology* 2005;16:436-445; Ito K, DeLeon S F, Lippmann M. Associations between ozone and daily mortality: Analysis and meta-analysis. *Epidemiology* 2005;16:446-457; Levy J I, Chemerynski SM, Sarnat JA. Ozone exposure and mortality: An empiric Bayes metaregression analysis. *Epidemiology* 2005;16:458-468.
[3] Horstman DH, Folinsbee LJ, Ives PJ, Abdul-Salaam S, McDonnell WF. Ozone concentration and pulmonary response relationships for 6.6-hour exposures with five hours of moderate exercise to 0.08, 0.10, and 0.12 ppm. *Am Rev Respir Dis* 1990; 42:1158-1163.
[4] McDonnell WF, Stewart PW, Smith MV, Pan WK, Pan J. Ozone-induced respiratory symptoms: exposure-response models and association with lung function. *Eur Respir J* 1999;14:845–853.
[5] Triche EW, Gent JF, Holford TR, Belanger K, Bracken MB, Beckett WS, Naeher L, McSharry JE, Leaderer BP. Low-level ozone exposure and respiratory symptoms in infants. *Environ Health Perspect* 2006;114:911–916.
[6] Mudway IS and Kelly FJ. An investigation of inhaled ozone dose and the magnitude of airway inflammation in healthy adults. *Am J Respir Crit Care Med* 2004;169:1089-1095.
[7] Hollingsworth JW, Kleeberger SR, Foster WM. Ozone and pulmonary innate immunity. *Proc Am Thorac Soc* 2007;4:240-246.
[8] Gent JF, Triche EW, Holford TR, Belanger K., Bracken MB, Beckett WS, Leaderer BP. Association of low-level ozone and fine particles with respiratory symptoms in children with asthma. *JAMA* 2003;290:1859-1867; Desqueyroux H, Pujet J-C, Prosper M, Squinazi F, Momas I. Short-term effects of low-level air pollution on respiratory health of adults suffering from moderate to severe asthma. *Environmental Research* 2002;89:29-37; and Burnett RT, Brook JR, Yung WT, Dales RE, Krewski D. Association between ozone and hospitalization for respiratory diseases in 16 Canadian cities. *Environmental Research* 1997;72:24-31.
[9] Tager IB, Balmes J, Lurmann F, Ngo L, Alcorn S, Kunzli N. Chronic exposure to ambient ozone and lung function in young adults. *Epidemiology* 2005;16:751–759.
[10] http://www.epa.gov/airnow/aqibroch/aqi.html#11
[11] Desqueyroux H, Pujet JC, Prosper M, Le Moullec Y, Momas I. Effects of air pollution on adults with chronic obstructive pulmonary disease. *Archives of Environmental Health* 2002;57:554-560; and Höppe P, Peters A, Rabe G, Praml G, Lindner J, Jakobi G, Fruhmann G, Nowak D. Environmental ozone effects in different population subgroups. *International Journal of Hygiene and Environmental Health* 2003;206:505-516.
[12] Peters JM, Avol E, Gauderman WJ, Linn WS, Navidi W, London SJ, Margolis H, Rappaport E, Vora H, Gong H, Thomas DC. A study of twelve southern California communities with differing levels and types of air pollution II. Effects on pulmonary function. *Am J Respir Crit Care Med* 1999;159:768-775; and Thurston GD, Lippmann M, Scott MB, Fine JM. Summertime haze air pollution and children with asthma. *Am J Respir Crit Care Med* 1997;155:654-660
[13] Kinney PL and Lippmann M. Respiratory effects of seasonal exposures to ozone and particles. *Archives of Environmental Health* 2000;55:210-216.
[14] Delfino RJ, Murphy-Moulton AM, Becklake MR. Emergency room visits for respiratory illnesses among the elderly in Montreal: Association with low level ozone exposure. *Environmental Research* 1998;76:67-77.
[15] Devlin RB. Identification of subpopulations that are sensitive to ozone exposure: Use of end points currently available and potential use of laboratory-based end points under development. *Environ Health Perspec* 1993;101:225-230; and Frampton MW, Morrow PE, Torres A, Cox C, Voter KZ, Utell MJ. Ozone responsiveness in smokers and nonsmokers. *Am J Respir Crit Care Med* 1997;155:116-121.
[16] U.S. Environmental Protection Agency. National Ambient Air Quality Standards for Ozone. Final Rule, *Federal Register*, Vol. 73, No. 60, March 28, 2008.. The EPA evaluates data from ozone air pollution monitors to see whether a community meets that standard based on the fourth highest reading per year averaged over three years.
[17] U.S. Environmental Protection Agency. *Air Quality Criteria for Ozone and Related Photochemical Oxidants*, 2006.

linear function best described the data (Burnett et al. 1997a,b; Jaffe et al. 2003; Tenias et al., 1998; Castellsague et al., 1995). These results do not provide adequate evidence to suggest that nonlinear departures exist along any part of this range of NO_2 exposure concentrations. Evidence from human clinical studies has not helped to clarify understanding of the concentration-response function of NO_2 (see chapter 3).

4.3. Susceptible and Vulnerable Populations

The NAAQS are intended to provide an adequate margin of safety for both general populations and sensitive subpopulations, or those subgroups potentially at increased risk for ambient air pollution health effects. The term susceptibility generally encompasses innate or acquired factors that make individuals more likely to experience effects with exposure to pollutants. Genetic or developmental factors can lead to innate susceptibility, while acquired susceptibility may result from age, disease, or personal risk factors such as smoking, diet, or exercise. In addition, new attention has been paid to the concept of some population groups having increased vulnerability to pollution-related effects due to extrinsic factors including socioeconomic status (e.g., reduced access to health care) or particularly elevated exposure levels. Potentially susceptible and/or vulnerable groups comprise a large fraction of the U.S. population. Given the likely heterogeneity of individual responses to air pollution, the severity of health effects experienced by a susceptible subgroup may be much greater than that experienced by the population at large (Zanobetti et al., 2000).

Many factors such as genetic (Kleeberger et al., 2005) and social (Gee and Payne-Sturges, 2006) determinants of disease may contribute to interindividual variability and heightened susceptibility to NO_2. The previous NO_X AQCD (U.S. Environmental Protection Agency, 1993) identified certain groups within the population that may be more susceptible to the effects of NO_2 exposure, including persons with preexisting respiratory disease, children, and older adults. Findings from recent studies supported the conclusions from the previous assessment with regard to susceptibility.

4.3.1. Preexisting Disease as a Potential Risk Factor

A recent report of the National Research Council (NRC) emphasized the need to evaluate the effect of air pollution on susceptible groups including those with respiratory illnesses and cardiovascular disease (CVD) (NRC, 2004). Generally, chronic obstructive pulmonary disease (COPD), conduction disorders, CHF, diabetes, and MI are conditions believed to put persons at greater risk for adverse events associated with air pollution. In addition, epidemiologic evidence indicates persons with airway hyperresponsiveness as determined by methacholine provocation may be at greater risk for symptoms such as phlegm and lower respiratory symptoms than subjects without airway hyperresponsiveness (Boezen et al., 1998). Several researchers have investigated the effect of air pollution among potentially sensitive groups with preexisting medical conditions.

4.3.1.1. Asthmatics

Evidence from epidemiologic studies shows an association between NO_2 exposure and children's hospital admissions, ED visits, and calls to doctors for asthma. This evidence came from large longitudinal studies, panel studies, and time-series studies. NO_2 exposure was associated with aggravation of asthma effects that include symptoms, medication use, and lung function. Effects of NO_2 on asthma were most evident with a cumulative lag of 2 to 6 days, rather than same-day levels of NO_2. Time-series studies also demonstrated a relationship in children between hospital admissions or ED visits for asthma

and NO_2 exposure, even after adjusting for copollutants such as PM and CO. Important evidence was also available from epidemiologic studies of indoor NO_2 exposures. A number of recent studies showed associations with wheeze, chest tightness, and length of symptoms (Belanger et al., 2006); respiratory symptom rates (Nitschke et al., 2006); school absences (Pilotto et al., 1997a); respiratory symptoms, likelihood of chest tightness, and asthma attacks (Smith et al., 2000); and severity of virus-induced asthma (Chauhan et al., 2003). However, several studies (Mukala et al., 1999, 2000; (Farrow et al., 1997) evaluating younger children found no association between indoor NO_2 and respiratory symptoms.

Airway hyperresponsiveness in asthmatics to both nonspecific chemical and physical stimuli and to specific allergens appeared to be the most sensitive indicator of response to NO_2 (U.S. Environmental Protection Agency, 1993). Responsiveness is determined using a challenge agent, which causes an abnormal degree of constriction of the airways as a result of smooth muscle contraction. This response ranges from mild to severe (spanning orders of magnitude) and is often accompanied by production of sputum, cough, wheezing, shortness of breath, and chest tightness. Though some asthmatics do not have this bronchoconstrictor response (Pattemore et al., 1990), increased airway hyperresponsiveness is correlated with asthma symptoms and increased asthma medication usage. Clinical studies reported increased airway hyperresponsiveness to allergen challenge in asthmatics following exposure to 0.26-ppm NO_2 for 30 min during rest (Barck et al., 2002; et al.; Strand et al., 1997; 1998).

Toxicological studies provided biological plausibility that asthmatics are likely susceptible to the effects of NO_2 exposure. Numerous animal studies provide evidence that NO_2 can produce inflammation and lung permeability changes. These studies provided evidence for several mechanisms by which NO_2 exposure can induce effects, including reduced mucociliary clearance, and alveolar macrophage function such as depressed phagocytic activity and altered humoral- and cell-mediated immunity. Chauhan et al. (2003) reviewed potential mechanisms by which NO_2 exacerbates asthma in the presence of viral infections. These mechanisms included "direct effects on the upper and lower airway by ciliary dyskinesis, epithelial damage, increases in pro-inflammatory mediators and cytokines, rises in IgE concentration, and interactions with allergens, or indirectly through impairment of bronchial immunity." These are all mechanisms that can provide biological plausibility for the NO_2 effects in asthmatic children observed in epidemiologic studies. However, it must be noted that the experimental animal studies that looked at effects on markers of inflammation, such as BAL fluid levels of total protein and lactate dehydrogenase and recruitment or proliferation of leukocytes, occured only at exposure levels of $\geq$ 5 ppm. Studies conducted at these higher exposure concentrations may elicit mechanisms of action and effects that do not occur at near-ambient levels of NO_2.

4.3.1.2. Cardiopulmonary Disease and Diabetes

While less evidence was available for these conditions, preexisting cardiovascular-related conditions may lead to heightened susceptibility to the effects of NO_2 exposure. Recent epidemiologic studies reported that persons with preexisting conditions may be at increased risk for adverse cardiac health events associated with ambient NO_2 concentrations (Peel et al., 2007; Mann et al., 2002; D'Ippoliti et al., 2003; von Klot et al., 2005). Peel et al. (2007) reported evidence of effect modification by comorbid hypertension and diabetes on the association between ED visits for arrhythmia and NO_2 exposure. In another study, a statistically significant positive relationship was reported between NO_2 concentrations and hospitalizations for IHD among those with prior diagnoses of CHF and arrhythmia (Mann et al., 2002). However, Mann et al. (2002) noted the vulnerability in the secondary CHF group could be due to increased prevalence of MI as the primary diagnosis in this group. In addition, these authors stated they were unable to distinguish the effects of NO_2 from other traffic pollutants (Mann et al., 2002). Von Klot et al. (2005) reported cardiac readmission among MI survivors was associated with NO_2 and this association was robust to adjustment for PM_{10}. Modification of the association between NO_2 and MI by conduction disorders but not diabetes or hypertension was observed by D'Ippoliti et al. (2003).

Park et al. (2005b) examined the relationship of NO_2 and HRV among those with IHD, hypertension and diabetes but did not find an association.

There was limited evidence from clinical or toxicological studies on potential susceptibility to NO_2 in persons with CVD; however, the limited epidemiologic evidence indicated that these individuals may be more sensitive to effects of NO_2 exposure or air pollution in general. Reductions in blood hemoglobin (~10%) have been reported in healthy subjects following exposure to NO_2 (1 to 2 ppm) for a few hours during intermittent exercise (Frampton et al., 2002). The clinical importance of hemoglobin reduction in persons with significant underlying lung disease, heart disease, or anemia has not been evaluated, but the reductions could lead to adverse cardiovascular consequences. These consequences would be exacerbated by concomitant exposure to CO, a combustion copollutant of NO_2 that binds to hemoglobin and reduces oxygen availability to tissues and organs.

4.3.2. Age as a Potential Risk Factor

Children and older adults (65+ years) are often considered at increased risk from air pollution compared to the general population. The American Academy of Pediatrics (2004) concluded that children and infants are among the most susceptible to many air pollutants, including NO_2. Because 80% of alveoli are formed postnatally and changes in the lung continue through adolescence, the developing lung is highly susceptible to damage from exposure to environmental toxicants (Dietert et al., 2000). In addition to children, older adults frequently are classified as being particularly susceptible to air pollution. The basis of the increased sensitivity in the elderly is not known, but one hypothesis is that it may be related to changes in the respiratory tract lining's fluid antioxidant defense network and/or to a decline in immune system surveillance or response (Kelly et al., 2003). The generally declining health status of many older adults may also increase their risks to air pollution-induced effects.

Evidence showed that associations of NO_2 with both respiratory ED visits and hospitalizations were stronger among children (Peel et al., 2005; Atkinson et al., 1999b; Fusco et al., 2001; Hinwood et al., 2006; Anderson et al., 1998) and older adults (Migliaretti et al., 2005; Atkinson et al., 1999b; Schouten et al., 1996; Ponce de Leon et al., 1996; Prescott et al., 1998). However, two studies (Sunyer et al., 1997; Migliaretti et al., 2005) found no difference in the rates of ED visits associated with NO_2 concentrations for children (<15 years) and adults (15 to 64 years). Luginaah et al. (2005) and Wong et al. (1999) found no statistically significant difference in the elderly and adult age groups.

Many field studies focused on the effect of NO_2 on the respiratory health of children, while fewer field studies have compared the effect of NO_2 in adults and other age groups. In general, children and adults experienced decrements in lung function associated with short-term ambient NO_2 exposures (see Section 3.1.5). Importantly, a number of long-term exposure studies indicated that effects in children that include impaired lung function growth, increased respiratory symptoms and infections, and onset of asthma (see Section 3.4).

In elderly populations, associations between NO_2 and hospitalizations or ED visits for CVD, including stroke, have been observed in several studies (Anderson et al., 2007a; Atkinson et al., 1999b; Jalaludin et al., 2006; Hinwood et al., 2005; Wong et al., 1999; Barnett et al., 2006; Zanobetti and Schwartz, 2006; Simpson et al., 2005a; Wellenius et al., 2005b; Morgan et al., 1998a; Morris et al., 1995). However, some results were inconsistent across cities (Morris et al., 1995), and investigators could not distinguish the effect of NO_2 from the effect of other traffic-related pollutants such as PM and CO (Simpson et al., 2005a; Barnett et al., 2006; Morgan et al., 1998b; Jalaludin et al., 2006; Zanobetti and Schwartz, 2006).

Several mortality studies investigated age-related differences in NO_2 effects. Among the studies that observed positive associations between NO_2 and mortality, a comparison of all-age– or ≤ 64-years-of-age–group NO_2-mortality risk estimates to that of the ≥ 65-years-of-age group indicated that, in general, the elderly population was more susceptible to NO_2 effects (Biggeri et al., 2005; Burnett et al.,

2004). One study (Simpson et al., 2005a) found no difference in increases in CVD mortality associated with NO_2 concentrations between all ages and those participants of ≥ 65 years of age.

4.3.3. Gender as a Potential Risk Factor

A limited number of studies stratified results by gender. Lugninaah et al. (2005) found increases in hospital admissions associated with NO_2 among females but not males. In a study of children in Toronto, Canada, NO_2 was positively associated with asthma admissions among both boys and girls (Lin et al., 2005). However, in a study of asthma admissions among children in Vancouver, NO_2 was significantly and positively associated with asthma hospitalization only for boys in the low socioeconomic group (Lin et al., 2004). An increased association with asthma with exposure to traffic pollutants was observed for girls (Kim et al., 2004a). Decrements in FVC and FEV_1 growth associated with NO_2 were reported in male and female children in Mexico (Rojas-Martinez et al., 2007a,b).

4.3.4. Genetic Factors for Oxidant and Inflammatory Damage

A consensus now exists among epidemiologists that genetic factors related to health outcomes and ambient pollutant exposures merit serious consideration (Kauffmann et al., 2004; Gilliland et al., 1999; ATS 2000b). Interindividual variation in human responses to air pollutants may indicate that that some subpopulations are at increased risk of detrimental effects from pollutant exposure, and it has become clear that genetic background is an important susceptibility factor (Kleeberger, 2005). Several criteria must be satisfied in selecting and establishing useful links between polymorphisms in candidate genes and adverse respiratory effects. First, the product of the candidate gene must be instrumentally involved in the pathogenesis of the adverse effect of interest, often a complex trait with many determinants. Second, polymorphisms in the gene must produce a functional change in either the protein product or in the level of expression of the protein. Third, in epidemiologic studies, the issue of confounding by other environmental exposures must be carefully considered. In general, work has focused on genes involved in oxidant and inflammation damage.

Several glutathione S-transferase (GST) genes have common, functionally important polymorphic alleles that affect host defense function in the lung (e.g., homozygosity for the null allele at the GSTM1 and GSTT1 loci, homozygosity for the A105G allele at the GSTP1 locus). GST genes are inducible by oxidative stress. Exposure to radicals and oxidants in air pollution induces decreased GSH that increases transcription of GSTs. Individuals with genotypes that result in enzymes with reduced or absent peroxide activity are likely to have reduced oxidant defenses and potentially increased susceptibility to inhaled oxidants and radicals.

Studies of genotype, respiratory health, and air pollution in general have been conducted (Lee et al., 2004; Gilliland et al., 2002; Gauderman et al., 2007). NO_2-related genetic effects have been presented primarily by Romieu et al. (2006) and indicated that asthmatic children with GSTM1 null and GSTP1 Val/Val genotypes appear to be more susceptible to developing respiratory symptoms related to O_3, but not NO_2, concentrations. Though, it was hypothesized that ambient NO_2 concentrations may affect breathing in general in children regardless of their GSTM1 or GSTP1 genotypes, GSTM1-positive and GSTP1 Ile/Ile- and Ile/Val-genotype children were more likely to experience cough and bronchodilator use, specifically in response to NO_2 than GSTM1-null and GSTP1-Val/Val children. Contrary to expectations, a 20-ppb increase in ambient NO_2 concentrations was associated with a decrease in bronchodilator use among GSTP1 Val/Val-genotype children. It remains plausible that there are genetic factors that can influence health responses to NO_2, though the few available studies did not provide specific support for genetic susceptibility to NO_2 exposure.

4.3.5. Other Potentially Susceptible Populations

Although data specific to NO_2 exposures was lacking for many of the susceptibility factors listed below, several potentially susceptible groups deserve specific mention in this document. These include individuals in a chronic pro-inflammatory state (e.g., diabetics), obesity, and children born prematurely or with low birth weight.

Factors that may influence susceptibility or vulnerability are:

Susceptibility Factors

- Age, Gender
- Adverse birth outcomes: e.g., preterm birth, low birth weight, growth restriction, birth defects
- Race/ethnicity
- Genetic factors
- Pre-existing disease, e.g., diabetes
- Obesity
- Respiratory diseases, e.g., asthma, COPD
- Cardiovascular diseases

Vulnerability Factors

- Socioeconomic status
- Education level
- Air conditioning Use
- Proximity to Roadways
- Geographic Location (West vs. East)
- Level of Exercise
- Work Environment (e.g., outdoor workers)

Chronic inflammation appears to enhance susceptibility for air pollution-related cardiovascular events in older individuals and persons with diabetes, coronary artery disease, obesity, and past myocardial infarctions (Bateson and Schwartz 2004, Goldberg et al., 2001; Zanobetti and Schwartz, 2002; Peel et al. 2007). Dubowsky et al. (2006) reported that individuals with conditions associated with both chronic inflammation and increased cardiac risk were more vulnerable to the short-term pro-inflammatory effects of air pollution. This included individuals with diabetes; obesity; and concurrent diabetes, obesity and hypertension. Zanobetti and Schwartz (2001) reported more than twice the risk for hospital admissions for heart disease in persons with diabetes than in persons without diabetes associated with exposure to ambient air pollution, indicating that persons with diabetes are an important at-risk group. Data from the Third National Health and Nutrition Examination Survey indicated that 5.1% of the U.S. population older than 20 years of age has diagnosed diabetes and an additional 2.7% has undiagnosed diabetes (Harris et al., 1998). Moreover, another study found that subjects with impaired glucose tolerance without type II diabetes also had reduced HRV (Schwartz, 2001). This may indicate that the at-risk population may be even larger.

Mortimer et al. (2000) reported that among asthmatic children, birth characteristics continue to be associated with increased susceptibility to air pollution later in life, demonstrating that air pollution-induced asthma symptoms were more severe in children born prematurely or of low birth weight. Specifically, the authors revealed asthmatic children born more than three weeks prematurely or weighing less than 2,500 grams (5.5 pounds) had a six-fold decrease in breathing capacity associated with air pollution compared to full-weight, full-term children. The low birth weight and premature children also reported a five-fold greater incidence of symptoms like wheezing, coughing and tightness in the chest.

4.3.6. Increased Vulnerability Associated with Increased Exposure

Certain groups may experience relatively high exposure to NO_2, thus forming a potentially vulnerable population. Many studies found that indoor, personal, and outdoor NO_2 levels are strongly

associated with proximity to traffic or traffic density (see Section 2.5.4). NO_2 concentrations in heavy traffic or on freeways, have been observed in the range of 40 to 70 ppb and can be more than twice the residential outdoor or residential/arterial road level (Lee et al., 2000; Westerdahl et al., 2005). Due to high air exchange rates, NO_2 concentrations inside a vehicle could rapidly approach levels outside the vehicle during commuting; the mean in-vehicle NO_2 concentration has been observed to be between 2 to 3 times non-traffic ambient levels (see Section 2.5.4). Those with occupations that require them to be in or close to traffic or roadways (e.g., bus and taxi drivers, highway patrol officers, toll collectors) or those with long commutes could be exposed to relatively high levels of NO_2 compared to ambient levels.

