

LEAF BLOWER POLLUTION HAZARDS IN ORANGE COUNTY

SUMMARY

The widespread daily usage of two-cycle gasoline engine leaf blowers in the cities and unincorporated areas presents a health hazard to all citizens of Orange County. The hazards are four-fold:

- Toxic exhaust fumes and emissions are created by gas-powered leaf blowers. Exhaust pollution *per leaf blower* per hour is the equivalent of the amount of smog from 17 cars driven one hour and is localized in the area of blower usage.
- The high-velocity air jets used in blowing leaves whip up dust and pollutants. The particulate matter (PM) swept into the air by blowing leaves is composed of dust, fecal matter, pesticides, fungi, chemicals, fertilizers, spores, and street dirt which consists of lead and organic and elemental carbon. About five pounds of PM per leaf blower per hour are swept into the air and take hours to settle.
- The quantity of pollution products that are injected into county air. The total amount of pollutants injected into the environment by blower usage in the county is significant. The ARB calculates that leaf blowers inject 2.11 tons of combustion pollutants per day into Orange County air. Leaf blowers in the County sweep twenty tons per day of small size particulate matter into the air.
- Blower engines generate high noise levels. Gasoline-powered leaf blower noise is a danger to the health of the blower operator and an annoyance to the non-consenting citizens in the area of usage.

In light of the evidence, the Grand Jury determined the health hazards citizens are exposed to by the use of leaf blowers outweigh the questionable economic benefit blowers may bring to the cities and the County. The Grand Jury recommends that the cities, school districts, community college districts, and the County cease using gas powered blowers in their maintenance and cleanup operations.

INTRODUCTION AND PURPOSE

The focus of this study was to describe and assess the health hazards caused by gasoline-powered leaf blowers used in Orange County. The Grand Jury assessed the air and noise pollution introduced into the county by gasoline-powered leaf blowers (hereinafter-called leaf blowers).

The purpose of this report is to recommend that cities take actions to reduce health hazards presented by leaf blowers. School districts and community college districts should do likewise since children are most vulnerable to the pollution and noise caused by leaf blowers. The