SES is a known determinant of health, and there is evidence that SES modifies the effects of air pollution (O'Neill et al. 2003; Makri and Stilianakis, 2008). Higher exposures to air pollution and greater susceptibility to its effects may contribute to a complex pattern of risk among those with lower SES. Conceptual frameworks have been proposed to explain the relationship between SES, susceptibility, and exposure to air pollution. Common to these frameworks is the consideration of the broader social context in which persons live, and its effect on health in general (O'Neill et al., 2003; Gee and Payne-Sturges, 2004), as well as on maternal and child health (Morello-Frosch and Shenassa, 2006) and asthma (Wright and Subramanian, 2007) specifically. Multilevel modeling approaches that allow parameterization of community-level stressors such as increased life stress as well as individual risk factors were considered by these authors. In addition, statistical methods that allow for temporal and spatial variability in exposure and susceptibility have been discussed in the recent literature (Jerrett and Finkelstein, 2005; Künzli et al., 2005).

Many recent studies examined modification by SES indicators on the association between mortality and PM (O'Neill et al., 2003; Martins et al., 2004; Jerrett et al., 2004; Finkelstein et al., 2003; Romieu et al., 2004a) or other indices such as traffic density, distance to roadway or a general air pollution index (Ponce et al., 2005; Woodruff et al., 2003; Finkelstein et al., 2004). SES modification of NO_2 associations has been examined in fewer studies. For example, in a study conducted in Seoul, Korea, community-level SES indicators modified the association of air pollution with ED visits for asthma; of the five criteria air pollutants evaluated, NO_2 showed the strongest association in lower SES districts compared to high SES districts (Kim et al., 2007.) In addition, Clougherty et al. (2007) evaluated exposure to violence (a chronic stressor) as a modifier of the effect of traffic-related air pollutants, including NO_2, on childhood asthma. The authors reported an elevated risk of asthma with a 4.3-ppb increase in NO_2 exposure solely among children with above-median exposure to violence in their neighborhoods.

4.4. At-Risk Susceptible Population Estimates

Although NO_2-related health risk estimates may appear to be small, they may well be important from an overall public health perspective owing to the large numbers of persons in the potential risk groups. Several population groups have been identified as possibly having increased susceptibility or vulnerability to adverse health effects from NO_2, including children, older adults, and persons with preexisting pulmonary diseases. One consideration in the assessment of potential public health impacts is the size of various population groups that may be at increased risk for health effects associated with NO_2-related air pollution exposure. Table 4.4.1 summarizes information on the prevalence of chronic respiratory conditions in the U.S. population in 2004 and 2005 (National Center for Health Statistics, 2006a,b). Individuals with preexisting cardiopulmonary disease constitute a fairly large proportion of the population, with tens of millions of persons included in each disease category. Of most concern are those persons with preexisting respiratory conditions, with approximately 10% of adults and 13% of children having been diagnosed with asthma and 6% of adults with COPD (chronic bronchitis and/or emphysema).

There are approximately 2.5 million deaths from all causes per year in the U.S. population, with about 100,000 deaths from chronic lower respiratory diseases (Kochanek et al., 2004) and 4,000 from

asthma (NCHS, 2006c). For respiratory health diseases, there are nearly 4 million hospital discharges per year (DeFrances et al., 2005), 14 million ED visits (McCaig and Burt, 2005), 112 million ambulatory care visits (Woodwell and Cherry, 2004), and an estimated 700 million restricted-activity days per year due to respiratory conditions (Adams et al., 1999). Of the total number of visits for respiratory disease, 1.8 million annual ED visits were reported for asthma, including more than 750,000 visits by children. In addition, nearly 500,000 annual hospitalizations for asthma were reported (NCHS, 2006c).

Centers for Disease Control and Prevention (CDC) analyses have shown that the burden of asthma has increased over the past two decades (NCHS, 2006c). In 2005, approximately 22.2 million people (7.7% of the population) had asthma. The incidence was higher among children (8.9% of children) compared to adults (7.2%) (Note: 2004 data is shown in Table 4.4-1, with a prevalence of 6.7%). In addition, prevalence and severity is higher among certain ethnic or racial groups such as Puerto Ricans, American Indians, Alaskan Natives, and African Americans. The asthma hospitalization rate for black persons was 240% higher than for white persons. Puerto Ricans were reported to have the highest asthma death rate (360% higher than non-Hispanic white persons) and non-Hispanic black persons had an asthma death rate that was 200% higher than non-Hispanic white persons. Furthermore, a higher prevalence of asthma among persons of lower SES and an excess burden of asthma hospitalizations and mortality in minority and inner-city communities have been observed in several studies (Wright and Subramanian, 2007). Gender and age are also determinants of prevalence and severity: adult females had a 40% higher prevalence than adult males; and boys, a 30% higher prevalence than girls. Overall, females had a hospitalization rate about 35% higher than males.

Table 4.4-1. Prevalence of selected respiratory disorders by age group and by geographic region in the U.S.(2004 [U.S. Adults] and 2005 [U.S. Children] National Health Interview Survey).

CHRONIC CONDITION/DISEASE ADULTS (18+ YEARS)	AGE (YEARS)						REGION			
	ALL ADULTS		18-44	45-64	65-74	75+	NORTH-EAST	MID-WEST	SOUTH	WEST
	CASES ($\times 10^6$)	%	%	%	%	%	%	%	%	%
Asthma	14.4	6.7	6.4	7.0	7.5	6.6	6.8	6.8	6.0	7.5
COPD: Chronic Bronchitis	8.6	4.2	3.2	4.9	6.1	6.3	4.0	4.7	4.4	3.5
COPD: Emphysema	3.5	1.7	0.3	2	4.9	6.0	1.5	1.7	2.0	1.1
CHRONIC CONDITION/DISEASE CHILDREN (<18 YEARS)	ALL CHILDREN		0-4	5-11	12-17		NORTH-EAST	MID-WEST	SOUTH	WEST
	CASES ($\times 10^6$)	%	%	%	%		%	%	%	%
Respiratory Conditions	6.5	8.9	6.8	9.9	9.6		10.1	8.5	9.3	7.9

Source: National Center for Health Statistics (2006a,b)

In addition, population groups based on age group also comprise substantial segments of the population that may be potentially at risk for NO_2-related health impacts. Based on U.S. census data from 2000, about 72.3 million (26%) of the U.S. population are under 18 years of age, 18.3 million (7.4%) are under 5 years of age, and 35 million (12%) are 65 years of age or older. Hence, large proportions of the U.S. population are in age groups that are likely to have increased susceptibility and vulnerability for health effects from ambient NO_2 exposure.

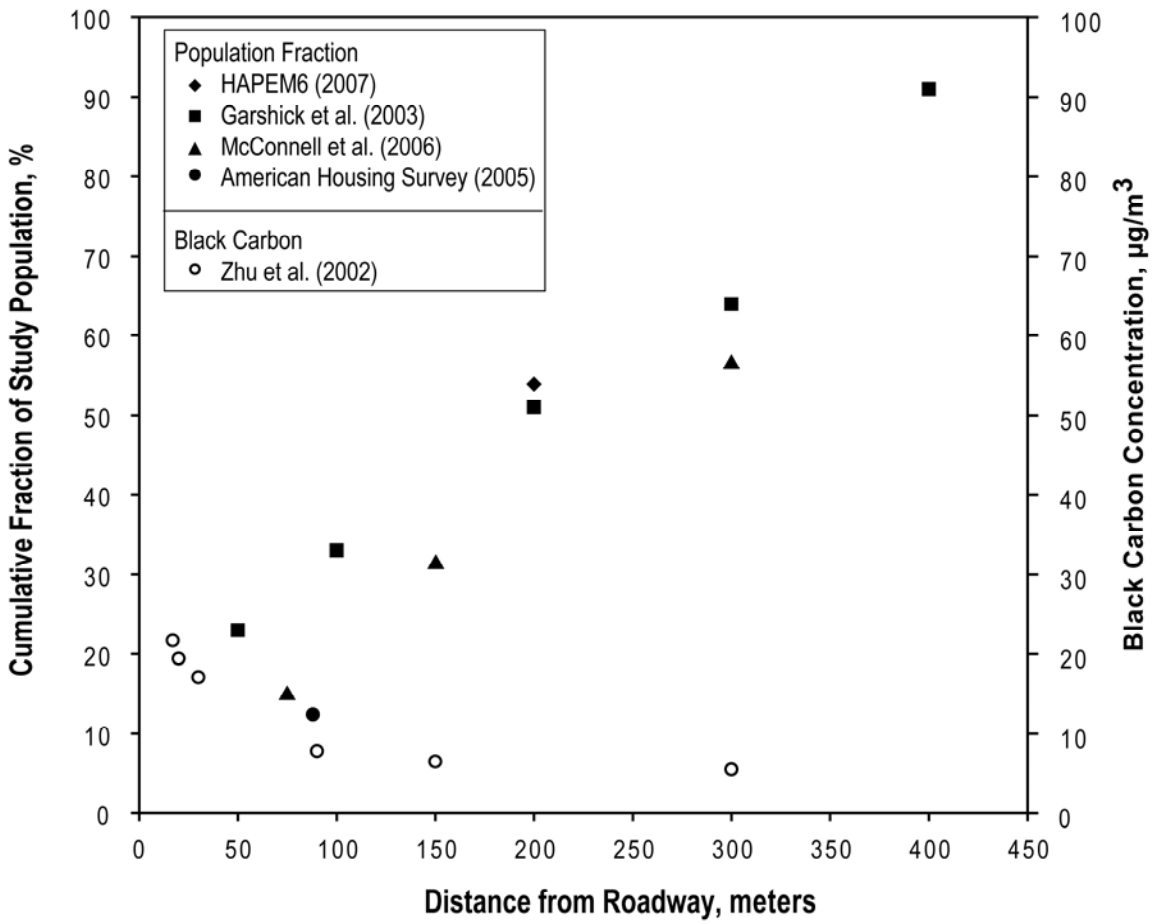


Figure 4.4-1. Fraction of the study populations living within a specified distance from roadways. For comparison, concentrations of the traffic pollutant black carbon are plotted as a function of distance from the roadway.

Based on data from the American Housing Survey, approximately 36 million persons live within 300 feet (~90 meters) of a four-lane highway, railroad, or airport and 12.6% of U.S. housing units are located within this distance (U.S. Census Bureau, 2006). Furthermore, several exposure studies offer insight into differential exposures to NO_2 from traffic in childhood. In California, 2.3% of schools, grades K–12, with a total enrollment of more than 150,000 students were located within ~500 feet (150 m) of high-traffic roads, and a higher proportion of nonwhite and economically disadvantaged students attended schools within close proximity to these high-traffic roadways (Green et al., 2004). Similar findings were reported for Detroit schoolchildren (Wu and Batterman, 2006). Figure 4.4-1 shows the proportion of study populations in Boston, MA (Garshick et al. 2003) and Los Angeles, CA (McConnell et al. 2006), the entire U.S. (American Housing Survey, 2005), and from population exposure models (HAPEM6, 2007) living within a certain distance from major roadways. It also presents results of air quality measurements showing the decrease in concentration of black carbon, a traffic-related pollutant, with increasing distance from the roadway. The considerable size of the population groups at risk indicate that exposure to ambient NO_2 could have an impact on public health in the U.S.

4.5. Summary of Public Health Issues

In the few studies that specifically examined concentration-response relationships between NO_2 and health outcomes, there was little evidence of an effect threshold. However, various factors, such as interindividual variation in response, additivity to background of effect and/or exposure, and measurement error tend to linearize the concentration-response relationship and obscure any population-level thresholds that might exist.

Persons with preexisting respiratory disease, children, and older adults may be more susceptible to the effects of NO_2 exposure. Individuals in sensitive groups may be affected by lower levels of NO_2 than the general population or experience a greater impact with the same level of exposure. A number of factors may increase susceptibility to the effects of NO_2. Studies generally reported a positive excess risk for asthmatics, and there was emerging evidence that CVD may cause persons to be more susceptible, though it is difficult to distinguish the effect of NO_2 from other traffic pollutants. Children and older adults (65+ years) may be more susceptible than adults, possibly due to physiological changes occurring among these age groups.

In addition to intrinsically susceptible groups, a portion of the population may be at increased vulnerability due to higher exposures, generally people living and working near roadways. A considerable fraction of the population resides, works, or attends school near major roadways. Of this population, those with physiological susceptibility will have even greater risks of health effects related to NO_2.

Effects on vegetation

EPA final rule (March 27, 2008)

Broader multi-state regions in the east (NC, TN, KY, IN, OH, PA, NJ, NY, DE, MD, VA) and west (CA, NV, AZ, OK, TX) are predicted to have levels of air quality above the W126 level of 21 ppm-hour, which is approximately equal to the secondary standard proposed in 1996 and is associated with approximately up to 10 percent biomass loss in 50 percent of tree seedling cases studied. Much of the east and Arizona and California have 12-hour W126 O3 levels above 13 ppm-hour which has been associated with approximately up to 10 percent biomass loss in 75 percent of tree seedling cases studied.

The Staff Paper presented an assessment combining recent U.S. Forest Service Forest Inventory and Analysis (FIA) biomonitoring site data with the county level air quality data for those counties containing the FIA biomonitoring sites. This assessment showed that incidence of visible foliar injury ranged from 21 to 39 percent of the counties during the four-year period (2001-2004) across all counties with air quality levels at or below that of the current 0.08 ppm 8-hour standard. **Of the counties that met an 8-hour level of 0.07 ppm in those years, 11 to 30 percent of the counties still had incidence of visible foliar injury.**

The magnitude of these percentages suggests that phytotoxic exposures sufficient to induce visible foliar injury would still occur in many areas after meeting the level of the current secondary standard or alternative 0.07 ppm 8-hour standard. While the data show that visible foliar injury occurrence is geographically widespread and is occurring on a variety of plant species in forested and other natural systems, linking visible foliar injury to other plant effects is still problematic. However, its presence indicates that other O_3-related vegetation effects might also be present.

"Technical Report on Ozone Exposure, Risk, and Impact Assessment for Vegetation," EPA January 2007 (prepared by Abt Associates, Bethesda, Md.) (from page 95)

7.1 Summary of Results

The simulations produced a prediction of average annual total tree growth over the 3-year period for each scenario. These results were compared to the base scenario, which consisted of a prediction of growth under the hourly meteorology and O3 conditions for the period 1993-1995.

The predictions indicated substantial increases in 3-year total tree growth increments with reduction of O3 exposure, particularly under Scenario 3, a rollback to conform to the standard of the 1st highest maximum 8-hour average being no greater than 0.070 ppm. Yellow poplar had nearly a twenty percent increase in growth in response to this scenario, an average annual increase of 6.5%.

Dr. Ellis Cowling
North Carolina State University March 2, 2007
Comments on EPA staff paper, section on effects on vegetation

Ozone and other oxidants cause stress in plants and thus predispose both individual plants and whole ecosystems to attack by natural enemies that include disease- and injury-inducing bacteria, fungi, nematodes, viruses, and insects. In some cases, exposure to high concentrations of ozone also decreases the resistance of plants to injury and damage by abiotic stress factors such as drought and frost.

Different species and varieties of plants vary widely in susceptibility to ozone and other oxidants. Many species of crop plants, forest and shade trees, and some of the multiple-species of plants in natural ecosystems are more sensitive to injury and damage by ozone than most people. ***That is, many plants show visible symptoms of injury at concentrations of ozone that are considerably lower (40 to 60 ppb of ozone) than the 80 to 120 ppb of ozone that are generally recognized to cause ill-health in people.***

The injurious effects of ozone and other oxidants on plants and ecosystems are CUMULATIVE in their effects rather than acute or chronic in their effects as is found for most health effects of ozone on people.

Re: Indirect greenhouse gases CO, NOx, NMVOCs, and SO2 (from EPA report on Greenhouse Gases, 1990-2006)

These gases do not have a direct global warming effect, but indirectly affect terrestrial radiation absorption by influencing the formation and destruction of tropospheric and stratospheric ozone, or, in the case of SO2, by affecting the absorptive characteristics of the atmosphere. Additionally, some of these gases may react with other chemical compounds in the atmosphere to form compounds that are greenhouse gases.

The short-lived gases such as water vapor, carbon monoxide, tropospheric ozone, ozone precursors (e.g., NOx and NMVOCs), and tropospheric aerosols (e.g., SO2 products and carbonaceous particles), however, vary regionally, and consequently it is difficult to quantify their global radiative forcing impacts. No GWP values are attributed to these gases that are short-lived and spatially inhomogeneous in the atmosphere.

New Ozone Standard May Increase Region's Air Quality Action Days; Montgomery County Will Continue Free Bus Service on Code Red and Purple Days

5/15/08 -- As the summer season approaches, Montgomery County residents are reminded that the County's Ride On bus service will continue to offer free rides on Code Red and Code Purple Air Quality Action days. Residents in the Washington D.C. region may experience more Air Quality Action days this year because the U.S. Environmental Protection Agency (EPA) revised the National Ambient Air Quality Standard (NAAQS) for ozone in March to better protect public health and welfare. A Code Orange air quality forecast indicates air quality that fails to meet the new strengthened Federal standards.

Montgomery County was the first jurisdiction in the region to offer free rides on Code Red days because vehicles generate 30 to 40 percent of the pollutants that cause ozone in the Baltimore/Washington area.

"**Maryland's suburban Washington region suffers from some of the worst air pollution in the nation -- and the failure to address this situation is impacting public health and our economy**," said Montgomery County Executive Isiah Leggett. "Montgomery County is aggressively working to improve our air quality and mitigate emissions at a local level. We hope that residents, particularly on unhealthy air quality days, will also take simple steps like taking transit or carpooling and delaying outdoor mowing and painting to help protect our environment."

Ozone has been shown to cause **bronchitis, nonfatal heart attacks and premature death; increase hospital and emergency room visits, and aggravate asthma.** Repeated exposure to ozone **also damages sensitive vegetation and trees,** leading to increased susceptibility to disease, pests and damaged foliage.

The Air Quality Index (AQI), EPA's tool for communicating air quality to the public, was also updated to reflect the change in the health standard. Under the new standards, Air Quality Index (AQI) levels for Code Orange and Code Red days will now be reached at lower ozone concentrations. The AQI includes five color codes: Code Green for good air quality; Code Yellow for moderate air quality; Code Orange, considered unhealthy for sensitive groups; Code Red which is unhealthy and indicates everyone should limit outdoor activities; and Code Purple for very unhealthy air quality. Code Orange days will be determined when

ozone levels reach the lower standard of 75 parts per billion (ppb) as opposed to 84 ppb under the previous standard, and Code Red days will now occur when the ozone level reaches 96 ppb instead of the previous level of 105 ppb.

Unhealthy levels of ozone occur in the summer as strong sunlight reacts with volatile organic compounds (VOC's), nitrogen oxides and other chemicals. Ozone-forming pollutants originate from vehicles, **[**gas-powered**]** lawnmowers, **[**edgers, trimmers, and blowers**]** and boats; emissions from power plants and other fuel burning equipment; and vapors from gasoline, paints and industrial processes.

Residents can reduce their impact on air quality if they:

-- Carpool, telecommute, or take mass transit to work (ONLY Code Red and Purple are ride free days in Montgomery County for both Ride On and Metrobus);

-- Limit driving and combine errands;

-- Refuel after dark;

-- **Avoid using gasoline-powered lawn equipment**, including mowers;

-- Wait for a cooler day to use oil-based paints or switch to non-solvent or low VOC based paints;

-- Avoid using aerosols and household products that contain solvents;

-- Bring a lunch to work to avoid mid-day driving; and

-- Conserve energy - at home, at work, and everywhere.

Every summer day, gas-powered lawn and garden equipment releases more than 100 times the VOC's of a typical large industrial plant. For every person who postpones lawn mowing on Air Quality Action days, potential VOC reductions equal the amount generated by a car driving from Baltimore to Raleigh, North Carolina.

Although the Washington region has successfully lowered overall pollution and reduced the number of Code Red days each summer, the area is still in violation of Federal air quality standards established under the Clean Air Act for ozone and particulate matter. In addition to concerns about public health effects caused by

poor air quality, the region could also lose federal funds for highway projects if Federal standards are not met. This could ultimately lead to even worse levels of congestion and air quality.

For more information visit the County's Department of Environmental Protection's website at www.montgomerycountymd.gov/dep, or call **240-777-7700**. For information on Ride On bus schedules, call the Transit Information Center at **240-777-7433**, or check the Countys web site at www.montgomerycountymd.gov/rideon.

Just the Facts About ...

Lawn and Garden Equipment

From the Ambient Air Quality Series

Your Yard and Clean Air

Most people don't think about air pollution when mowing the lawn, using the leaf blower or trimming the bushes. Emissions from lawn and garden equipment like lawnmowers, chain saws, leaf blowers, string trimmers and other gasoline-powered outdoor equipment are a significant source of pollution. The small engines that power today's lawn and garden equipment are not controlled or maintained in the same way that engines on cars are, so they emit high levels of carbon monoxide (CO), volatile organic compounds (VOCs) as well as nitrogen oxides (NOx) and particulate matter (PM). These pollutants have negative health effects, and VOCs and NOx are the primary contributors to the formation of ground-level ozone, a key component of smog. Ground-level ozone is a particular problem in this region.

Small Engine Rules

The first time engine manufacturers had to consider controlling emissions was in 1997, when the U.S. Environmental Protection Agency's (EPA's) rules for controlling pollution from lawn and garden equipment went into effect. These 1997 rules, called Phase 1, are for small spark-ignition engines of 25 HP or less (string trimmers, leaf blowers, chain saws and lawnmowers, lawn tractors). The regulation sets allowable exhaust levels for VOCs, CO, and NOx. The rule applies to all small engines produced after September 1, 1997 and are expected to result in a 32 percent reduction in VOC emissions from these engines. A second set of rules will be phased in from 2001 through 2007 and will require manufacturers to make more durable, fuel-efficient equipment. These engine standards will result in an additional 59 percent reduction in both VOC and NOx emissions beyond the 32 percent from the 1997 rules. Even though new engines will be getting cleaner over the next several years, chances are the lawn and garden equipment you are using right now is still emitting a lot of pullution. Until you buy one of the cleaner, more efficient models, you can reduce your personal contribution to the air pollution problem by adopting practices that will help protect the environment.

Gas Can Rules

Not only is your gas-powered lawn and garden equipment contributing large amounts of pollutants, but the storage of fuel in portable-cans also results in the release of volatile organic compounds. The average VOC emissions from a protable gas can are about 0.027 lbs/day. This consists of permeation (of vapors through the walls in plastic containers), spillage and overfilling, and displaced vapor (during refueling) emissions. About 71 percent of these are diurnal emissions, which result when stored fuel vapors escape through any possible openings while the gas can is subjected to the daily cycle of increasing and decreasing ambient temperatures. Maryland has proposed new regulations for gas cans, including automatic shut-off, automatic closure, one opening for dispensing and refilling, flow rates based upon container capacity and a permeation standard. These standards will obtain a 75 percent reduction in VOC emissions or about 0.02 lbs. VOC/day less emissions than a conventional can.

Ozone and Montgomery County

Ozone is a colorless gas that can be found in the air we breathe. Each molecule of ozone is composed of three atoms of oxygen, one more than the oxygen molecule we need to

breathe to sustain life. The additional oxygen atom makes ozone extremely reactive. Ozone exists naturally in the Earth's upper atmosphere, known as the stratosphere, where it shields the Earth from the sun's ultraviolet rays. However, ozone is also found close to the Earth's surface. This ground-level ozone is a harmful air pollutant.

Ground-level or "bad ozone" is created when intense sunlight reacts with nitrogen oxides (NOx) and volatile organic compounds (VOCs). High concentrations of ground-level ozone occur during hot, sunny days, when the flow of air is limited or stagnant and a mixture of VOCs and NOx is present. The main ozone-causing pollutants, VOCs and NOx, come from many sources such as the fumes from vehicles, lawnmowers, and boats, or emissions from power plants and industrial facilities.

Ozone is a serious issue in Montgomery County. Montgomery County is part of the Washington Metropolitan "severe" non-attainment area for the EPA's one-hour ozone standard. Currently, The National Ambient Air Quality Standard for ozone is a one-hour standard of 120 ppb. The one-hour standard was revised in July 1997 when the EPA issued a new 8-hour average standard of 80 ppb. A 1999 court ruling had blocked promulgation of the 8-hour standard. Recently, however, the Court of Appeals, upheld the stricter 8-hour standard. During recent summers, there have been an average of approximately five days during which the region experienced Code Red conditions (violations of the one-hour standard). There have been an average of 31 Code Orange condition days (violations of the 8-hour standard) during recent summers.

Montgomery County Actions--The "Reel Solution to Pollution Program"

In order to encourage residents to utilize alternatives to the gas-powered lawn and garden equipment, the Montgomery County Department of Environmental Protection will be conducting a rebate exchange program. In conjunction with a household hazardous waste collection day, Montgomery County residents will have the opportunity to scrap their gas powered lawn and garden equipment. Residents that reserve a rebate check with the Department of Environmental Protection will be given a rebate check for the following amounts provided the equivalent gas powered lawn and garden equipment is scrapped on that date and proof of purchase is provided for a:

1. a "reel" push mower-$50 rebate check
2. an electric leaf blower-$25 rebate check
3. an electric trimmer-$25 rebate check

Additionally, the Department of Environmental Protection will be offering a gas can exchange program. The first 288 residents to reserve a new gas can, will receive a new gas can when they scrap their old gas cans.

What Can You Do?

♦Avoid Spilling Gasoline- purchase a new spill proof gas can

♦Follow the manufacturer's guidelines for maintenance of you lawn and garden equipment.

♦Consider purchasing a "reel" mower or an electric mower. There is no gas or oil required with an electric mower, however there is pollution generated from the electricity.

♦Decrease lawn area by planting additional trees and shrubs to reduce the energy cost of heating and cooling your house.

♦Do not mow your lawn on code red forecasted days.

Did You Know?

♦One lawnmower run for 1 hour emits ozone precursors equal to one car driven for 635 miles.

♦Air pollution costs the nation approximately $50 Billion in health care costs each year.

♦Approximately 30% of all the nitrogen compounds that enter the bay are deposited from the air.

Printed on 100% recycled paper, 50% post-consumer waste, 100% processed chlorine free.

For more information:

Department of Environmental Protection / Montgomery County, Maryland
255 Rockville Pike, Suite 120, Rockville, MD 20850
240.777.7770 fax: 240.777.7765
e-mail: help@askDEP.com

askDEP.com
We've got answers!

Regulatory Announcement

EPA Finalizes Emission Standards for New Nonroad Spark-Ignition Engines, Equipment, and Vessels

The U.S. Environmental Protection Agency (EPA) is adopting new exhaust emission standards for marine spark-ignition engines and small land-based nonroad engines. EPA is also adopting evaporative emission standards for equipment and vessels using these engines. These standards apply only to newly manufactured products. The standards will reduce the harmful health effects of ozone and carbon monoxide from these engines, equipment, and vessels.

Which engines and vehicles are affected?

We are adopting new standards for emissions of hydrocarbons (HC), nitrogen oxides (NOx), and carbon monoxide (CO) from a variety of nonroad engines, equipment, and vessels that cause or contribute to air pollution. The controls for these products have been combined into one rulemaking because these engines and vehicles share many common characteristics. Differences in their design and use led us to adopt separate emission standards for each group.

- Small Nonroad Spark-Ignition Engines and Equipment: Spark-ignition (SI) nonroad engines rated below 25 horsepower (19 kW) used in household and commercial applications, including lawn and garden equipment, utility vehicles, generators, and a variety of other construction, farm, and industrial equipment.
- Marine Spark-Ignition Engines and Vessels: Spark-ignition engines used in marine vessels, including outboard engines, personal watercraft, and sterndrive/inboard engines.

United States Environmental Protection Agency

Office of Transportation and Air Quality
EPA420-F-08-013
September 2008

What are the differences between the final rule and the proposed rule?

Several minor changes from the proposed rule are being adopted in the final rule. These changes reflect important cooperative efforts between EPA and the regulated industries to implement cleaner technology as early as possible while still providing communities across the United States with needed emissions reductions.

First, the implementation dates for Marine Outboard/Personal Watercraft (OB/PWC) and Sterndrive/Inboard (SD/I) exhaust emissions standards are being delayed one year to allow sufficient time for manufacturers to convert their entire product line-ups to lower emissions simultaneously while adopting to supplier changes. Second, modifications are being made to the Marine SD/I High Performance (>373 kW) exhaust emissions requirements to reflect the limitations of catalyst technology on these engines. Lastly, we are adopting provisions for cold weather evaporative emission standards to reflect the capability of fuel line materials and adding a phase-in for marine diurnal standards. Both of these changes will enhance the safety of the new requirements.

Why is EPA regulating these engines, equipment, and vessels?

The engines and vehicles covered by this rule are significant sources of air pollution. They account for about 26 percent of mobile source VOC emissions and 23 percent of mobile source carbon monoxide emissions. With the new controls, VOC pollutants will be further reduced by 34 percent for Small SI engines and 70 percent for Marine SI engines by 2030. With the new controls, CO pollutants will be further reduced by 9 percent for Small SI engines and 19 percent for Marine SI engines by 2030.

The new standards continue the process of establishing nonroad standards as required by the Clean Air Act. We are required to study emissions from nonroad engines and vehicles and to set emissions standards if the level of pollutants from these sources cause or significantly contribute to air pollution and, more specifically, if the emissions of CO, NOx or hydrocarbons contribute significantly to the formation of ozone and carbon monoxide in more than one area of the country currently not meeting ozone and carbon monoxide standards. We completed the Nonroad Engine and Vehicle Emission Study in 1991, and in 1994 determined that these sources contribute significantly to ozone or CO nonattainment. We have already set emission standards for most nonroad engines, including farm and construction equipment, locomotives, commercial marine, and recreational vehicles.

What are the New Requirements?

The new requirements vary depending on the kind of engine or vehicle. In developing these requirements, we considered specific factors for each type. Among the factors considered were the environmental impacts, the number of hours each year that the engine is used, the need for high-performance operation, and the costs. The new requirements for each type of engine and vehicle are:

Small Nonroad Engines

We are adopting HC+NOx exhaust emission standards of 10 g/kW-hr for Class I engines starting in the 2012 model year and 8 g/kW-hr for Class II engines starting in the 2011 model year. We expect manufacturers to meet these standards by improving fuel systems, engine combustion and in some cases adding catalysts. These standards are consistent with the requirements recently adopted by the California Air Resources Board (ARB). We are not adopting new exhaust emission standards for handheld emissions.

For spark-ignition engines used in marine generators, we are adopting a more stringent Phase 3 CO emission standard of 5 g/kW-hr. This applies equally to all sizes of small SI engines used in marine generators.

We are adopting new evaporative emission standards for both handheld and nonhandheld equipment. The new standards include requirements to control fuel tank permeation, fuel line permeation, and diffusion emissions. For nonhandheld engines we also require control of running losses.

When fully implemented, the new standards will result in a 35 percent reduction in HC+NOx emissions from new engines' exhaust. The new standards will reduce evaporative emissions by 45 percent.

Marine spark-ignition engines and vessels

We are adopting a more stringent level of emission standards for outboard and personal watercraft engines starting with the 2010 model year. The HC+NOx standard for engines producing less than or equal to 4.3 kW maximum power is 30 g/kWh and for engines producing greater than 4.3 kW have a standard that gradually increases based on the engine's maximum power. The CO standard for engines producing less than or equal to 40 kW gradually increases based on the engine's maximum power. The CO standard for engines with maximum power greater than 40 kW is 300 g/kWh. We expect manufacturers to meet these standards with improved fueling systems and other in-cylinder controls. The federal levels of the HC+NOx standards are consistent with the requirements recently adopted by California ARB with the addition of a first-ever CO standard for this category of nonroad engines.

We are adopting new exhaust emission standards for sterndrive and inboard marine engines. The standards are 5 g/kW-hr for HC+NOx and 75 g/kW-hr for CO starting with the 2010 model year. We expect manufacturers to meet these standards with three-way catalysts and closed-loop fuel injection. To ensure proper functioning of these emission control systems in use, we will require manufacturers to diagnose engines for failure in the emission control system.

For sterndrive and inboard marine engines above 373 kW with high-performance characteristics (generally referred to as "SD/I high-performance engines"), we are adopting a CO standard of 350 g/kW-hr. We are adopting a HC+NOx standard of 20 g/kWh for high-performance engines producing between 373 and 485 kW in 2010 followed by a tightened standard of 16 g/kWh in 2011. For high-performance engines producing greater than 485 kW, we are adopting a HC+NOx standard of 25 g/kWh in 2010 and 22 g/kWh in 2011. We are also adopting a variety of other special provisions for high-performance engines to reflect unique operating characteristics.

The emission standards described above relate to engine operation over a prescribed duty cycle for testing in the laboratory. We are also adopting "not-to-exceed" standards that require manufacturers to maintain a certain level of emission control when engines operate under normal speed-load combinations that are not included in the certification duty cycle.

We are also adopting new standards to control evaporative emissions for all vessels using marine spark-ignition engines. The new standards include requirements to control fuel tank permeation, fuel line permeation, and diurnal fuel tank vapor emissions, including provisions to ensure that refueling emissions do not increase.

When fully implemented, the new standards will result in an estimated 70 percent reduction in HC+NOx emissions and a 50 percent reduction in CO from new SD/I engines' exhaust. The standards will also result in a 60 percent reduction in HC+NOx emissions from OB/PWC engines. The new standards will reduce evaporative emissions by about 70 percent.

Health and Environmental Benefits

We estimate that by 2030, the new standards will result in significant annual reductions of pollutant emissions from regulated engine and equipment sources nationwide, including approximately 600,000 tons of volatile organic hydrocarbon emissions, 130,000 tons of NOx emissions, and 5,500 tons of direct particulate matter ($PM_{2.5}$) emissions. These reductions correspond to significant reductions in the formation of ground-level ozone and ambient $PM_{2.5}$. We also expect to see annual reductions of 1.5 million tons of carbon monoxide emissions, with the greatest reductions in situations where there have been problems with individual exposures. The final rule will result in substantial benefits to public health and welfare and the environment. We estimate that by 2030, on an annual basis, these emission reductions will prevent 230 PM-related premature deaths, between 77 and 350 ozone-related premature deaths, approximately 1,700 hospitalizations and emergency room visits, 23,000 work days lost, 180,000 lost school days, 590,000 acute respiratory symptoms, and other quantifiable benefits every year. The total estimated annual benefits of this rule in 2030 are approximately between $1.6 and $4.4 billion. Estimated costs in 2030 are many times less, at approximately $190 million.

Costs

The estimated annualized cost of the new exhaust and evaporative emissions standards is $391 million, assuming a seven percent discount rate over 30 years. The corresponding annualized fuel savings due to more efficient controls is $155 million. As a result, the net annualized cost of the program is $236 million.

The results of the economic impact modeling performed for the Small SI and Marine SI engines and equipment control programs suggest that the social costs of those programs are expected to be about $459 million in 2030 with consumers of these products expected to bear about 86 percent of these costs. We estimate fuel savings of about $273 million in 2030 that will accrue to consumers.

For More Information

You can access the rule and related documents on EPA's Office of Transportation and Air Quality (OTAQ) Web site at:

www.epa.gov/otaq/equip-ld.htm or www.epa.gov/otaq/marinesi.htm

For more information on this rule, please contact the Assessment and Standards Division at:

U.S. Environmental Protection Agency
Office of Transportation and Air Quality
2000 Traverwood Drive
Ann Arbor, MI 48105
Information Line:734-214-4636
E-mail: asdinfo@epa.gov

Obama

. Homes have been lost, jobs shed, businesses shuttered. Our health care is too costly, our schools fail too many, and each day brings further evidence that the ways we use energy strengthen our adversaries and threaten our planet.

These are the indicators of crisis, subject to data and statistics. Less measurable, but no less profound, is a sapping of confidence across our land, a nagging fear that America's decline is inevitable, that the next generation must lower its sights.

From proposal on non-road SI engine emissions, May 18, 2007 (Page 28107)

"States with 8-hour ozone nonattainment areas will be required to take action to bring those areas into compliance in the future. Based on the final rule designating and classifying 8-hour ozone nonattainment areas (69 FR 23951, April 30, 2004), most 8-hour ozone nonattainment areas will be required to attain the 8-hour ozone NAAQS in the 2007 to 2014 time frame and then be required to maintain the 8-hour ozone NAAQS thereafter. Emissions of ozone precursors from the engines, vessels and equipment subject to the proposed standards contribute to ozone in many, if not all, of these areas. Therefore, the expected HC and NOX reductions from the standards proposed in this action will be useful to states in attaining or maintaining the 8-hour ozone NAAQS."

Vegetation effects (p. 28107)

"Ozone contributes to many environmental effects, with impacts to plants and ecosystems being of most concern. Ozone can produce both acute and chronic injury in sensitive species depending on the concentration level and the duration of the exposure. Ozone effects also tend to accumulate over the growing season of the plant, so that even lower concentrations experienced for a longer duration have the potential to create chronic stress on vegetation.

"Ozone damage to plants includes visible injury to leaves and a reduction in food production through impaired photosynthesis, both of which can lead to reduced crop yields, forestry production, and use of sensitive ornamentals in landscaping. In addition, the reduced food production in plants and subsequent reduced root growth and storage below ground, can result in other, more subtle plant and ecosystems impacts. These include increased susceptibility of plants to insect attack, disease, harsh weather, interspecies competition and overall decreased plant vigor."

Health and environmental effects. Costs to society exceed the benefits to private users; market cannot correct "negative externality" (Pages 28105-6)

"The health and environmental effects associated with emissions from Small SI engines and equipment and Marine SI engines and vessels are a classic example of a negative externality (an activity that imposes uncompensated costs on others). With a negative externality, an activity's social cost (the cost on society imposed as a result of the activity taking place) exceeds its private cost (the cost to those directly engaged in the activity). In this case, as described in this section, emissions from Small SI engines and equipment and Marine SI engines and vessels impose

public health and environmental costs on society. The market system itself cannot correct this externality. The end users of the equipment and vessels are often unaware of the environmental impacts of their use for lawn care or recreation. Because of this, consumers fail to send the market a signal to provide cleaner equipment and vessels. In addition, producers of these engines, equipment, and vessels are rewarded for emphasizing other aspects of these products (*e.g.*, total power). To correct this market failure and reduce the negative externality, it is necessary to give producers social cost signals. The standards EPA is proposing will accomplish this by mandating that Small SI engines and equipment and Marine SI engines and vessels reduce their emissions to a technologically feasible limit. In other words, with this proposed rule the costs of the services provided by these engines and equipment will account for social costs more fully."

From press release on first non-road SI engine rule (2000)

www.epa.gov/ttn/chief/conference/ei16/session4

http://www.epa.gov/otaq/regs/nonroad/equip-ld/hhsfrm/f00007.htm

For the handheld categories, Class III and IV engines are used primarily in residential equipment such as string trimmers, leaf blowers and chainsaws.

Health and Environmental Benefits

The Phase 2 handheld engine standards will result in a 70 percent reduction in HC+NOx emissions from these engines beyond the 32 percent reduction expected from the Phase 1 standards. This is equivalent to an annual reduction of 500,000 tons of exhaust HC+NOx emissions by the year 2027. This reduction in HC+NOx emissions will be accompanied by an overall reduction in fuel consumption.

Small SI engines currently produce approximately one tenth of U.S. mobile source HC emissions and are the largest single contributor to nonroad HC inventories. Thus, the Phase 2 standards will help the States in their progress towards compliance with the NAAQS for ozone.

Both HC and NOx contribute to the formation of tropospheric ozone through a complex series of reactions. In a recent report, researchers emphasize that both HC and NOx controls are needed in most areas of the United States. EPA's primary reason for controlling emissions from small SI handheld engines is the role of their HC emissions in forming ozone. Of the major air pollutants for which National Ambient Air Quality Standards have been designated under the Clean Air Act, the most widespread problem continues to be ozone, which is the most important component of smog.

The Phase 2 standards will generate significant reductions in emissions from these engines with small increases in cost. Table 4 presents the estimated average price increase for handheld equipment due to the Phase 2 standards.

Base Year U.S. Population Estimates in Final NONROAD2005*

Year	SCC	Equipment Description	HPmin	HPmax	HPavg	Population
1998	2265003070	4-Str Terminal Tractors	50	75	58.19	411
1998	2265003070	4-Str Terminal Tractors	75	100	98.62	188
1998	2265003070	4-Str Terminal Tractors	100	175	114.2	739
1998	2265003070	4-Str Terminal Tractors	175	300	250	9
1998	2267003070	LPG - Terminal Tractors	25	40	35	11
1998	2267003070	LPG - Terminal Tractors	50	75	57	388
1998	2267003070	LPG - Terminal Tractors	75	100	97	147
1998	2267003070	LPG - Terminal Tractors	100	175	104	730
1998	2267003070	LPG - Terminal Tractors	175	300	190	0
1998	2268003070	CNG - Terminal Tractors	50	75	62	23
1998	2268003070	CNG - Terminal Tractors	75	100	94	41
1998	2268003070	CNG - Terminal Tractors	100	175	125	9
1998	2268003070	CNG - Terminal Tractors	175	300	250	9
1996	2265004010	4-Str Lawn mowers (res)	1	3	2.55	636,892
1996	2265004010	4-Str Lawn mowers (res)	3	6	4.1	31,652,672
1996	2265004010	4-Str Lawn mowers (res)	6	11	6.24	10,436
1996	2265004011	4-Str Lawn mowers (Com)	1	3	2.55	29,577
1996	2265004011	4-Str Lawn mowers (Com)	3	6	4.1	1,469,938
1996	2265004011	4-Str Lawn mowers (Com)	6	11	6.24	485
1998	2260004015	2-Str Rotary Tillers < 6 HP (res)	0	1	0.957	59,060
1998	2260004015	2-Str Rotary Tillers < 6 HP (res)	1	3	2.514	417,521
1998	2265004015	4-Str Rotary Tillers < 6 HP (res)	3	6	4.712	2,965,010
1998	2260004016	2-Str Rotary Tillers < 6 HP (com)	0	1	0.957	9,855
1998	2260004016	2-Str Rotary Tillers < 6 HP (com)	1	3	2.514	69,668
1998	2265004016	4-Str Rotary Tillers < 6 HP (com)	3	6	4.712	494,745
1996	2260004020	2-Str Chain Saws < 6 HP (res)	1	3	2.11	5,150,700
1996	2260004020	2-Str Chain Saws < 6 HP (res)	3	6	3.916	0
1996	2260004021	2-Str Chain Saws < 6 HP (com)	1	3	2.11	159,300
1996	2260004021	2-Str Chain Saws < 6 HP (com)	3	6	3.916	560,500
1996	2260004025	2-Str Trimmers/Edgers/Brush Cutter (res)	0	1	0.81	3,850,000
1996	2260004025	2-Str Trimmers/Edgers/Brush Cutter (res)	1	3	1.4	9,750,000
1996	2260004025	2-Str Trimmers/Edgers/Brush Cutter (res)	3	6	3.3	0
1996	2260004026	2-Str Trimmers/Edgers/Brush Cutter (com)	0	1	0.81	0
1996	2260004026	2-Str Trimmers/Edgers/Brush Cutter (com)	1	3	1.4	1,680,650
1996	2260004026	2-Str Trimmers/Edgers/Brush Cutter (com)	3	6	3.30	119,350
1996	2265004025	4-Str Trimmers/Edgers/Brush Cutter (res)	3	6	3.3	222,344
1996	2265004025	4-Str Trimmers/Edgers/Brush Cutter (res)	6	11	7.9	0
1996	2265004025	4-Str Trimmers/Edgers/Brush Cutter (res)	11	16	16	0
1996	2265004025	4-Str Trimmers/Edgers/Brush Cutter (res)	16	25	18.00	0
1996	2265004026	4-Str Trimmers/Edgers/Brush Cutter (com)	3	6	3.3	26,363
1996	2265004026	4-Str Trimmers/Edgers/Brush Cutter (com)	6	11	7.9	7,052
1996	2265004026	4-Str Trimmers/Edgers/Brush Cutter (com)	11	16	16	373
1996	2265004026	4-Str Trimmers/Edgers/Brush Cutter (com)	16	25	18	809
1996	2260004030	2-Str Leafblowers/Vacuums (res)	0	1	0.84	570,000
1996	2260004030	2-Str Leafblowers/Vacuums (res)	1	3	1.41	6,330,000
1996	2260004030	2-Str Leafblowers/Vacuums (res)	3	6	3.42	0
1996	2260004031	2-Str Leafblowers/Vacuums (com)	0	1	0.84	0
1996	2260004031	2-Str Leafblowers/Vacuums (com)	1	3	1.41	510,000

Base Year U.S. Population Estimates in Final NONROAD2005*

Year	SCC	Equipment Description	HPmin	HPmax	HPavg	Population
1996	2260004031	2-Str Leafblowers/Vacuums (com)	3	6	3.42	190,000
1996	2265004030	4-Str Leafblowers/Vacuums (res)	3	6	3.4	358,692
1996	2265004030	4-Str Leafblowers/Vacuums (res)	6	11	8.3	0
1996	2265004030	4-Str Leafblowers/Vacuums (res)	11	16	14.23	0
1996	2265004030	4-Str Leafblowers/Vacuums (res)	16	25	20.96	0
1996	2265004031	4-Str Leafblowers/Vacuums (com)	3	6	3.4	29,083
1996	2265004031	4-Str Leafblowers/Vacuums (com)	6	11	8.3	284,431
1996	2265004031	4-Str Leafblowers/Vacuums (com)	11	16	14.2	8,959
1996	2265004031	4-Str Leafblowers/Vacuums (com)	16	25	21.0	9,747
1996	2265004031	4-Str Leafblowers/Vacuums (com)	25	40	31	742
1996	2265004031	4-Str Leafblowers/Vacuums (com)	50	75	61.21	5,061
1996	2265004031	4-Str Leafblowers/Vacuums (com)	100	175	120.8	5,020
1998	2260004035	2-Str Snowblowers (res)	1	3	2.921	966,993
1998	2260004035	2-Str Snowblowers (res)	3	6	4.686	1,480,768
1998	2265004035	4-Str Snowblowers (res)	6	11	8.699	2,498,136
1998	2265004035	4-Str Snowblowers (res)	11	16	12.59	116,759
1998	2260004036	2-Str Snowblowers (com)	1	3	2.921	107,444
1998	2260004036	2-Str Snowblowers (com)	3	6	4.686	164,530
1998	2265004036	4-Str Snowblowers (com)	6	11	8.699	277,571
1998	2265004036	4-Str Snowblowers (com)	11	16	12.59	12,973
1998	2265004040	4-Str Rear Engine Riding Mowers (res)	3	6	5.105	6,954
1998	2265004040	4-Str Rear Engine Riding Mowers (res)	6	11	9.153	1,006,160
1998	2265004040	4-Str Rear Engine Riding Mowers (res)	11	16	12.61	780,271
1998	2265004040	4-Str Rear Engine Riding Mowers (res)	16	25	18.26	3,691
1998	2265004041	4-Str Rear Engine Riding Mowers (com)	3	6	5.105	186
1998	2265004041	4-Str Rear Engine Riding Mowers (com)	6	11	9.153	26,858
1998	2265004041	4-Str Rear Engine Riding Mowers (com)	11	16	12.61	20,829
1998	2265004041	4-Str Rear Engine Riding Mowers (com)	16	25	18.26	99
1998	2265004046	4-Str Front Mowers (com)	6	11	8	27,794
1998	2265004046	4-Str Front Mowers (com)	11	16	13.47	94,937
1998	2265004046	4-Str Front Mowers (com)	16	25	17	41,976
1998	2265004046	4-Str Front Mowers (com)	25	40	32.27	630
1998	2265004051	4-Str Shredders < 6 HP (com)	1	3	2.986	101,841
1998	2265004051	4-Str Shredders < 6 HP (com)	3	6	4.835	199,316
1998	2265004055	4-Str Lawn & Garden Tractors (res)	3	6	5.002	24,846
1998	2265004055	4-Str Lawn & Garden Tractors (res)	6	11	9.735	778,998
1998	2265004055	4-Str Lawn & Garden Tractors (res)	11	16	13.61	8,655,718
1998	2265004055	4-Str Lawn & Garden Tractors (res)	16	25	18.41	2,821,097
1998	2265004056	4-Str Lawn & Garden Tractors (com)	3	6	5.002	663
1998	2265004056	4-Str Lawn & Garden Tractors (com)	6	11	9.735	20,795
1998	2265004056	4-Str Lawn & Garden Tractors (com)	11	16	13.61	231,056
1998	2265004056	4-Str Lawn & Garden Tractors (com)	16	25	18.41	75,306
1998	2265004066	4-Str Chippers/Stump Grinders (com)	3	6	3.5	34
1998	2265004066	4-Str Chippers/Stump Grinders (com)	6	11	9.791	1,678
1998	2265004066	4-Str Chippers/Stump Grinders (com)	11	16	15.32	6,916
1998	2265004066	4-Str Chippers/Stump Grinders (com)	16	25	20.05	13,034
1998	2265004066	4-Str Chippers/Stump Grinders (com)	25	40	35.1	984
1998	2265004066	4-Str Chippers/Stump Grinders (com)	50	75	60.77	4,199

Base Year U.S. Population Estimates in Final NONROAD2005*

Year	SCC	Equipment Description	HPmin	HPmax	HPavg	Population
1998	2265004066	4-Str Chippers/Stump Grinders (com)	75	100	80	39
1998	2265004066	4-Str Chippers/Stump Grinders (com)	100	175	119	1,005
1998	2267004066	LPG - Chippers/Stump Grinders (com)	25	40	35.1	984
1998	2267004066	LPG - Chippers/Stump Grinders (com)	50	75	60.77	4,199
1998	2267004066	LPG - Chippers/Stump Grinders (com)	75	100	80	39
1998	2267004066	LPG - Chippers/Stump Grinders (com)	100	175	119	1,005
1998	2260004071	2-Str Commercial Turf Equipment (com)	1	3	3	119
1998	2265004071	4-Str Commercial Turf Equipment (com)	3	6	5.217	343,058
1998	2265004071	4-Str Commercial Turf Equipment (com)	6	11	8.771	91,253
1998	2265004071	4-Str Commercial Turf Equipment (com)	11	16	13.99	203,640
1998	2265004071	4-Str Commercial Turf Equipment (com)	16	25	19.33	265,433
1998	2265004071	4-Str Commercial Turf Equipment (com)	25	40	27.24	52,592
1998	2265004071	4-Str Commercial Turf Equipment (com)	50	75	59.59	454
1998	2265004075	4-Str Other Lawn & Garden Eqp. (res)	0	1	0.914	25,378
1998	2265004075	4-Str Other Lawn & Garden Eqp. (res)	1	3	2.34	109,896
1998	2265004075	4-Str Other Lawn & Garden Eqp. (res)	3	6	4.867	280,075
1998	2265004075	4-Str Other Lawn & Garden Eqp. (res)	6	11	8.208	185,063
1998	2265004075	4-Str Other Lawn & Garden Eqp. (res)	11	16	15.54	2,710
1998	2265004075	4-Str Other Lawn & Garden Eqp. (res)	16	25	20.04	1,776
1998	2265004076	4-Str Other Lawn & Garden Eqp. (com)	0	1	0.914	30,154
1998	2265004076	4-Str Other Lawn & Garden Eqp. (com)	1	3	2.34	130,577
1998	2265004076	4-Str Other Lawn & Garden Eqp. (com)	3	6	4.867	332,781
1998	2265004076	4-Str Other Lawn & Garden Eqp. (com)	6	11	8.208	219,889
1998	2265004076	4-Str Other Lawn & Garden Eqp. (com)	11	16	15.54	3,220
1998	2265004076	4-Str Other Lawn & Garden Eqp. (com)	16	25	20.04	2,111
1998	2265004076	4-Str Other Lawn & Garden Eqp. (com)	25	40	36.04	206
1998	2265004076	4-Str Other Lawn & Garden Eqp. (com)	50	75	66.00	71
1998	2265004076	4-Str Other Lawn & Garden Eqp. (com)	75	100	86.00	25
1998	2265004076	4-Str Other Lawn & Garden Eqp. (com)	100	175	113	83
1998	2265005010	4-Str 2-Wheel Tractors	6	11	8.197	2,595
1998	2265005010	4-Str 2-Wheel Tractors	11	16	14.19	2,239
1998	2265005015	4-Str Agricultural Tractors	16	25	20.4	1,075
1998	2265005015	4-Str Agricultural Tractors	25	40	30.5	111
1998	2265005015	4-Str Agricultural Tractors	75	100	82.13	1,286
1998	2265005015	4-Str Agricultural Tractors	100	175	125	145
1998	2265005020	4-Str Combines	50	75	60	1
1998	2265005020	4-Str Combines	75	100	90	9
1998	2265005020	4-Str Combines	100	175	141.2	20
1998	2265005025	4-Str Balers	25	40	34.57	13,265
1998	2265005025	4-Str Balers	50	75	65.28	4,246
1998	2265005025	4-Str Balers	100	175	113	482
1998	2265005030	4-Str Agricultural Mowers	3	6	6	88
1998	2265005030	4-Str Agricultural Mowers	6	11	9.206	6,148
1998	2265005030	4-Str Agricultural Mowers	11	16	16	90
1998	2265005030	4-Str Agricultural Mowers	16	25	18	1,880
1998	2260005035	2-Str Sprayers	0	1	0.88	22,521
1998	2260005035	2-Str Sprayers	1	3	2.567	20,997
1998	2265005035	4-Str Sprayers	3	6	4.37	81,764

United States Environmental Protection Agency
Air and Radiation
EPA420-F-03-011
April 2003
Office of Transportation and Air Quality

Program Update

Reducing Air Pollution from Nonroad Engines

In response to environmental and public health concerns, the U.S. Environmental Protection Agency (EPA) has established emission standards for most categories of nonroad engines. These engines operate in a wide variety of applications, including construction equipment, marine vessels, lawn and garden equipment, and locomotives. As a whole, these emission-control programs significantly reduce the impact of nonroad engines and equipment on the nation's air quality.

Background

Since the early 1970s, EPA has set increasingly stringent emission standards for highway cars and trucks. After making much progress in controlling highway emissions, the Agency turned to the wide variety of nonroad engines, which also contribute significantly to air pollution. These emission standards reduce harmful air pollution and help states meet the National Ambient Air Quality Standards, as required by the Clean Air Act.

"Nonroad" is a term that covers a diverse collection of engines, equipment, vehicles, and vessels. Sometimes referred to as "off-road" or "off-highway," the nonroad category includes outdoor power equipment, recreational vehicles, farm and construction machinery, lawn and garden equipment, marine vessels, locomotives, and many other applications.[1] Until the mid-1990s, emissions from these engines were largely uncontrolled.

The 1990 amendments to the Clean Air Act directed EPA to study the contribution of nonroad engines to urban air pollution, and regulate them if they contributed to air quality problems. In 1991, EPA published a report showing that nonroad equipment emitted large amounts of nitrogen oxides (NOx), hydrocarbons (HC), carbon monoxide (CO) and particulate matter (PM). In general, the report showed that nonroad engines had total emissions almost as high as highway motor vehicles. In the case of diesel particulate matter, nonroad emissions were significantly higher than highway emissions.[2]

In response, EPA has adopted emission standards for most categories of new nonroad engines. The following sections summarize the status of these programs for the various nonroad equipment categories.

Land-Based Diesel Engines

Diesel engines dominate the market for nonroad engines. They currently contribute about 44 percent of diesel PM emissions and 12 percent of total NOx emissions from mobile sources nationwide.[3] Examples of land-based nonroad applications using diesel engines include the following: construction equipment such as backhoes, agricultural equipment such as tractors, material handling equipment such as heavy forklifts, industrial equipment such as airport service vehicles, and utility equipment such as generators and pumps.

In 1994, EPA adopted the first set of emission standards (“ Tier 1”) for all new nonroad diesel engines greater than 37 kilowatts (50 horsepower), except those used in locomotives and marine vessels.[4] The Tier 1 standards were phased in for different engine sizes between 1996 and 2000, reducing NOx emissions from these engines by 30 percent.

EPA has since adopted more stringent emission standards for NOx, HC, and PM from new nonroad diesel engines. This program includes the first set of standards for nonroad diesel engines less than 37 kW (phasing in between 1999 and 2000), including marine engines in this size range. It also phases in more stringent “Tier 2” emission standards from 2001 to 2006 for all engine sizes and adds yet more stringent “Tier 3” standards for engines between 37 and 560 kW (50 and 750 hp) from 2006 to 2008. These standards will further reduce nonroad diesel engine emissions by 60 percent for NOx and 40 percent for PM from Tier 1 emission levels.

Recent developments of advanced emission-control technologies have made it possible to consider an new round of standards, with the potential to reduce PM and NOx emissions by an additional 90 percent. These technologies can be damaged by sulfur in diesel fuel, so EPA has proposed a comprehensive program for low-sulfur fuels in combination with the more stringent emission standards, with a plan to finalize these requirements in 2004.

Land-Based Spark-Ignition Engines

EPA divided land-based spark-ignition engines into three broad categories—(1) small engines typically used for lawn and garden applications, (2) large engines used in industrial applications, and (3) specialty engines used in recreational applications

Small SI Engines

Nonroad spark-ignition engines below 19 kW (25 horsepower), which usually run on gasoline, are used primarily in lawn and garden equipment. Lawnmowers, string trimmers, leaf blowers, chain saws, commercial turf equipment, and lawn and garden tractors fall within this category, but engines used for marine propulsion, recreational vehicles, or hobby applications (such as remote-control airplanes) are treated separately. These engines currently contribute about 16 percent of HC emissions and 21 percent of CO emissions from mobile sources nationwide.

Under Phase 1 regulations, new Small SI engines have been meeting standards for HC, CO, and NOx emissions since 1997. The Phase 1 standards have resulted in a 32 percent reduction in HC levels from these engines.

EPA adopted Phase 2 standards for Small SI engines in two separate rulemakings:

- For nonhandheld applications (such as lawn and garden tractors and lawnmowers), the second set of emission standards phases in between 2001 and 2007 and will result in an additional 60 percent reduction in HC and NOx emissions.
- For handheld applications (such as leaf blowers and chainsaws), the second set of emission standards phases in between 2002 and 2007 and will result in an additional 70 percent reduction in HC and NOx emissions.

Standards requiring control of evaporative emissions do not yet apply to Small SI engines.

Large SI Engines

Nonroad SI engines above 19 kW (25 hp), which are usually car and truck engines installed in industrial equipment, are used in many different applications, including forklifts, airport service equipment, generators, compressors, welders, aerial lifts, and ice-grooming machines. These engines— which may operate on liquefied petroleum gas, gasoline, or natural gas—currently contribute about 2 percent of NOx emissions, and 3 percent of HC and CO emissions from mobile sources nationwide. Many of them operate indoors, where high exhaust concentrations can expose workers to elevated levels of CO emissions.

EPA has adopted emission standards for Large SI engines that take effect for new engines starting in 2004. Manufacturers will rely on well-established emission-control technologies from automotive engines, including three-way catalysts and electronic fueling systems, to meet these emission standards. Starting in 2007, manufacturers will need to use optimized engines, including new diagnostic systems, to meet more stringent standards calling for a 90-percent reduction in NOx, HC, and CO emissions. Additional control technologies will reduce evaporative HC emissions from gasoline fuel tanks.

Recreational Vehicles

This category includes off-highway motorcycles, all-terrain vehicles, and snowmobiles that operate on gasoline. This category may also include some motorized scooters, mini-bikes, and mopeds. Recreational vehicles currently contribute about 5 percent of HC emissions and 2 percent of CO emissions from mobile sources nationwide. These estimated HC emissions include combined exhaust and evaporative emissions. In November 2002, EPA adopted emission standards for new recreational vehicles that will be phased in starting in 2006. These new standards will reduce HC emissions from these vehicles by 67 percent and will reduce CO emissions by 28 percent. Manufacturers are likely to meet the new standards primarily by increasing their use of 4-stroke engine technology. Manufacturers are also likely to use advanced two-stroke engine system designs in some applications. In addition, improved materials and barrier treatments will reduce the permeation of gasoline through fuel tanks and hoses.

Marine Engines and Vessels

A wide variety of engines are used in marine applications, including gasoline engines for personal watercraft and outboard applications and diesel engines used on recreational and commercial vessels ranging from tugboats to very large ocean-going vessels. Because it is not possible to

apply the same set of standards to all of these applications, EPA has divided programs for reducing marine engine emissions into two broad categories: (1) marine spark-ignition engines, including outboard engines and personal watercraft, as well as gasoline-fueled sterndrive and inboard engines and (2) marine diesel engines, including auxiliary engines and both recreational and commercial propulsion engines.

Marine Spark-ignition Engines

These engines, many of which have typically used simple two-stroke technology, contribute about 10 percent of HC and 3 percent of CO emissions from mobile sources nationwide. However, their contribution to total emissions in and around marinas and harbors is significantly higher. Also, CO in the exhaust from these engines poses an ongoing safety threat to boaters.

Emission standards for outboard and personal watercraft engines call for manufacturers to meet increasingly stringent HC levels over a nine-year phase-in period starting in 1998. By 2006, manufacturers will produce all their engines with 75 percent lower HC emissions on average. The gradually decreasing emission standard lets manufacturers determine the best approach to achieving the targeted reductions over time by allowing them to phase in the types of control technologies in the most sensible way, while minimizing the cost impact to the consumer.

Sterndrive and inboard gasoline engines typically use four-stroke automotive engines that have been modified for sport boats. Uncontrolled emission levels from these engines are usually considerably lower than from outboard engines, but there is still an opportunity to significantly reduce NOx, HC, and CO emissions. EPA is in the process of developing emission standards that would require manufacturers to use catalysts and other available emission-control technology on their new engines.

In addition, EPA has proposed requirements that would address evaporative emissions from all types of vessels using gasoline engines. These requirements would reduce venting of evaporated gasoline from fuel tanks and reduce the permeation of fuel through the walls of fuel tanks and hoses.

Marine Diesel Engines

Marine diesel engines are used for propulsion and auxiliary power in a variety of marine applications, including recreational yachts, fishing boats, tug and towboats, dredgers, and coastal and ocean-going vessels. These engines currently contribute about 8 percent of NOx emissions and 9 percent of diesel PM emissions from mobile sources, though the contribution is greater in areas with commercial ports.

Internationally, emissions from marine diesel engines are controlled by Annex VI of the International Convention for the Prevention of Pollution from Ships (known as the MARPOL convention). The NOx limits, contained in Regulation 13 of Annex VI apply to marine diesel engines rated above 130 kW and are similar in stringency to the first tier of emission standards adopted for land-based nonroad diesel engines (described above). These standards apply to any engine rated above 130 kW installed on a vessel constructed on or after January 1, 2000. The standards are also triggered if an engine is substantially modified (it is adjusted in such a way that its emissions may be increased) on or after January 1, 2000, regardless of when the engine was made or installed on a vessel. As of the date of this publication, the international standards have not yet gone into effect. However, EPA adopted requirements earlier this year to make these standards enforceable beginning January 2004 for engines above 2.5 liters per cylinder installed on vessels flagged in the United States. The MARPOL standards are expected to be enforceable back to January 1, 2000 for all vessels, once enough nations have ratified the Annex for it to go into effect.

In addition to the international standards, EPA has adopted more stringent national standards for certain categories of marine diesel engines installed on vessels flagged in the United States. The levels of the standards and their application dates vary depending on engine size:

- Engines below 37 kW: the standards are the same as for land-based nonroad diesel engines of that size, and begin in 1999 or 2000 for Tier 1 and 2004 or 2005 for Tier 2, depending on engine size.
- Engines above 37 kW with per-cylinder displacement below 5 liters: these are Category 1 marine diesel engines. The national standards begin in 2004 or 2005, depending on engine size; the MARPOL standards apply voluntarily until then for engines above 130 kW.
- Engines with per-cylinder displacement between 5 and 30 liters: these are Category 2 marine diesel engines. The national standards begin in 2007; the MARPOL standards apply voluntarily until 2004, and are mandatory from 2004 until 2007.
- Engines with per-cylinder displacement above 30 liters: these are Category 3 marine diesel engines and are subject only to the MARPOL standards. These standards are voluntary until 2004 and mandatory after 2004.
- Recreational marine diesel engines: these are marine diesel engines with per-cylinder displacement up to 5 liters per cylinder used in recreational vessels. They are subject to the same numerical standards as Category 1 marine diesel engines, beginning in 2006.

In the February 2003 rulemaking related to marine diesel engines, EPA made a commitment to consider additional standards for Category 3 marine diesel engines and to finalize standards by April 27, 2007. That rulemaking may also include more stringent standards for Category 1 and Category 2 marine diesel engines.

Locomotives

Locomotives contribute about 7 percent of NOx emissions and 5 percent of diesel PM emissions from mobile sources nationwide. These engines are generally larger than any land-based nonroad diesel engines in displacement volume and total power and may last for 40 years or longer. New emission standards will reduce NOx emissions by two-thirds, while HC and PM emissions from these engines will decrease by 50 percent.

EPA has adopted three separate sets of emission standards, with the standards taking effect depending on the date a locomotive is first manufactured.

- The first set of standards (Tier 0) apply to locomotives and locomotive engines originally manufactured from 1973 through 2001 any time they are manufactured or remanufactured. This unique feature of the locomotive program is critical, because locomotives are generally remanufactured five to ten times during their total service lives of 40 years or more.

- The second set of standards (Tier 1) apply to locomotives and locomotive engines originally manufactured from 2002 through 2004. These locomotives and locomotive engines must meet the Tier 1 standards at the time of original manufacture and at each subsequent remanufacture.

- The final set of standards (Tier 2) apply to locomotives and locomotive engines originally manufactured in 2005 and later. Tier 2 locomotives and locomotive engines must meet the applicable standards at the time of original manufacture and at each subsequent remanufacture.

Aircraft

Aircraft emissions contribute about 1 percent of NOx emissions and 2 percent of HC emissions from mobile sources nationwide. Some cities with high airport traffic see a more pronounced impact from these en-

gines. In addition, commercial aircraft emissions are a fast-growing segment in the transportation sector. Aircraft emissions also include greenhouse gases and may contribute significantly to depletion of the stratospheric ozone layer.

Emission standards for gas turbine engines that power civil aircraft have been in place for about 20 years. These engines are used in virtually all commercial aircraft, including both scheduled and freight airlines. The standards do not apply to general aviation or military aircraft. Controls on engine smoke and prohibitions on fuel venting were established in 1974 and have been revised several times since then. Gas turbine engines have been subject to limits on hydrocarbon emissions for each landing and takeoff cycle since 1984.

The International Civil Aviation Organization (ICAO) plays an important role in defining uniform emission standards that can be adopted by individual nations. In May 1997, EPA adopted ICAO's NOx and CO emission standards for gas turbine engines. In addition, EPA plans in the near future to adopt a second round of more stringent ICAO NOx standards for gas turbine engines for implementation in 2004.

EPA is also exploring other ways to reduce air pollution from air transportation. Since 1998, EPA and the Federal Aviation Administration have jointly chaired a national stakeholder initiative to reduce aviation emissions through a voluntary program. Stakeholders include airlines, aircraft engine manufacturers, airports, state and local air pollution control officials, and environmental organizations. The stakeholder initiative has narrowed its focus to a two-step program—near-term emission reductions from ground-service equipment and longer-term reductions from aircraft. If stakeholders are able to reach an agreement for voluntary reductions, this would represent a big step toward establishing a comprehensive national program to reduce aviation-related emissions.

For More Information

You can access additional documents on nonroad engine programs on the Office of Transportation and Air Quality (OTAQ) Web site at:

www.epa.gov/otaq/nonroad.htm

You can also contact the OTAQ library for document information at:

U. S. Environmental Protection Agency
OTAQ Library
2000 Traverwood Drive
Ann Arbor, Michigan 48105
(734) 214-4311

The following additional fact sheets go into more detail on these nonroad engine control programs:

General:
- *How to Maintain or Rebuild Engines Certified to EPA Standards* (EPA420-F-02-035), September 2002.
- *Blue Sky Series Engines* (EPA420-F-02-036), September 2002.
- *Emission Regulations for Stationary and Mobile Engines* (EPA420-F-02-034), September 2002.

Land-Based Diesel Engines:
- *Summary of EPA's Proposed Program for Low-Emission Nonroad Engines and Fuel* (EPA420-F-03-008), April 2003.
- *Public Health and Environmental Benefits of EPA's Proposed Program for Low-Emission Nonroad Diesel Engines and Fuel* (EPA420-F-03-010), April 2003.
- *New Emission Standards for Nonroad Diesel Engines* (EPA420-F-98-034), August 1998.

Small Spark-Ignition Engines:
- *Final Phase 2 Standards for Small Spark-Ignition Handheld Engines* (EPA420-F-00-007), March 2000.
- *New Phase 2 Standards for Small Spark-Ignition Nonhandheld Engines* (EPA420-F-99-008), March 1999.
- *Small Engine Emission Standards—Answers to Commonly Asked Questions from Dealers and Distributors* (EPA420-F-98-025), September 1998.
- *Be a Grower, Not a Mower* (EPA420-F-96-018), April 1997.

Recreational Vehicles and Large Spark-ignition Engines:
- *Emission Standards for New Nonroad Engines* (EPA420-F-02-

037), September 2002. This fact sheet describes new emission standards for recreational vehicles, Large SI engines, and recreational marine diesel engines.

- *Environmental Impacts of Newly Regulated Nonroad Engines* (EPA420-F-02-033), September 2002.
- *Frequently Asked Questions from ATV Riders* (EPA420-F-02-038), September 2002.
- *Frequently Asked Questions from Off-highway Motorcycle Riders* (EPA420-F-02-039), September 2002.
- *Frequently Asked Questions from Snowmobile Riders* (EPA420-F-02-040), September 2002.
- *Frequently Asked Questions from Facility Managers and Other Owners of Industrial Spark-ignition Engines* (EPA420-F-02-041), September 2002.
- *Emission Exemption for Racing Motorcycles and Other Competition Vehicles* (EPA420-F-02-045), September 2002.

Marine Spark-Ignition Engines:

- *Organization of Gasoline and Diesel Marine Engine Emission Standards* (EPA420-F-99-046), December 1999.
- *Emission Standards for New Gasoline Marine Engines* (EPA420-F-96-012), August 1996.
- *Emission Standards for New Spark-Ignition Marine Engines: Information for the Marine Industry* (EPA420-F-96-013), August 1996.
- *Boating Pollution Prevention Tips* (EPA420-F-96-003), July 1996.

Marine Diesel Engines:

- *Emission Standards Adopted for New Marine Diesel Engines* (EPA420-F-03-001), January 2003. This fact sheet describes the MARPOL Annex VI standards and their application to engines with per-cylinder displacement over 2.5 liters. These are the only standards that apply to Category 3 engines.
- *MARPOL 73/78 Annex VI Marine Diesel Engine Requirements* (EPA420-F-99-038), October 1999.
- *Emission Standards for New Nonroad Engines* (EPA420-F-02-037), September 2002. This fact sheet describes new emission standards for recreational vehicles, Large SI engines, and recreational marine diesel engines.
- *Frequently Asked Questions from Owners of Recreational Boats*

with Diesel Engines (EPA420-F-02-042), September 2002.
- *Emission Standards for new Commercial Marine Diesel Engines* (EPA420-F-99-043), November 1999. This fact sheet describes the Tier 2 standards that apply to Category 1 and Category 2 marine diesel engines.
- *Emission Standards for Marine Diesel Engines: Scope of Application* (EPA420-F-00-006), February 2000.
- *Responsibilities for Marine Vessel Operators with EPA-Certified Engines* (EPA420-F-99-044), December 1999.
- *Organization of Gasoline and Diesel Marine Engine Emission Standards* (EPA420-F-99-046), December 1999.
- *Reducing Marine Vessel and Port Emissions in the South Coast* (EPA420-F-96-011), July 1996.

Locomotives:
- *Final Emission Standards for Locomotives* (EPA420-F-97-048), December 1997.
- *Requirements for Railroads Regarding Locomotive Exhaust Emission Standards* (EPA420-F-99-036), September 1999.
- *Applicability of Locomotive Emission Standards* (EPA420-F-99-037), September 1999.
- *Federal Preemption of State and Local Control of Locomotives* (EPA420-F-97-050), December 1997.
- *Environmental Benefits of Emission Standards for Locomotives* (EPA420-F-97-049), December 1997.
- *Emission Factors of Locomotives* (EPA420-F-97-051), December 1997.

Aircraft:
- *Evaluation of Air Pollutant Emissions from Subsonic Commercial Aircraft* (EPA420-R-99-013), April 1999.
- *Reducing Aircraft and Airport Emissions in the South Coast* (EPA420-F-96-010), July 1996.
- *Adopted Aircraft Engine Emission Standards* (EPA420-F-97-010), April 1997.

[1] This fact sheet also describes emission standards that apply to aircraft engines, even though EPA does not consider these to be nonroad engines under the Clean Air Act.
[2] EPA refers to the combined set of highway and nonroad engines as mobile sources. This does not include engines used in stationary

applications, which are regulated by separate programs, usually at the state level.

[3] Diesel engines may also be referred to as compression-ignition or CI engines. These engines typically operate on diesel fuel, but other fuels may be also be used. In contrast, spark-ignition (or SI) engines generally operate on gasoline, natural gas, or liquefied petroleum gas.

[4] The U.S. Mine Safety and Health Administration sets requirements related to emissions from underground mining equipment.

Higher Air Temperatures □□ *Increased Pollution and Health Risks, Changing Plant and Animal*
Species, More Frequent Forest Fires
Temperature in the Washington region increased at a much faster rate in the last fifty years compared to the last hundred years. A comparison of trends in the annual average temperature during these two periods reveals that the rate of annual temperature increase of 0.027°F (0.015°C) in the last fifty years (1955–2005) is three times the annual rate of increase of 0.009°F (0.005°C) during 1893–2005. Five of the last ten years have ranked as the top ten warmest in the United States, since record keeping began in the late 19th century.

A warmer climate could result in increased cases of vector-borne diseases, such as West Nile virus, and stronger, more frequent heat waves. Also, locally, there is a correlation between heat waves and the occurrence of high ozone days. Generally, the hotter the temperature, the more favorable the conditions are for ozone-producing chemical reactions in the air, which can lead to an increase in asthma cases and exacerbation of chronic respiratory diseases.

The University of Maryland Center for Environmental Science (UMCES) researchers projected temperature increases in Maryland based on models used by the IPCC. Currently there are around 40 days above 90 degrees and two days above 100 degrees on the average. Depending on future CO_2 emissions, there could be as many as 100 days above 90 and 30 days above 100 degrees F. (see Figure 7) The temperature increases in urban areas would be even higher due to the urban heat island effect. These increases could have economic impacts as well as devastating impacts on public health and the environment, leading to increases in ozone concentrations and resulting respiratory and health problems, as well as more severe droughts and increased electricity demand for air conditioning.

Households can reduce their energy use, electric bills, and greenhouse gas emissions in a variety of ways, ranging from simple actions to larger investments. Businesses and institutions can also take action to reduce emissions, including locating near transit, purchasing green power and clean vehicles, turning off electronic devices, supporting employee telecommuting programs, reducing mowing, reducing use of fertilizers, and installing more energy-efficient equipment. As shown in Table 5, many near term voluntary actions are no cost or low cost approaches to reducing emissions. WHAT TYPE OF MOWING?

United States
Environmental Protection
Agency

Air and Radiation

EPA420-F-00-007
March 2000

Office of Transportation and Air Quality

Regulatory Announcement

Final Phase 2 Standards for Small Spark-Ignition Handheld Engines

The U.S. Environmental Protection Agency (EPA) is adopting a second phase of more stringent emission standards for nonroad small spark ignition (SI) handheld engines (such as trimmers, brush cutters, and chainsaws). In addition, EPA is revising the compliance program provisions to be similar to those already adopted for nonhandheld engines and reflect closer harmonization with those required by the State of California. Small SI engines produce approximately one tenth of U.S. mobile source hydrocarbon (HC) emissions and are the largest single contributor to nonroad HC inventories. Thus, these standards will help the States in their progress towards compliance with the National Ambient Air Quality Standard (NAAQS) for ozone.

This final rule will reduce hydrocarbons plus oxides of nitrogen (HC+NOx) by an additional 70 percent beyond the current Phase 1 standards. The final rulemaking includes provisions that give industry flexibility and ease the transition to the more stringent Phase 2 program, especially for small volume engine and equipment manufacturers. The new standards will be phased in beginning with the 2002 model year. EPA is also adopting standards for two additional classes of nonhandheld engines that will apply to engines below 100 cubic centimeters displacement used in nonhandheld equipment applications.

Printed on Recycled Paper

History of Rulemaking

In July 1995, EPA finalized the first federal regulations affecting small nonroad SI engines at or below 19 kilowatts (kW), or 25 horsepower. The regulations, commonly known as "Phase 1," took effect for most new handheld and nonhandheld engines beginning in model year 1997 and are expected to result in a 32 percent reduction in HC emissions from these engines. Table 1 lists the different small SI engine categories, including the newly proposed Class I-A and I-B designations. For the nonhandheld categories, Class I engines are used primarily in walk-behind lawnmowers and Class II engines are used primarily in lawn and garden tractors. For the handheld categories, Class III and IV engines are used primarily in residential equipment such as string trimmers, leaf blowers and chainsaws. Class V engines are used primarily in commercial equipment such as chainsaws.

Table 1: Small SI Engine Classes						
Nonhandheld				Handheld		
Class I-A	Class I-B	Class I	Class II	Class III	Class IV	Class V
<66cc	66 to <100cc	100 to <225 cc	≥225 cc	< 20 cc	20cc to <50cc	≥50 cc

In September 1993, EPA initiated a regulatory negotiation (or "reg-neg") to develop a framework for a "Phase 2" rule that would further reduce emissions from these engines. The reg-neg ended in February 1996 without a consensus among all the participants on a Phase 2 program. However, the Agency continued to work with several former reg-neg members.

In March 1997, EPA published an Advance Notice of Proposed Rulemaking (ANPRM) announcing the Agency's intent to issue a Notice of Proposed Rulemaking (NPRM) which would cover both handheld and nonhandheld engines. The ANPRM also published the text of two Statements of Principles (SOPs) which were developed between the Agency and interested parties in 1996. In January of 1998, the Agency published the proposed rule for the Phase 2 regulations for small SI engines, both handheld and nonhandheld engines, based on the SOPs.

Since the publication of the January 1998 NPRM, there have been rapid and dramatic advances in emission reduction technologies for handheld engines used in applications such as trimmers, brush cutters, and chainsaws.

EPA had not been able to fully evaluate these technologies or discuss their possible availability at the time of the January 1998 NPRM. Having reviewed the available information regarding these new technologies, EPA believes this new information supported Phase 2 standards for handheld engines that are significantly more stringent than those proposed in the January 1998 proposal. In light of this information, and in the interest of providing an opportunity for public comment on the stringent levels being considered for the Phase 2 handheld engine emission standards and the technologies available for meeting these standards, EPA reproposed Phase 2 regulations for handheld engines in a July 1999 Supplemental Notice of Proposed Rulemaking (SNPRM). This final rule adopts the final Phase 2 requirements for handheld engines. EPA already finalized Phase 2 regulations for nonhandheld engines in March 1999.

Overview of the Final Phase 2 Rule for Handheld Class III, IV and V Engines

This final rule adopts emission standards and other regulatory requirements for Class III, IV and V engines as used in handheld equipment applications. The Phase 2 program for handheld engines is expected to result in a shift to dramatically cleaner engine technology. In addition, the Phase 2 rule includes new programmatic requirements to ensure that engines meet the tighter standards throughout the useful life of the equipment. Highlights of the Phase 2 final rule include:

- Tighter emission standards for HC+NOx (in grams per kilowatt-hour (g/kW-hr)) to be phased-in over a number of years, allowing the manufacturers an orderly and efficient transition of engine designs and technologies from those complying with the existing Phase 1 standards to those necessary to meet the Phase 2 requirements. Table 2 contains the Phase 2 emission standards for handheld engines.

Table 2: Phase 2 HC+NOx Emission Standards for Handheld Engines (in g/kW-hr) by Model Year

Engine Class	2002	2003	2004	2005	2006	2007 and later
Class III	238	175	113	50	50	50
Class IV	196	148	99	50	50	50
Class V	---	---	143	119	96	72

- Three useful life categories for handheld engines to account for widely varying product lives as noted in Table 3.

Table 3: Useful Life Categories for Handheld Engines (hours of use)			
All Handheld Classes	50	125	300

- A compliance program to ensure engines continue meeting the standards for the useful life of the engine, including certification, production line testing, and voluntary in-use testing.

- An Averaging, Banking, and Trading (ABT) program to provide engine manufacturers with additional flexibility in meeting the Phase 2 handheld standards.

Health and Environmental Benefits

The Phase 2 handheld engine standards will result in a 70 percent reduction in HC+NOx emissions from these engines beyond the 32 percent reduction expected from the Phase 1 standards. This is equivalent to an annual reduction of 500,000 tons of exhaust HC+NOx emissions by the year 2027. This reduction in HC+NOx emissions will be accompanied by an overall reduction in fuel consumption.

Small SI engines currently produce approximately one tenth of U.S. mobile source HC emissions and are the largest single contributor to nonroad HC inventories. Thus, the Phase 2 standards will help the States in their progress towards compliance with the NAAQS for ozone.

Both HC and NOx contribute to the formation of tropospheric ozone through a complex series of reactions. In a recent report, researchers emphasize that both HC and NOx controls are needed in most areas of the United States. EPA's primary reason for controlling emissions from small SI handheld engines is the role of their HC emissions in forming ozone. Of the major air pollutants for which National Ambient Air Quality Standards have been designated under the Clean Air Act, the most widespread problem continues to be ozone, which is the most important component of smog.

The Phase 2 standards will generate significant reductions in emissions from these engines with small increases in cost. Table 4 presents the estimated average price increase for handheld equipment due to the Phase 2 standards.

Table 4: Estimated Handheld Equipment Price Increase Due to Phase 2 Standards		
Class III	Class IV	Class V
$23	$20	$56

In addition, the technological changes necessary to bring these engines into compliance with the new emission standards would cause a decrease in fuel consumption of approximately 30 percent for handheld engines, resulting in lower operating costs to the consumer. Table 5 presents the cost effectiveness of the Phase 2 program for handheld engines.

Table 5: Cost Effectiveness of Phase 2 Handheld Engine Final Rulemaking	
Without Fuel Savings	$830 per ton HC+NOx
With Fuel Savings	$560 per ton HC+NOx

Effect on Industry

The final rule requires engine manufacturers to:

- build significantly cleaner, more durable engines
- certify that those engines will meet standards for their full regulatory useful lives

Some of the technologies currently in development to achieve these standards with the use of a catalyst (e.g., John Deere's "LE technology" and Komatsu Zenoah's "Stratified Scavenged" design) are anticipated to be a primary choice for manufacturers of Class III and IV engines to meet their Phase 2 emission levels. Class V engines are expected to use the same technologies without catalysts to meet their Phase 2 emission levels.

The rule includes provisions to ease the transition from the Phase 1 program to the Phase 2 program to ensure that the Phase 2 standards are cost-effective and achievable, and to minimize the compliance burden while maintaining the environmental benefits of the rule. These provisions include a declining set of average standards, a certification ABT program, and special provisions to ease and/or delay the impact of the rule on small volume engine families and equipment models.

For More Information

You can access additional documents on small nonroad SI engine rulemakings electronically on the Office of Transportation and Air Quality Web site at:

http://www.epa.gov/otaq/equip-ld.htm

You can also contact the NVFEL Library for document information at:

U.S. Environmental Protection Agency
Office of Transportation and Air Quality
NVFEL Library
2000 Traverwood Road
Ann Arbor, Michigan 48105
(734) 214-4311

More information

Check the operator's manual for detailed information about your specific kind of blower. For more information about leaf blowers and leaf blower manufacturers, see the "Who Makes That?" section of the Outdoor Power Equipment Institute's Web site, www.opei.org. You'll find a listing of all OPEI member companies who manufacture leaf blowers, as well as links to leaf blower manufacturers' Web sites.

Leaf Blower History

The grandfather of today's leaf blower was designed to spread fertilizers and pesticides on crops and fruit trees. In the late 1960's and early 1970's, landscapers realized that this blower – without the container for chemicals – could be used to move leaves and other yard debris. Manufacturers responded by designing a leaf blower that could be used by homeowners and lawn care and landscape professionals. Today, manufacturers continue to research and develop new improvements for further reducing leaf blower sound and emissions.

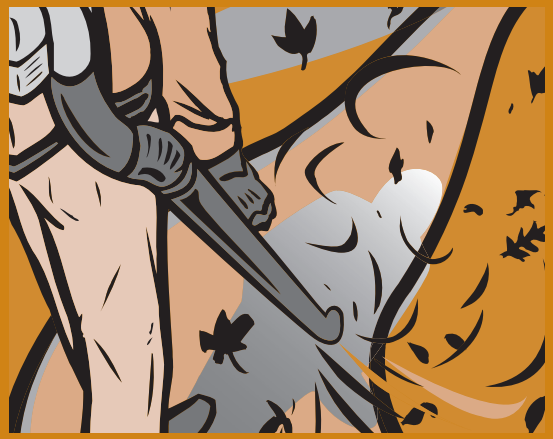
Más información

Para ampliar la información acerca de su tipo específico de soplador, consulte el manual del operador. Para obtener más información acerca de los sopladores de hojas y sus fabricantes, consulte la sección "Who Makes That?" (¿Quién fabrica eso?) en el sitio web del Outdoor Power Equipment Institute, www.opei.org. Allí encontrará un listado de todas las empresas miembros de OPEI que fabrican sopladores de hojas, como también los enlaces a los sitios web de los fabricantes de sopladores de hojas.

341 South Patrick Street
Alexandria. VA 22314
703-549-7600
www.opei.org

Historia del soplador de hojas

El abuelo del soplador de hojas actual fue diseñado para esparcir fertilizantes y pesticidas en los cultivos y árboles frutales. A fines de los años 60 y comienzos de los 70, los paisajistas se dieron cuenta que este soplador, sin el tanque para productos agroquímicos, podía usarse para desplazar las hojas y otras basuras de jardines. Los fabricantes respondieron diseñando un soplador de hojas que podían utilizarlo tanto los dueños de casa como los profesionales paisajistas y de mantenimiento de prados y jardines. Hoy en día, los fabricantes continúan investigando y desarrollando nuevas mejoras con el fin de reducir aun más el ruido y las emisiones de los sopladores de hojas.



A GUIDE TO SAFE & COURTEOUS USE

GUÍA PARA SU USO SEGURO Y CORDIAL

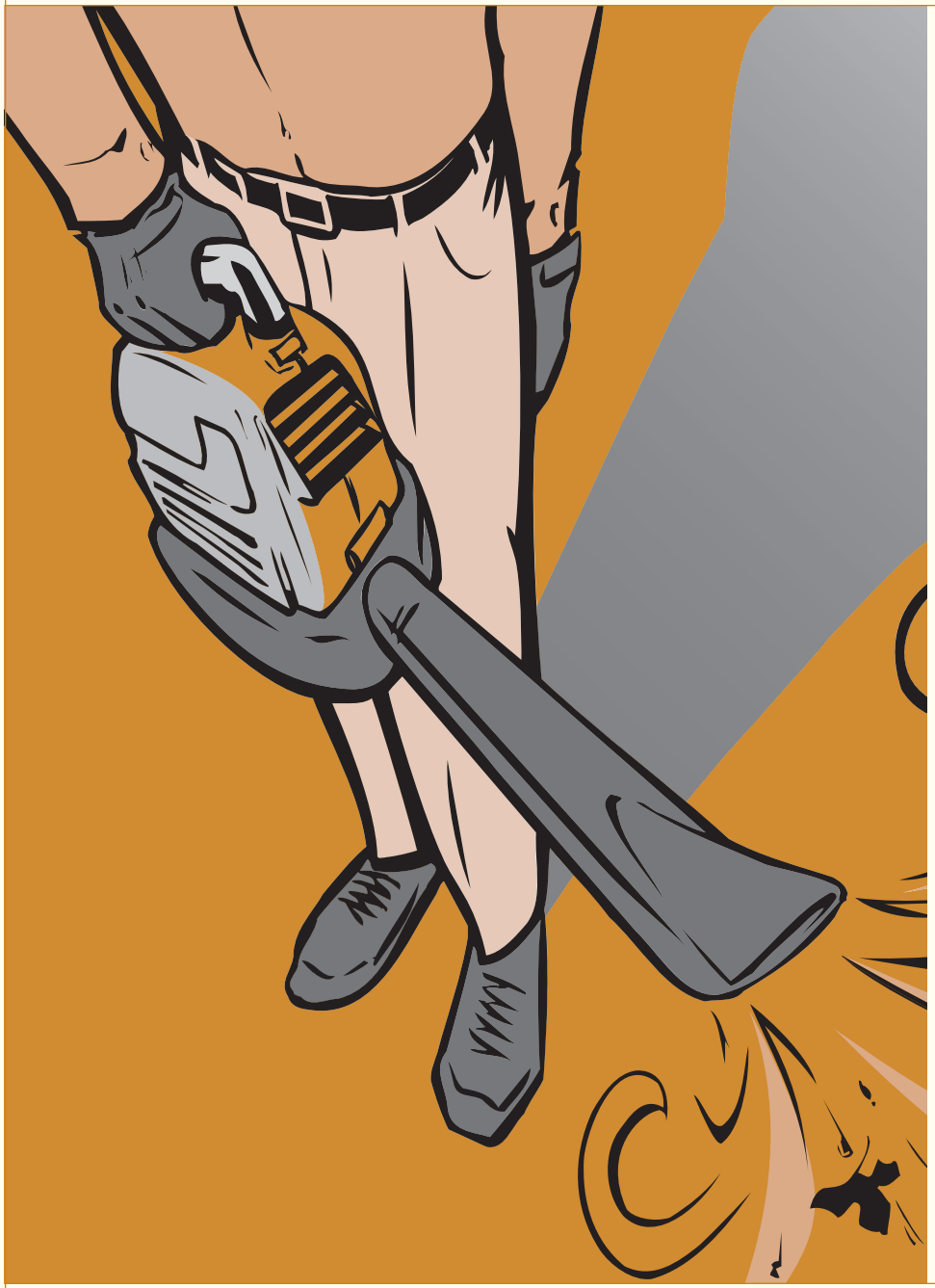
Introduction

This booklet will show you the proper way to use a leaf blower, as well as the different types of leaf blowers and different jobs that leaf blowers perform. After you read this booklet, and your operator's manual, you'll have a greater understanding of how to use a leaf blower safely and courteously to protect both yourself and the people around you.

Introducción

Este folleto le mostrará la manera correcta de usar un soplador de hojas, como también los diferentes tipos de sopladores de hojas y labores que realizan. Después de leer este folleto, y su manual del operador, usted habrá aprendido a usar el soplador de hojas de una manera segura y cordial tanto para su propia protección como para la de la gente a su alrededor.

Table of Contents/Contenido



Why do we use leaf blowers?

Since their introduction in the 1970's, leaf blowers have rapidly become an essential time and labor saving clean-up tool for landscape maintenance professionals and homeowners. Leaf blowers are extremely efficient for cleaning leaves, grass clippings, and debris from driveways, sidewalks, parking lots, sports arenas, parks and construction sites. In these situations, a leaf blower is more time and cost efficient than a rake or a broom.

Leaf blowers also perform tasks like cleaning areas covered by mulch or bark more effectively than hand tools. When used properly, there is little disturbance to the surface.

¿Por qué usar sopladores de hojas?

Desde su lanzamiento en los años 70, los sopladores de hojas se han convertido en una herramienta de limpieza, que nos ahorra tiempo y dinero, indispensable para los dueños de casa y los profesionales de mantenimiento de prados y jardines. Los sopladores de hoja son muy eficientes para limpiar las hojas, la hierba cortada y la basura en entradas de vehículos, aceras, plazas de estacionamiento, estadios deportivos, parques y sitios en construcción. En estas situaciones, un soplador de hojas es mucho más eficiente en lo que respecta a tiempo y costo que un rastrillo o una escoba.

Los sopladores de hojas también hacen tareas como la limpieza de áreas cubiertas de mulch o cortezas de una manera mucho más eficiente que las herramientas manuales. Cuando se usan correctamente, se perturba muy poco la superficie.

What do leaf blowers do?

You can use a leaf blower to:

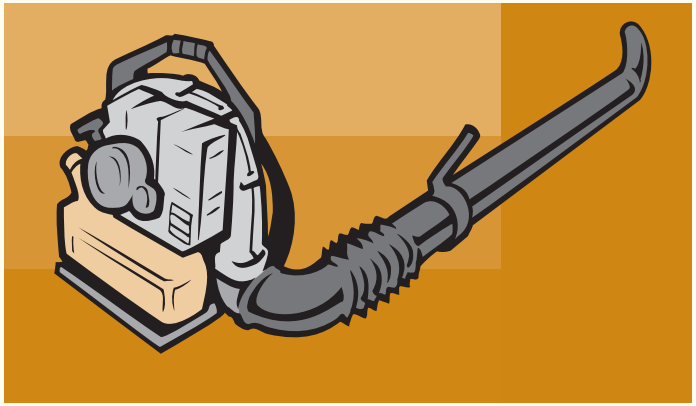
- Remove and gather leaves
- Vacuum leaves
- Remove grass clippings
- Dislodge or break up matted grass
- Clean parking lots
- Clean farm and construction equipment
- Clean arenas and amusement parks
- Remove light or fluffy snow
- Dry off pavement
- Clean rain gutters

¿Qué función tienen los sopladores de hojas?

El soplador de hojas es apto para:

- Quitar y juntar las hojas
- Aspirar las hojas
- Quitar la hierba cortada
- Sacar o separar el césped enmarañado
- Limpiar las plazas de estacionamiento
- Limpiar los equipos agrícolas y de construcción
- Limpiar los campos deportivos y parques de atracciones
- Quitar la nieve ligera o apelusada
- Secar el pavimento
- Limpiar los canales de recogida de aguas

Hand-held leaf blower



Backpack leaf blower

Types of leaf blowers

There are two main types of leaf blowers: hand-held and backpack models. Both types are usually powered by either a 2-stroke or 4-stroke engine. Some hand-held blowers also provide a blower-vacuum combination.

There are many different models, attachments and performance options available for different applications. Compared to leaf blowers manufactured in the early 1990's, today's leaf blowers are quieter and cleaner.

For more technical and performance information, check your operator's manual, ask your outdoor power equipment dealer or visit a manufacturer's Web site located at www.opei.org.

Tipos de sopladores de hojas

Existen dos tipos principales de sopladores de hojas: modelo manual y de mochila. Por lo general, los dos tipos son accionados por un motor ya sea de 2 ó 4 tiempos. Algunos sopladores manuales también proporcionan una combinación de soplador-aspiradora.

Existen muchas opciones diferentes de modelos, accesorios y características de funcionamiento disponibles para distintas aplicaciones. Comparados con los sopladores de hojas fabricados a comienzos de los años 90, los modelos actuales son más silenciosos y limpios.

Para obtener mayor información técnica y de las características de funcionamiento, consulte su manual del operador, converse con su concesionario de equipos motorizados para exterior o visite el sitio web de un fabricante en www.opei.org.

How to use a leaf blower

Before you use a leaf blower, read the operator's manual provided by the manufacturer. If you or your employer do not have an operator's manual, you can get one by contacting the manufacturer or your local retailer. Many manufacturers have them available on their Web sites. You need to know how the leaf blower works and how to use it properly before you start a job. For example, the following are general rules:

- Children should not use a leaf blower.
- Pay attention when using a leaf blower. Don't point an operating blower in the direction of people or pets.
- Make sure bystanders, including other operators, are at least 50 feet away. Stop blowing if you are approached.
- Do not use a leaf blower if you are tired or sick, taking medication, or if you have used drugs or alcohol.
- Do not use a blower indoors or in poorly ventilated areas.
- Inspect the blower before and during use to make sure controls, parts and safety devices are not damaged and are working properly.
- Never modify a blower in a way not authorized by the manufacturer.
- Do not operate while standing on a ladder, rooftop, tree or other unstable surface. Use nozzle attachments to reach high places.
- Work carefully. You need to be safe, courteous and responsible.

Dress Safely!

- Wear hearing protection when using a leaf blower – either ear plugs or earmuffs.
- Wear goggles that meet eye protection standards.
- Wear non-slip, heavy-duty work gloves.
- Wear sturdy protective clothing. Do not wear anything loose. Tie back long hair. Wear long pants to help protect your legs and long sleeves to help protect your arms.
- Wear sturdy shoes with non-slip soles.
- In dusty conditions, wear a respirator or dust mask as appropriate.

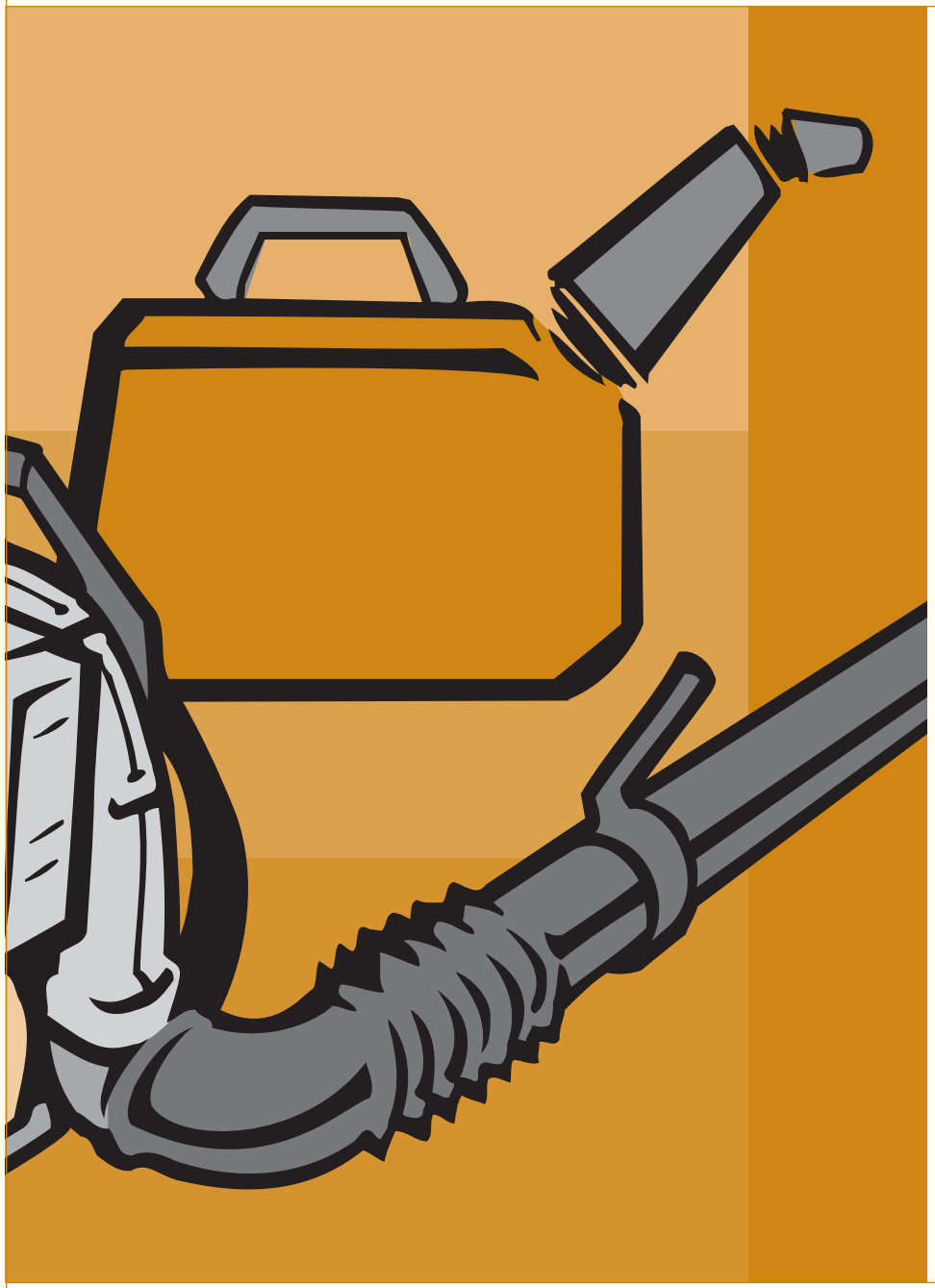
Cómo usar un soplador de hojas

Antes de usar un soplador de hojas, lea el manual del operador suministrado por el fabricante. Si usted o su empleador no tiene un manual del operador, comuniquese con el fabricante o un establecimiento local para obtener uno. Muchos fabricantes los tienen disponibles en sus sitios web. Usted tiene que saber cómo funciona el soplador de hojas y cómo usar correctamente antes de comenzar un trabajo. Por ejemplo, las siguientes son reglas generales:

- **Los niños no deben usar un soplador de hojas.**
- **Preste atención cuando use un soplador de hojas.**
- **No apunte el soplador en funcionamiento hacia personas o mascotas.**
- **Asegúrese que las personas, incluso otros operadores, se encuentren a por lo menos 15 m (50 pies) de distancia. Apague el soplador si alguien se le acerca.**
- **No use un soplador de hojas si está cansado o enfermo, está tomando medicamentos, o si ha usado drogas o tomado bebidas alcohólicas.**
- **No use un soplador en el interior de edificios o en lugar con poca ventilacion.**
- **Inspeccione el soplador antes y durante el uso para asegurarse que los controles, las piezas y los dispositivos de seguridad están funcionando correctamente y no tienen ningún daño.**
- **Nunca modifique un soplador de una manera no autorizada por el fabricante.**
- **No lo use mientras está de pie en una escalera, techo, árbol u otra superficie inestable. Use los accesorios de boquilla para alcanzar los lugares altos.**
- **Trabaje con mucho cuidado. Tiene que ser seguro, cordial y responsable.**

¡Use vestimenta segura!

- **Protéjase los oídos cuando use un soplador de hojas — use tapones para los oídos o tapaorejas.**
- **Use gafas que cumplan con las normas relativas a la protección de los ojos.**
- **Use guantes de trabajo gruesos, antideslizantes.**
- **Use ropa protectora fuerte. No use ninguna cosa suelta. Amárrese el cabello largo. Use pantalones largos para protegerse las piernas y mangas largas para protegerse los brazos.**
- **Use zapatos gruesos con suela antideslizante.**
- **En lugares polvorientos, use un respirador o una máscara contra polvo adecuada.**



Handle Gas Carefully

- Don’t spill when you fill! If you do spill, wipe leaf blower dry before using.
- Use the correct fuel/oil mix. Check the operator’s manual.
- Refuel before you start the engine. If refueling during work, turn off the engine and allow it to cool before fueling. Loosen the cap slowly to relieve pressure in the tank. Always retighten the fuel cap securely.
- Never smoke while handling fuel.
- Start the blower at least 10 feet from the fueling spot.
- Store fuel in a well-ventilated area in a properly marked safety container.
- Make sure the spark plug boot is secure to avoid sparks and possible ignition of fuel vapors.

Maneje la gasolina con cuidado

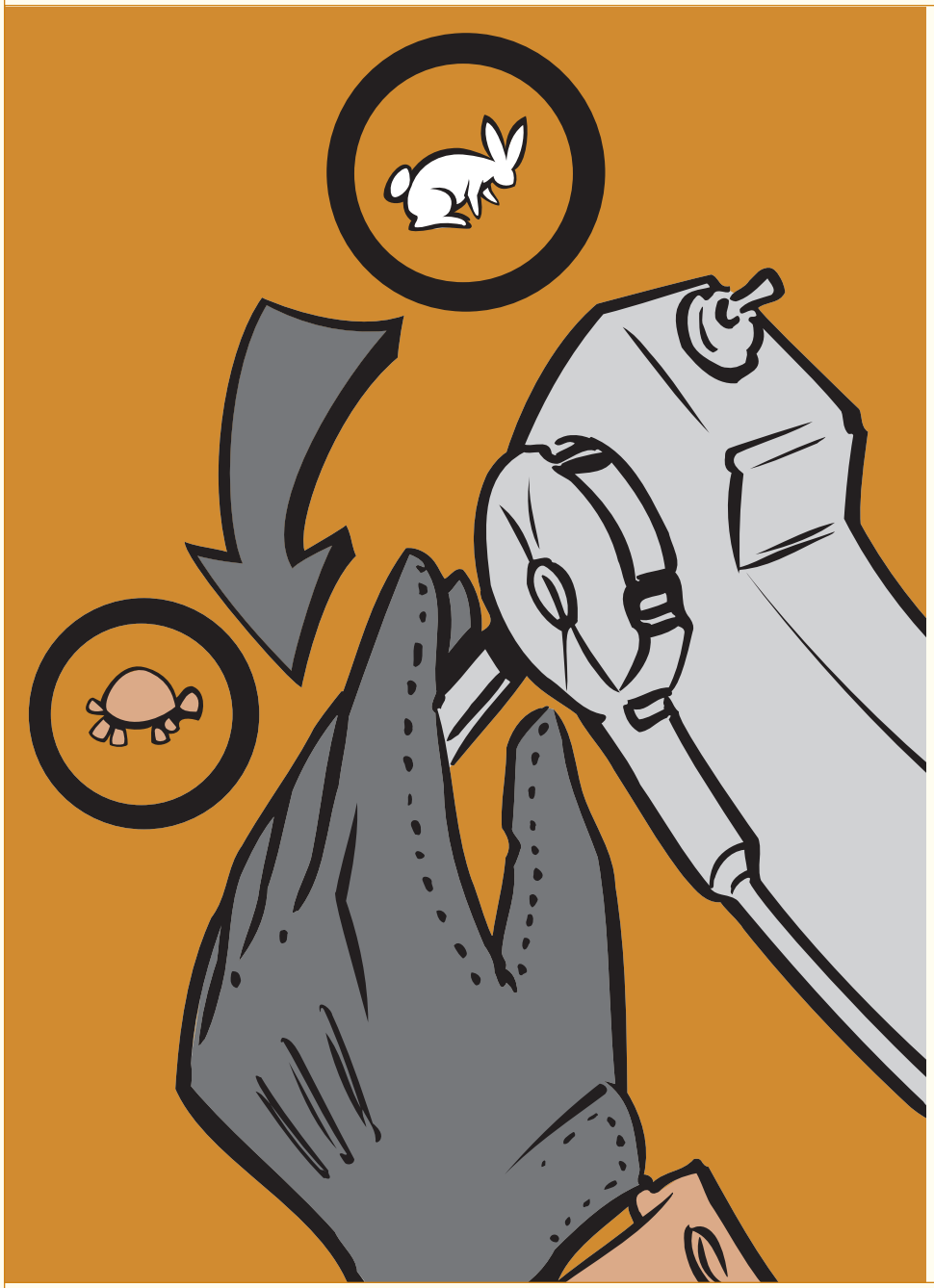
- ¡No la derrame cuando llene el tanque! Si la derrama, seque el soplador de hojas con un trapo antes de usarlo.
- Use la mezcla correcta de combustible/aceite. Consulte el manual del operador.
- Llene el tanque antes de encender el motor. Si tiene que llenarlo durante el trabajo, apague el motor y espere hasta que se enfríe antes de llenar de combustible. Afloje la tapa lentamente para descargar la presión en el tanque. Apriete siempre firmemente la tapa de combustible.
- Nunca fume mientras manipula el combustible.
- Encienda el soplador a por lo menos 3 m (10 pies) del lugar de abastecimiento de combustible.
- Guarde el combustible en un lugar bien ventilado en un recipiente de seguridad correctamente marcado.
- Asegúrese que el casquillo de la bujía esté bien firme para evitar las chispas y una posible inflamación de los vapores de combustible.

Operating courtesy

- Follow local rules and ordinances about when to use leaf blowers. Do not use very early in the morning or very late in the day.
- Check wind direction and intensity. Never point the nozzle or blow debris toward people, pets, cars or houses.
- Do not blow debris toward open windows or doors.
- Always be considerate of people passing by and of property.
- Do not leave the blower running when unattended.
- Do not use a blower to spread or mist fertilizers, chemicals or other toxic substances, unless it is designed for these purposes and in an appropriate area.

Cortesía durante el trabajo

- Respete las reglas y ordenanzas locales con respecto al uso de los sopladores de hojas. No lo use muy temprano en la mañana o muy avanzada la tarde.
- Compruebe la intensidad y dirección del viento. Nunca apunte la boquilla ni sople la basura hacia las personas, mascotas, automóviles o casas.
- No sople la basura hacia las ventanas o puertas abiertas.
- Siempre respete a los transeúntes y la propiedad ajena.
- No deje el soplador funcionando desatendido.
- No use un soplador para esparcir o atomizar fertilizantes, productos químicos u otras sustancias tóxicas, a menos que esté diseñado para ese fin y en una zona apropiada.



Reducing sound

- Use the lowest possible throttle speed to do the job.
- Use nozzle attachments that help reduce sound. See manufacturer's operator's manual.
- Avoid using more than one blower at a time, especially in neighborhoods or around buildings where sound can be intensified.
- Check the condition of the leaf blower muffler, air intakes and air filter to make sure they're in good operating condition.

Reducción del ruido

- Use la aceleración más baja posible para hacer el trabajo.
- Use accesorios de boquillas que ayuden a reducir el ruido. Lea el manual del operador suministrado por el fabricante.
- Evite usar más de un soplador a la vez, especialmente en vecindades o alrededor de edificios donde el ruido puede intensificarse.
- Revise la condición del silenciador, las tomas de aire y el filtro de aire del soplador de hojas para asegurarse de que están en buenas condiciones de funcionamiento.

Reducing dust

- Start with nozzle close to the ground at first – then raise it to a height where it does not generate dust.
- Use the full lower nozzle extensions to control sound and minimize dust.
- Pay attention to what you are moving.
- Practice moving grass clippings or a paper cup without moving dust.
- Wet dusty areas down first before using a blower.
- Never use a leaf blower to move excessively dusty materials.
- A leaf blower should NOT be used to clean up:
  — Large amounts of gravel or gravel dust
  — Construction dirt
  — Plaster dust
  — Cement and concrete dust
  — Dry garden topsoil
  Use a vacuum or power broom with water.

Reducción del polvo

- Primero, comience con la boquilla cerca del suelo y después elévela hasta una altura donde no genere polvo.
- Use las extensiones de boquilla inferiores completas para controlar el ruido y reducir el polvo.
- Preste atención a lo que está desplazando.
- Practique desplazar la hierba cortada o un vaso de papel sin levantar polvo.
- Moje primero las áreas polvorientas antes de usar un soplador.
- Nunca use un soplador de hojas para desplazar material excesivamente polvoriento.
- El soplador de hojas NO se debe usar para limpiar:
  — Grandes cantidades de gravilla o polvo de gravilla
  — Tierra de trabajos de construcción
  — Polvo de yeso
  — Polvo de cemento y hormigón
  — Capa superficial seca de jardines
  Use una aspiradora o escoba mecánica con agua

Being more efficient

You can improve your efficiency when using a leaf blower by:

- Reading your operator's manual completely.
- Learning how to control the air velocity at the end of the nozzle to lift leaves without lifting dust.
- Practicing leaf blower nozzle movement and throttle control combinations.
- Practicing up and down and left and right motions starting close to the ground and the debris, but not close enough to lift excessive amounts of dust.

Quiet blowers

Where blower sound is an issue, purchase sound-reduced blowers from your local lawn care equipment supplier or retailer. Blowers are now available that are as much as 75% quieter than older blowers.

Mayor eficiencia

Es possible mejorar su eficiencia cuando usa un spolador de hojas si:

- Lee el manual del operador completo.
- Aprende cómo controlar la velocidad del aire en el extremo de la boquilla para levantar las hojas sin levantar polvo.
- Practica el movimiento de la boquilla del soplador de hojas y las combinaciones de control del acelerador.
- Practica los movimientos de vaivén vertical y horizontal (de izquierda a derecha) comenzando cerca del suelo y la basura, pero no lo bastante cerca como para levantar una cantidad excesiva de polvo.

Sopladores silenciosos

En los lugares donde el ruido del soplador constituye un problema, compre sopladores de ruido reducido en una tienda al detalle o un proveedor de equipos para mantenimiento de prados y jardines local. Ahora hay disponibles sopladores que son hasta un 75% más silenciosos que sopladores de hojas más antiguos.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
SITE DESCRIPTION REPORT

Jul. 29, 2008

Site ID: 11-001-0025
Site Name: TAKOMA SCHOOL
Local ID:
Street Address: TAKOMA SC. PINEY BRANCH RD & DAHLIA ST N
City: Washington
State: District Of Columbia
Zip Code: 20012
County: District of Columbia
Location Description: MONITORING POINT
Location Setting: URBAN AND CENTER CITY
Coll. Method: GPS
Land Use: COMMERCIAL
Date Established: 19800101
Date Terminated:
Last Updated:
Regional Eval. Date: 19820831
HQ Eval. Date:
AQCR : NATIONAL CAPITAL
MSA: Washington,DC-MD-VA-WV
CMSA: Washington-Baltimore,DC-MD-VA-WV
Direct Met Site:
Met. Site ID:
Type Met Site:
Dist to Met. Site(m):
Local Region:
Urban Area: WASHINGTON, DC-MD-VA
EPA Region: PHILADELPHIA
City Population: 572059
Dir. to CBD: NW
Dist. to City(km): 8
Census Block: 5009
Block Group:
Census Tract: 00170
Congressional District: 98
Class 1 Area:
Site Latitude: +38.975278
Site Longitude: - 77.022778
Time Zone: EASTERN
UTM Zone:
UTM Northing:
UTM Easting:
Accuracy: 1
Datum: WGS84
Scale: 12000
Point/Line/Area: POINT
Vertical Measure(m): 91.0
Vert Accuracy: 2
Vert Datum MEAN SEA-LEVEL
Vert Method: GPS CARRIER PHASE STATIC RELATIVE POSITION

SITE COMMENTS

TSP ON ROOF OF GYMNASIUM DLDG. 03 MONITOR IN BOILER ROOM OF GYM- NASIUM BUILDING (FIRST FLOOR). START DATE 03-01-80.
TAKOMA ELE. SCHOOL

ACTIVE MONITOR TYPES

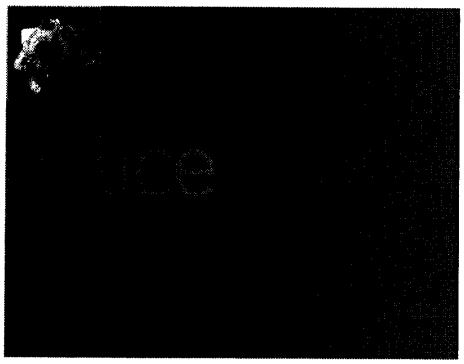
Monitor Type	# of Monitors
NON-REGULATORY	1
SLAMS	2
UNKNOWN	141
OTHER	1

AGENCY ROLES

Role	Agency Desc	Begin Date	End Date
SUPPORTING	District Dept of Environment, Air Quality Div - DDOE/AQD	19800101	

TANGENT ROADS

Road Number	Road Name	Traffic Count	Traffic Year	Traffic Volume Source	Road Type	Compass Sector
1	UNKNOWN	10000			LOCAL ST OR HY	UNK



Leaf Blower Ordinance - Frequently Asked Questions

On June 13, 2005, the Palo Alto City Council passed an ordinance prohibiting the use of a particular type of leaf blower in residential zones of the city. Following are some frequently asked questions regarding the ordinance:

Q. What exactly is banned?
A. Gas-powered leaf blowers may not be used in any residential zones by anyone including residents.

Q. How is "residential area" defined?
A. Residential zones are determined and defined in the Municipal Code.

Click on this link to see the map (use the back button on your browser to return to this page).
http://www.cityofpaloalto.org/civica/filebank/blobdload.asp?BlobID=8188

Q. What kind of leaf blowers may be used and when?
A.

- Residential zones
- Electric leaf blowers (no internal combustion engines) may be used only during the following hours:
  Monday – Friday 9 am – 5 pm
  Saturday 10 am – 4 pm
  Sundays and Holidays not allowed* (see * below for list of holidays)
- Non – residential zones
- Electric and gas-powered blowers may be used only during the following hours:
  Monday – Friday 8 am – 6 pm
  Saturday 10 am – 4 pm
  Sundays and Holidays not allowed*

*"Holiday" means and includes New Year's Day (January 1), Martin Luther King Day (the third Monday in January), Washington's Birthday (the third Monday in February), Memorial Day (the last Monday in May), Independence Day (July 4), Labor Day (the first Monday in September), Columbus Day (the second Monday in October), Veteran's Day (November 11), Thanksgiving Day (the fourth Thursday in November), and Christmas Day (December 25).

Q. What about City maintenance of parks?
A. City staff will not be using leaf blowers. This will result in less frequent maintenance to the parks and a diminished level of cleanliness since work will be done using rakes/brooms.

Q. When does the ban become effective?
A. July 1, 2005

Q. How will the leaf blower ban be enforced?
A. Citizens who believe they observe a violation will be asked to call in to the Police Department on the non-emergency number or via the Police Department's web page. Citizens will be required to identify themselves, provide contact information, and answer a few questions about their observations. Anonymous complaints will not be investigated. Police officers will not normally respond to complaints in person, but information received from citizens will be directed to our Community Service Officer who will follow up with appropriate enforcement efforts.

Q. Besides their name and contact information, what other specific information does someone making a complaint need to provide?

A. Persons calling or reporting online should provide the location of the violation including the exact address whenever possible, as well as any vehicle license plate number or name of the gardening company on the truck (when applicable). All of this information will be very important if a citation is required.

Q. Will police officers be taking sound meter readings on suspected violations?
A. No, as officers usually will not be responding at the time of the violation.

Q. Is there a grace period?
A. Yes, there is a one-month grace period, the month of July 2005, before violators will be cited.

Q. How do I report a violation of the ban?
A. The best first step to take is to speak to the gardener or to the homeowner to see if they are aware of the ban. Reports of violations may be made by calling the Police Department at 329-2413 or violations can be reported on-line. Go to Police Online Reporting to report on-line.

Q. Where can I find the entire noise ordinance?
A. The entire ordinance is also made available online.

Q. Will there be any exemptions given to residents/homeowners?
A. No, all residents are also prohibited from using gas-powered leaf blowers.

Q. Are gas-powered generators permitted to provide current for electric blowers?
A. Yes, as long as they do not exceed the noise ordinance.

Q. Will gardeners still need to be certified to use electric blowers?
A. No.

Q. If the violator is not the resident (i.e., the gardener), who receive the citation, the violator or the resident?
A. If the violator is the resident/ homeowner they will receive the citation, but if the violator is the gardener then they will receive the citation.

Q. I have some concerns that are not covered in these FAQ's. To whom may I speak?
A. Call Community Service Officer Oscar Vilorio at 329-2210.

(leafblower complaint form)

ENVIRONMENTAL HEALTH

Environmental Health Division

Community Noise Program

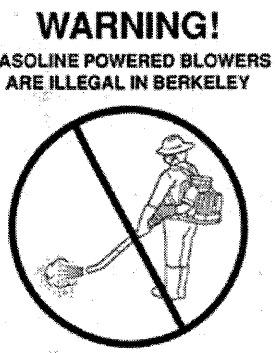
This program is mandated by the Berkeley Municipal Code (BMC) and sets forth standards by which noise is measured. The program is driven by requests for service from the public. Inspectors respond to complaints and enforce, interpret, and educate citizens about the noise ordinance. After-hours complaints are handled by the Berkeley Police Department on a priority basis.

Construction Noise Standards
Construction Noise (PDF Version)

Gasoline Powered Leaf Blowers

(Ordinance No. 5500-N.S.,Section 13.40.070)

"... it shall be unlawful for any person, including any city employee, to operate any portable machine powered with a gasoline engine used to blow leaves, dirt, and other debris off sidewalks, driveways, lawns, or other surfaces within the City limits."



Amplified Sound Permits

Fees partially support this BMC mandated program that requires generators of amplified sound to pay and apply for a permit prior to an event. Standards and procedures are used to determine if the permit can be issued to an applicant. Coordination with the Berkeley Police Department (BPD) and Recreation Division ensures that these events do not become a nuisance.

The Sound Permit Application Form (PDF Version) is available from this page but only as a PDF document. Print and complete the PDF version of the application form or obtain a form from Environmental Health at (510) 981-5310 and TDD (510) 981-6903. You can also request the form by sending an email to envhealth@ci.Berkeley.ca.us.

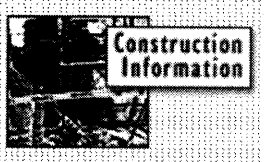
Submit the Sound Permit Application with your payment to the Environmental Health Division at 1947 Center Street, 3rd Floor, Berkeley, CA 94704. Use this link, Fees by Service Category, to navigate to information about current Environmental Health Division services and fee amounts.

Items that are followed by the phrase "PDF Version" will require the Adobe Acrobat Reader for viewing. To read PDF files, you can use this link to download Adobe Acrobat Reader for free.

Do you need assistance or wish to report a complaint?

Complete an on-line Request for Service form, or phone Environmental Health at (510) 981-5310 and TDD (510) 981-6903, or send an email to envhealth@ci.berkeley.ca.us.

Leaf Blowers



Leaf Blowers: What Every Cambridge Property Owner and Contractor Needs to Know

In response to the community's desire to balance the benefits and drawbacks of leaf blowers, the Cambridge City Council enacted an ordinance (Cambridge Municipal Code Section 8.16.081, effective March 1, 2008) that governs the operation of this equipment.

Who does this ordinance apply to?

This Ordinance applies to all residents, businesses, and property owners in Cambridge. However, commercial operators and large property owners should be aware of particular sections that apply only to them.

Commercial operators (any entity or organization that employs 2 or more employees, excluding municipal operators and contractors) are prohibited from use of leaf blower equipment unless they submit an operations plan, which is approved by the City Manager.

Owners of large properties may be eligible for an exemption to operate leaf blowers during summer months and on Sundays and Holidays under certain circumstances.

What counts as a leaf blower?

Any portable, handheld or backpack-style power equipment, powered by fuel or electricity, and used in landscape or property maintenance for blowing, removing or redistributing leaves, dust, dirt, clippings, litter and any other debris.

What equipment is permissible?

The Ordinance seeks to address concerns about air quality and noise produced by leaf blowers. As such, leaf blowers must meet current EPA emissions standards and the sound they emit cannot exceed 65 decibels (per manufacturer's rating).

How many leaf blowers can operate on a property at a time?

Only one leaf blower may be used in parcels of 10,000 square feet or smaller. Larger parcels may only use one leaf blower within each 10,000 square foot area.

When can leaf blowers legally operate?

The following schedule has been developed in consideration of both landscaping needs and neighborhood quality of life.

Dates Permitted
March 15 – June 15;
September 15 – December 31

Dates Prohibited
January 1 – March 14;
June 16 – September 14;
all Sundays and Legal holidays, except for Columbus Day and Veterans Day

Hours of Use (during permitted dates)
Monday – Friday: 8:00 a.m. – 5:00 p.m.
Saturday: 9:00 a.m. – 5:00 p.m.
Columbus Day: 12 noon – 5:00 p.m.
Veteran's Day: 1:00 p.m. – 5:00 p.m.

Beyond this Ordinance, what are some recommended leaf blower best practices?

Please consider the following guidelines before operating a leaf blower

- Be safe
  - Always use ear, eye, and respiratory protection.
  - Avoid leaf blowing near others, particularly children. Remember: for many people, dust and debris can trigger allergies, asthma, or other respiratory illness.
- Be considerate
  - Talk to your neighbors about your maintenance plans, and try to balance those with their need for quiet time.
  - Do not blow toward open windows or doors. If possible, do not use within 10 feet of windows or doors.
  - Do not blow debris onto adjacent property, the street, catch basins, gutters, vehicles, people or pets.
- Use the right tools for the right job
  - Do not use blower to move large mounds of debris.
  - Do not use for construction dust, plaster dust, or dry soil. Spray dusty areas with water before using blower.
  - Use rakes or brooms for heavier debris and to loosen debris from corners and edges.
- Operate efficiently
  - Use the lowest possible speed/throttle to accomplish task.
  - Use the full nozzle extension so that the air stream can work close to the ground.

Click here to view a more extensive list of best practices.

What if I have a concern about an apparent violation?

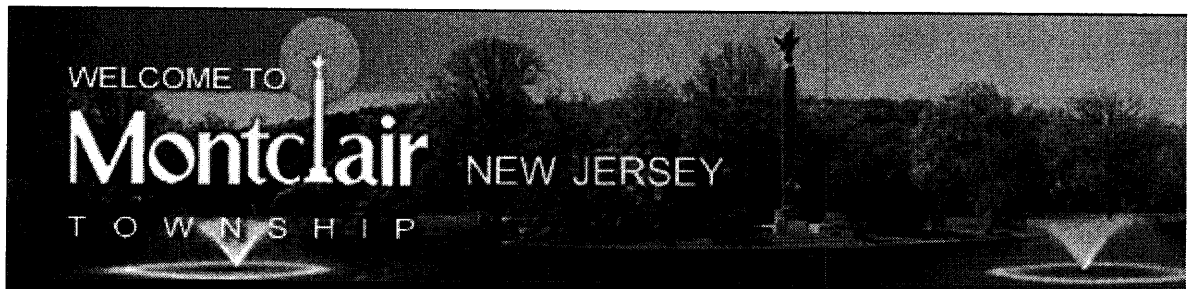
Reports of violations should be directed to the License Commission (during City office hours) at 617-349-6140, or to the Police Department (after hours) at 617-349-3300.

For additional information or assistance

Please contact the City Manager's Office at 617-349-4300 leafblowers@cambridgema.gov.

■ ■ ■

DP



Safety & Code Enforcement
Environmental Affairs
FAQ
Departments
Township Manager
Police
Fire
Community Services
Municipal Clerk
Health & Human Services
Recreation & Cultural Affairs
Planning, Building & Zoning
Safety & Code Enforcement
More...
Township Government
Mayor Jerry Fried
Deputy Mayor Roger S. Terry
Councilor-At-Large Kathryn Weller
First Ward Councilor Rich Murnick
Second Ward Councilor Cary Africk
Third Ward Councilor Nick Lewis
Fourth Ward Councilor Renée E. Baskerville, M.D.
Meeting Minutes
Meeting Agendas/Schedules
Montclair NOW Newsfeeds
RSS MONTCLAIR

NOTICE REGARDING LEAFBLOWERS FROM THE DEPARTMENT OF CODE ENFORCEMENT

The Township of Montclair has determined that unlimited use of leafblowers powered by internal combustion engines impairs the economic and social welfare, health, peace and quality of life of persons residing in Montclair. Therefore, restrictions have been put in place to minimize the adverse impa of such equipment by restricting its use within the Township.

The operation of leafblowers in the Township of Montclair is limited to between March 1 and June 30, inclusive, and between October 1 and December 15, inclusive.

Leafblowers may only be used by landscapers on weekdays between 8:00 a.m. and 6:00 p.m., and by an occupant or owner of the premises between 8:00 a.m. and 8:00 p.m.

Leafblowers may only be used by landscapers on Saturdays between 9:00 a.m. and 6:00 p.m., and by an occupant or owner of the premises between 9:00 a.m. and 8:00 p.m.

Leafblowers may only be used on Sundays, Good Friday, and Thanksgiving between 10:00 a.m. and 5:00 p.m.

It is a violation to operate any leafblower powered by an internal combustion engine in the Township of Montclair without a properly functioning muffler.

< Prev

[Back]

CITIZENS FOR A CLEANER, BETTER LINCOLN
DEBRIS & DUST (LEAF) BLOWERS

A brief early l

About **400 cities and towns** have banned or controlled blowers **nationwide**

Towns that **banned** blowers (partial list)

Most recent:
Scottsdale, AR - Mar 2008 (read)
Yonkers, NY - Jan 2008 (read)
Cambridge, MA - Dec 2007 (read)
Greenberg, NY 2007 (read)
Mamaroneck, NY 2007 (read)
Palo Alto, CA starting Jan 1-06 (read)
Pelham Manor, NY starting Jan 06
Aspen, CO July 18-05 (read) and (pdf)
Houston, Texas July 18-05 (read)
Evanston, IL 2005 (read)
Vancouver, BC Feb 04 (read)

In process:
Greenwich, CT, June 06 - considering citizen request for a ban (read)

Also:
Berkeley, CA (read)
Belvedere, CA
Beverly Hills, CA (banned in 1978 read)
Carmel, CA (banned in 1975)
Claremont, CA (read)
Del Mar, CA (read)
Hermosa Beach, CA
Laguna Beach, CA (read)
Lawndale, CA
Los Altos, CA (read)
Malibu, CA
Menlo Park, CA (read)
Mill Valley, CA
New Rochelle, NY (read)
Pelham, NY (read)
Princeton, NJ (1998)
Rye, NY
Santa Barbara, CA
Santa Monica, CA

Towns with blower **use & noise** ordinances (partial list)

Most recent:
Toronto, CND starting Feb-06 (read)

Also:
Boulder, CO
Foster City, CA (read)
Indian Wells, CA (read)
Los Angeles, CA (read)
Montclair, NJ (pending read)
Oyster Bay, NY
Palm Beach, FL (read)
Portsmouth, NH (read)
Sacramento, CA
Sunnyvale, CA
Tampa, FL
Winnetka, IL

Counties controlling leaf blowers:

Weschester County, New York (read/law)
Leaf Blower Pollution Control - April 2007

States controlling leaf blowers:

California
Small Engine Pollution Rules - 2007 read

About 13% of Californians live in cities that ban the use of leaf blowers, and six of the ten largest California cities have ordinances that restrict or ban leaf blowers. All together, about one hundred California cities have ordinances that restrict either leaf blowers specifically or all gardening equipment generally,

Scarsdale, NY
West Hollywood, CA
White Plains, NY

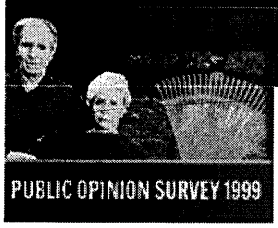
including the cities with bans on leaf blower use (IME 1999). In 2000. nationwide, two states, Arizona and New Jersey, have considered laws at the state level, and five other states have at least one city with a leaf blower ordinance (IME 1999).
Source: California 79-page Report of the State's Environmental Protection Agency (pdf)

Arizona
Pending legislation - 2007 read

ZERO AIR POLLUTION
Los Angeles

Research, facts and experiences regarding the Los Angeles leaf blow and the California State Legislative

OVERVIEW | DEBATE | HEALTH | ACTION



OVERVIEW

Definitions

IN VARIOUS MUNICIPAL CODES

What's on this page:

Blower Ordinances in:

About 11 printed pages.

The following ordinances are referenced as of the year 2000. No claim is made that they are valid at any later date. Still, this partial list may serve as reference.

Other California Cities that have or had leaf blower ordinances: Albany, Bakersfield, Belvedere, Carmel, Coronado, Davis, Del Mar, Downey, Hermosa Beach, Hillsborough, Malibu, Newport Beach, Ojai, Palm Desert, Palm Springs, Pasadena, Piedmont, Redondo Beach, San Marino, Solana Beach, Town of Tiburon, West Hollywood, Woodside. There may be more. Let us know.

Berkeley 13.40.070.B.14

BANS GAS BLOWERS

". . . any portable machine powered with a gasoline engine used to blow . . ."

http://www.ci.berkeley.ca.us

(NOTE) 13.Tampering. The removal or rendering inoperative, other than for purposes of maintenance, repair, or replacement, of any noise control device or element thereof, of any product required to meet specified noise emission limits under federal, state or local law, and the use of said product after its noise control device has been removed or rendered inoperative, other than for purposes of maintenance, repair or replacement

14.Notwithstanding Subsection B.11 of this section, it shall be **unlawful for any person, including any City employee, to operate any portable machine powered with a gasoline engine used to blow leaves, dirt, and other debris off sidewalks, driveways, lawns or other surfaces within the City limits.**

a. Notice of this prohibition shall be posted in all stores selling such gasoline powered machines within the City limits. (Ord. 6026-NS § 1, 1990: Ord. 5500-NS § 1 (part), 1982)

Beverly Hills 5-1.210

BANS GAS BLOWERS

"Portable machine powered with a gasoline engine 1. ."

http://www.ci.beverly-hills.ca.us

It shall be **unlawful for any person within the City to use or operate any portable machine powered with a gasoline engine used to blow leaves**, dirt, and other debris off sidewalks, driveways, lawns, or other surfaces.
(4-13.05)

Claremont 8.24.010

BANS GAS BLOWERS

A. "Leaf blower" means any air blowing machine which uses a concentrated stream of air to blow leaves, grass cuttings, trash, or other debris."

and:

"Internal combustion engine (gasoline) powered leaf blowers"

8.24.010 Definitions.
For the purposes of this chapter:

B. "Parcel" means an area of real property as defined by the Los Angeles County Recorder.

C. "Power yard maintenance equipment" means any engine driven device or machine used primarily for the maintenance of lawns, shrubs, trees, or other landscaping. (Ord. 90-29 § 2 (part), 1990)

8.24.020 Leaf blower use.
Leaf blowers powered by installed line current or by battery may be used in the city subject to the provisions of this chapter not withstanding the noise standards in Chapter 5 of the Land Use and Development Code. Internal combustion engine (gasoline) powered leaf blowers shall be prohibited in the city after March 1, 1991. (Ord. 90-29 § 2 (part), 1990)

8.24.030 Permitted hours of operation.
Electric or battery powered leaf blowers may be operated only between 8:00 a.m. and 6:00 pm., seven days per week. (Ord. 90-29 § 2 (part), 1990)

8.24.040 Requirements for use in residential areas.
A. No leaf blower shall be operated for more than fifteen minutes per hour on any one parcel.

B. No leaves or other debris shall be blown into the street, sidewalk, or beyond the parcel property line.

C. The full blower nozzle extension shall be used for

maximum efficiency and to minimize the spread of dust.

D. When leaf blowers are used in dusty conditions, surfaces shall be moistened prior to blowing or a mister used during blowing.

E. After leaf blower use, debris shall be disposed in trash receptacles.

F. Leaf blowers shall be in proper working order and all manufacturer's noise and dust control equipment on the leaf blower shall remain on the blower and be in operating condition.

G. Leaf blower users shall operate the leaf blower with the least amount of noise and at the lowest speed possible and keep use time as short as possible.

H. Commercial leaf blower operators shall have in their possession a Claremont business license available for inspection on site. (Ord. 90-29 § 2 (part), 1990)

8.24.050 Prohibition of leaf blowers on city property.
Use of any type of leaf blower on any city owned or maintained property is prohibited.

(Ord. 90-29 § 2 (part), 1990)

8.24.060 Violation and penalty.
No person, whether as principal, agent, employee or otherwise, shall violate, cause the violation, or otherwise fail to comply with any of the requirements of this chapter. Any violation of this chapter shall be punishable as provided in Chapter 1.12 of this code. (Ord. 90-29 § 2 (part), 1990)

Dana Point
Ordinance No. 01-18 or 91-18 [smudged numerals)

Adding Chapter 6.20:

HOURS AND DECIBEL RESTRICTIONS

6.20.010 Definitions

(b) "Leaf Blower" means any portable power equipment designed or operated to produce a current of air by fuel, electricity, or other means to push, propel, or blow dust, leaves, grass clippings, cuttings, and trimming from trees and shrubs or other debris."

and See 6.20.016 below regarding Dana Point Public Nuisance law.

"Whereas, in order to control unnecessary, excessive, and annoying noise, dust, and debris in the City of Dana Point, it is hereby declared to be the policy of the City to regulate such noise, dust, and other debris generated by the use of leaf blowers."

Title 6 HEALTH AND SANITATION

6.20.012 Regulations on Leaf Blower Operation.

(a) In residential areas, the use and operation of leaf blowers is prohibited except during the hours of 9:00 a.m. to 5:00 p.m. Monday through Saturday. The use and operation of leaf blowers is further prohibited on any day which is a legal holiday identified in this Code. For commercial, industrial, and recreational areas within two hundred (200¢) feet of a residential area, the restricted hours of operation noted above shall apply.

(b) It shall be unlawful for any person operating a leaf blower to create any noise exceeding the following decibel levels when measured at a distance of fifty (50¢) feet from such leaf blower:

(1) **New leaf blowers purchased, leased, or rented on or after a date three (3) months from the effective date of this Chapter shall not exceed a noise level of 70 dba.**

(2) **New leaf blowers purchased, leased, or rented on or after forty-eight (48) months from the effective date of this Chapter shall not exceed a noise level of 65 dba.**

(3) All leaf blowers other than those specified at Subparagraphs (1) and (2) hereinabove shall not exceed a noise level of 70 dba on or after one year from the effective date of this Chapter.

I Any person using or operating a leaf blower shall not cause dirt, dust, debris, leaves, grass clippings, cuttings, or trimmings from trees or shrubs to be blown or deposited on any adjacent or other parcel, land, lot, street, alley, or gutter from which the leaf blower is being used or operated. Deposits of dirt, dust, leaves, grass clippings, debris, cuttings, or trimmings from trees or shrubs shall be removed and disposed of in a sanitary manner, to prevent dispersement by wind, vandalism, or similar means.

(d) Each commercially operated leaf blower shall have affixed on it the business name, address, and telephone number in a clear, identifying manner.

6.20.014 Violations–Infractions.

(a) Any person violating any of the provisions of this Chapter shall be deemed guilty of an infraction, and upon conviction thereof, shall be fined in an amount not exceeding fifty ($50.00) dollars. Each day such violation is committed or permitted to continue shall constitute a separate offense and shall be punishable as such.

(b) Any person convicted of a violation of this Chapter more than three (3) times in any calendar year shall be deemed guilty of an infraction as defined in Section 1.01.220(b) of this Code and subject to punishment in accordance with Section 1.01.220(b) of this Code.

Dana Point:
6.20.016 Violations–Additional Remedies–Injunctions–Public Nuisance.

(a) As an additional remedy, the operation of any leaf blower in violation of any provision of this Chapter **which operation causes discomfort or annoyance to reasonable persons of normal sensitiveness or which endangers the comfort, repose, health, or peace of residents in the area, shall be deemed and is declared to be a public nuisance and may be subject to abatement summarily by a restraining order or injunction issued by a court of competent jurisdiction.**

(b) Any violation of this Chapter is declared to be a public nuisance and may be abated in accordance with law. The expense of such abatement may be by Resolution of the City Council, declared to be a lien against the property in which such nuisances are maintained, and such lien shall be made a personal obligation of the property owner.

Foster City
(No ordinance code number)
www.fostercity.org
DISTANCE, HOURS RESTRICTIONS

CDD@fostercity.org

"The definition of leaf blowers includes a blower nozzle extension."

"In order to minimize the impact on City residents from noise from leaf blowers and other portable equipment powered by self-contained engines used in property maintenance, the city has adopted the following restrictions regarding the use of leaf blowers within residential districts and within 100 yards of a residential district:
No person shall operate such equipment:

before 8:00 a.m. or after 5:00 p.m. Monday through Friday; or

before 9:00 a.m. or after 5:00 p.m. on Saturdays; or

Sundays or holidays: New Years Day, Presidents' Day, Memorial Day, 4th of July, Labor Day, Thanksgiving and Christmas.

The definition of leaf blowers includes a blower nozzle extension. No material may be blown upon neighboring properties or onto

	any part of the public right-of-way, including but not limited to sidewalks, streets, storm drains or the lagoon, without being immediately removed. Please also be advised that in order to operate a landscape maintenance business legally or to do work in Foster City a business license issued by the City is required.
Indian Wells **TITLE 9 PEACE, SAFETY AND MORALS 1 CHAPTER 9.06 NOISE** **9.06.020(f) Leaf Blower:** **"Leaf-blower" means portable power equipment that is powered by fuel or electricity and used. . ."** http://www.indianwells.org	"Leaf-blower" means portable power equipment that is powered by fuel or electricity and used in any landscape maintenance, construction, property repair, or property maintenance for the purpose of blowing, dispersing or redistributing dust, dirt, leaves, grass clippings, cuttings and trimmings from trees and shrubs or other debris".
Laguna Beach 7.25.080 BANS *ALL* BLOWERS **". . . electrical or gasoline powered blowers, such as commonly used by gardeners and. . ."** http://www.lagunabeach.com	Garden/debris blowers prohibited. The use of electrical or gasoline powered **blowers, such as commonly used by gardeners and other persons for cleaning lawns, yards, driveways, gutters, and other property is prohibited at any time within the city limits.** (Ord. 1259 § 1, 1993: Ord. 535 § 1 (part), 1964).
Lawndale: 8.20.075 BANS GAS BLOWERS **"A. Definitions. The term "weed and debris blowers" means use of portable power equipment powered by gasoline or diesel fuel.**	Gasoline-powered weed and debris blowers. A. Definitions. The term "weed and debris blowers" means portable power equipment powered by gasoline or diesel fuel and used in any landscape maintenance, construction, property repair, or property maintenance for the purpose of blowing, dispersing or redistributing debris. The term "debris" means dust, dirt, paper, packaging, trash, leaves, grass clippings, cuttings and trimmings from trees and shrubs, or other similar material. B. The use of gasoline powered weed and debris blowers or vacuums is prohibited within the city after July 1, 1997. C. [Electric or other non gas] Weed and debris blower operations shall not cause debris to be blown or deposited on any adjacent or other parcel of land, lot, or public right-of-way/property other than the parcel, land, or lot upon which the weed and debris blower is being operated. D. Notwithstanding the foregoing, a person shall not be in violation of this section of blowing debris on any adjacent land if they remove the debris within one hour of deposit and dispose of the debris in a sanitary

manner which will prevent dispersement by wind, vandalism, or similar means.

E. Weed and debris blowers shall not be operated in close proximity to any operable window, door, or mechanical air intake opening or duct of any building so as to deposit debris within such windows, doors, openings or ducts unless with the permission of the occupants of the building (Ord. 814-96 sec.1; Ord. 713-92 sec.1)

Los Altos: 15

BANS GAS BLOWERS

"a. Portable gasoline-powered leaf blowers are defined as portable power equipment that is powered by a self contained fuel engine and used. . ."

http://www.ci.los-altos.ca.us

15 Portable gasoline Powered blowers.

a. Portable gasoline-powered leaf blowers are defined as portable power equipment that is powered by a self contained fuel engine and used in any landscape, maintenance, construction, property repair, or property maintenance for the purpose of blowing, dispersing or redistributing dust, dirt, leaves, grass clippings, cuttings and trimmings from trees and shrubs or other debris.

b. **Gasoline-powered blowers prohibited**. Use or operation of portable gasoline-powered leaf blowers within the city for any purpose except testing noise levels is unlawful and shall constitute an infraction, punishable as provided by law. (Prior code § 10-5.07)

Los Angeles Municipal Code, Chapter XI — Noise Regulation, Article 2 — Special Noise Sources,

Section 112.04 (c).

DISTANCE RESTRICTIONS

(Commonly referred to as a "BAN")

". . .gas powered blower. . ."

AND: See below.

Re: Powered Equipment Intended for Repetitive Use in Residential Areas and Other Machinery, Equipment, and Devices.

"I Notwithstanding the provisions of Subsection (a) above, no gas powered blower shall be used within 500 feet of a residence at anytime. Both the user of such a blower as well as the individual who contracted for the services of the user, if any, shall be subject to the requirements of and penalty provisions for this ordinance. Violation of the provisions of this subsection shall be punishable as an infraction in an amount not to exceed One Hundred Dollars ($100.00), notwithstanding the graduated fines set forth in L.A.M.C. Section 11.00(m). "

Los Angeles Municipal Code, SECTION 112.05: Maximum noise Level of Powered Equipment or Powered Hand Tools.

Go to full ordinance here.

http://www.cityofla.org

[Further noise restrictions on blowers:]

"Between the hours of 7:00 a.m. and 10:00 p.m., in any residential zone of the City or within 500 feet thereof, no person shall operate or cause to be operated any powered equipment or powered hand tool that produces a maximum noise level exceeding the following noise limits at a distance of 50 feet therefrom:"

"(c) 65dB(A) for powered equipment intended for repetitive use in residential areas, including lawn mowers, backpack blowers, small lawn and garden tools and riding tractors."

[NOTE: "including" assumes, "including, but

not limited to. . ."]

Menlo Park 8.07.030

USE RESTRICTIONS AND REQUIREMENTS.

"Certified Leaf Blowers" includes all blowers, whatever fuel, whatever way they are held or moved about.

AND: See below.

(1) **Certified Leaf Blowers**. Certified leaf blowers may be operated in the city Mondays through Fridays between the hours of eight (8) a.m. and five (5) p.m. Certified leaf blowers may be operated by residents of the city on Saturdays between the hours of eleven (11) a.m. and three (3) p.m. to maintain their property. Operation of certified leaf blowers in the city is prohibited on Sundays, observed federal holidays as defined by the city and on "Spare the Air" days as declared by the Bay Area Air Quality Management District.

(2) Non-Certified Leaf Blowers. The use of any leaf blower other than a certified leaf blower as defined by this chapter, is prohibited.

(3) **Electric Blowers.** The provisions of this Chapter 8.07 do not apply to electrically powered blowers. (Ord. 895 § 3 (part), 1999)

BANS GAS BLOWERS

and: 8.07.040 Limitations on use.

Any person who uses or operates a leaf blower in the city shall at all times comply with the following:

(1) **Full *Blower* Nozzle Extension**. The full blower nozzle extension and diffuser as provided by the manufacturer or supplied by the distributor shall be used at all times.

(2) **Earplugs**. Earplugs or ear protectors shall be worn or inserted at all times by persons operating a leaf blower. (Ord. 895 § 3 (part), 1999)

Menlo Park
Ordinance No. 886
[NOTE: this ordinance is also published in full in Spanish]

Section 2: Section 8.04.010(20) (Leaf Blowers) of Chapter 8.04 of the City of Menlo Park Municipal Code is hereby repealed in its entirety and replaced with the following:

http://www.ci.menlo-park.ca.us

(20) Gasoline-Powered Leafblowers. The use or operation of gasoline-powered leafblowers in the City of Menlo Park is prohibited. **Gasoline-powered leafblowers are defined as portable power equipment that is powered by a self contained fuel engine and used** in any landscape, maintenance, construction, property repair, or property maintenance for the purpose of blowing, dispersing, or redistributing dust, dirt, leaves, grass clippings, cuttings and trimmings from trees and shrubs or other debris.

Palo Alto
Title 9 PUBLIC PEACE, MORALS AND SAFETY, Chapter 9.10 NOISE:

BAN GAS Residential Area after July 1, 2002.

"Combustion engine — leaf-blower" means any

(h) "Combustion engine — leaf-blower" means any portable machine powered with a gasoline engine used to blow leaves, dirt and other debris off sidewalks, driveways, lawns or other surfaces."

(i) "Residential power equipment" means any mechanically powered saw, sander, drill, grinder, electric leaf-blower, lawnmower, hedge trimmer, edger, or any other similar tool or device."

portable machine powered with a gasoline engine used. . ."

[NOTE: Code also includes descriptions of (a)=Sound level, (b) Precision sound level meter, (c) Noise level, (d) Local ambient, (f) Property plane.]

http://www.citypalo-alto.ca.us

(Ord. 3751 Sec.1, 1987: Ord.3609Sec.1, 1985: Ord.2664Sec.1 (part, 1972)

(2)Between July 1, 2000 and January 1, 2001, no person shall operate an electric powered leaf blower which produces a noise level in excess of seventy-five dBA when measured from a distance of twenty-five feet, and no person shall operate an electric powered leaf blower except during the following hours: nine a.m. and five p.m. Monday through Saturday and ten a.m. and four p.m. Sundays and holidays.
(3)No person shall operate any leaf blower which does not bear an affixed manufacturer's label indicating the model number of the leaf blower and designating a noise level not in excess of sixty-five dBA when measured from a distance of fifty feet utilizing American National Standard Institute methodology. **Any leaf blower which bears such a manufacturer's label shall be presumed to comply with any noise level limit** of this chapter provided that it is operated with all mufflers and full extension tubes supplied by the manufacturer for that leaf blower.

> **[ZAP comment**: This presumption does not take into account that machines which are not well maintained, and which have been used over time, may not actually comply to noise standards, even if they bear the original manufacturer's label.**]**

No person shall operate any leaf blower without attachment of all mufflers and full extension tubes supplied by the manufacturer for that leaf blower.

No person shall operate any leaf blowers except during the following hours: nine a.m. and five p.m. Monday through Friday, and ten a.m. and four p.m. Saturday. No person shall operate any leaf blowers on Sundays and holidays.

No person shall operate any leaf blower powered by an internal combustion engine within any residential zone after July 1, 2002.

No person shall operate any leaf blower powered by an internal combustion engine within non-residential zone except during the following hours: eight a.m. and six p.m. Monday through Friday, and ten a.m. to four p.m. Saturday.

Commercial operators of leaf blowers are prohibited from operating any leaf blower within the city if they do not prominently display a certificate approved by the Chief of Police verifying that the operator has been trained to operate leaf blowers according to standards adopted by the Chief of Police.

In addition to all authorizations and restrictions otherwise provided in this

chapter, public streets, sidewalks, and parking lots in business districts and at the Municipal Golf Course and all city parks may be cleaned between four a.m. and eight a.m. using leaf blowers which bear an affixed manufacturer's label indicating the model number of the leaf blower and designating a noise level not in excess of sixty-five dBA when measured from a distance of fifty feet utilizing American National Standard Institute methodology. The restrictions on leaf blowers contained in this subsection (f)(3) shall become effective on and after January 1, 2001, except that the prohibitions on the use of leaf blowers powered by internal combustion engines shall become effective on and after July 1, 2002.

Sacramento
8.68.180

RESTRICTIONS

"Portable gasoline-powered blower" means any portable power equipment that is powered by a gasoline engine and commonly used . . ."

http://www.sacto.org

http://www.ci.sacramento.ca.us

"Portable gasoline-powered blower" means any portable power equipment that is powered by a gasoline engine and commonly used in landscape or property maintenance to blow, disperse, or redistribute dust, dirt, leaves, grass clippings, cuttings, and trimmings from trees and shrubs or other debris on sidewalks, driveways, lawns, or other surfaces. and

8.68.180 Portable gasoline-powered blowers.

A. It is unlawful for any person to operate any portable gasoline-powered blower on residential property or within two hundred (200) feet of residential property, except between the hours of nine a.m. and six p.m. Monday through Saturday and between the hours of ten a.m. and four p.m. on Sunday.

B. It is unlawful for any person to operate any portable gasoline-powered blower on residential property or within two hundred (200) feet of residential property during the hours permitted by subsection A of this section if the blower creates **noise exceeding** the following specified levels measured at a distance of fifty (50) feet from the blower:

1. Blowers purchased or otherwise acquired between May 15, 1992, and November 15, 1995, shall not exceed seventy (70) dba.

2. Blowers purchased or otherwise acquired after November 15, 1995, shall not exceed sixty-five (65) dba.

3. Blowers in use on or before the effective date of the ordinance codified in this chapter or purchased or otherwise acquired before May 15, 1992, shall not exceed seventy (70) dba after November 15, 1993. (Prior code § 66.02.213)

and 8.68.200: F. Blowers. The operating of any noise-creating blower or power fan or any internal combustion engine the operation of which causes noise due to the explosion of operating gases or fluids, unless the noise from such blower or fan is muffled and such engine is **equipped with a muffler device sufficient to deaden such noise.**

San Diego
Municipal Code Sec. 59.5.0502 G

http://www.sandiego-online.com

http://www.sannet.gov

A "leaf blower" means any portable, hand-held or back pack, engine powered device with a nozzle that creates a directable airstream which is capable of and intended for moving leaves and light materials.

Santa Barbara
9.16.020 — 9.16.021.

BANS GAS BLOWERS

A. Definitions: LEAF BLOWER. Any device used, designed or operated to produce a current of air by fuel, electricity or other means to push, propel or blow cuttings, refuse or debris.

"9.16.021: use of Gasoline Powered Leaf Blowers Prohibited."

". . .any portable machine powered with a gasoline engine, or gasoline powered generator,. . ."

http://www.ci.santa-barbara.ca.us

Leaf Blowers — Restriction on Use.

D. PHASE-OUT OF CERTAIN LEAF BLOWERS

1. Existing Leaf Blowers: The use of Leaf Blowers which are not manufactured to meet or exceed the Noise Level Standards is prohibited in all areas of the City under all circumstances, after October 9, 1997.

2. Sale of New Leaf Blowers: It is unlawful to sell or offer for sale within the City of Santa Barbara Leaf Blowers which are not manufactured to meet or exceed the Noise Level Standards of 65 decibels.

E. Certification:

Owners and operators will present equipment to the City parks and Recreation Director . . . for noise testing according to ANSI testing criteria in the Noise Level Standards. Leaf Blowers which generate 65 decibels or less according to the test will be issued a certification sticker, which is valid for one year following the date of testing. The use of a Leaf Blower, without a current and valid certification sticker affixed to it, within the City after July 1, 1998, is an infraction.

9.16.021: **use of Gasoline Powered Leaf Blowers Prohibited.**

Measure D97, adopted November 4, 1997, provides: In order to secure and promote the public health, comfort, safety and welfare, and to protect the rights of its citizens to privacy and freedom from nuisance, it is the purpose of this ordinance to prohibit unnecessary, excessive and annoying noises at levels which are detrimental to the health and welfare of the community, and to minimize airborne dust and pollen.

It shall be unlawful for any person within the City to use or operate any portable machine powered with a gasoline engine, or gasoline powered generator, to blow leaves, dirt, and other debris off sidewalks, driveways, lawns, or other surfaces. (Ord. 5036, 1997).

Santa Monica
Municipal Code, [Copyright 1996] 4.08.270 Restrictions on leafblower operation.

a. No person shall operate any motorized leafblower within the City.

Penalties:

BANS *ALL* BLOWERS

http://www.ci.santa-monica.ca.us

b. Any person violating this Section shall be guilty of an infraction, which shall be punishable by a fine not exceeding two hundred fifty dollars, or a misdemeanor, which shall be punishable by a fine not exceeding one thousand dollars per violation, or by imprisonment in the County Jail for a period not exceeding six months, or by both such fine and imprisonment (Prior code Sec. 4212; added by Ord. No. 1578CCS Sec. 1, adopted 3/26/91); amended by Ord. No. 1813CCS Sec. 2, adopted 9/12/95)

Infraction, $250 OR misdeameanor, $1,000 AND/OR

imprisonment up to 6 months.

Sunnyvale
19.42.030 Noise

RESTRICTIONS

"(d) A "leaf blower" is a small, combustion engine-powered device used for property or landscape maintenance that can be hand-held or carried on the operator's back and which operates by propelling air under pressure through a cylindrical tube."

a) Operational noise shall not exceed **seventy-five dBA at any point on the property line of the premises upon which the noise or sound is generated or produced**; provided, however, that the noise or sound level shall not exceed fifty dBA during nighttime or sixty dBA during daytime hours at any point on adjacent residentially zoned property

(d) A "leaf blower" is a small, combustion engine-powered device used for property or landscape maintenance that can be hand-held or carried on the operator's back and which operates by propelling air under pressure through a cylindrical tube. It is unlawful for any person to operate a leaf blower on private property in or adjacent to a residential area except between the hours of 8:00 am and 8:00 pm.

Effective January 1, 2000, all leaf blowers operated in or adjacent to a residential area shall operate at or below a noise level of sixty-five dBA at a distance of fifty feet, as determined by a test conducted by the American National Standards Institute or an equivalent. The dBA **rating shall be prominently displayed** on the leaf blower. (Ord. 2623-99 § 1 (part): prior zoning code § 19.24.020(b)-(d)).

OUT OF STATE:

Vancouver, BC

as of July 1, 2001

Original motion:

"THAT effective September 1, 2001 the Noise By-law be amended to prohibit the use of gas-powered leaf blowers throughout the City of Vancouver at all times."

Motion as amended and passed:

"A. THAT the Noise By-law be amended to prohibit the use of gas-powered leaf blowers throughout the City of Vancouver, within 50 metres of any residential premises, except for

the appropriate use during October through January, when the vast majority of leaves are in need of collecting; and

FURTHER THAT effective February 2, 2004 the Noise By-law be amended to prohibit the use of gas-powered leaf blowers throughout the City of Vancouver at all times."

> **[ZAP comment:** Residents of Vancouver who would like this to actually go into effect should be expressing their support to the press and to local politicians on a regular basis between now and February 2004. Ask canidates running for office to hear you out and take a stand before the vote.**]**

"B. THAT staff report back on the effects of other noise producing machines including weed eaters and lawn mowers."

Toronto, Ontario, Canada

See **Toronto Public Health Technical Report**: Leaf Blowers and other Lawn/Garden Equipment: Noise, Air Pollution and Regulation (June 2001).

We are told the recommendation to ban all blowers for ten months of the year on private properties may be greatly watered down by the time it is presented again on February 13, 2002.

Boulder, CO

Arizona state

Attempted to pass a ban in part of the state in 2001. Failed due to lack of community support.

Texas state

Attempted to pass a ban. Failed.

BACK TO TOP

Home | **Overview** | **Debate** | **Health** | **Action** | **Links** | **Presentation Materials**

Terms, Privacy and Contact Us

To report violations of the gas leaf blower ban in the City of Los Angeles, dial 311.

That operator will connect you to the Report Line. Also report repeat violations in the future. If an LAPD car is in the vicinity, they may be able to respond. If not, your report(s) will be followed-up at a later date.

Be prepared to report the day of the week, the date, the time, the address, and the license plate on the gardener's vehicle, if any.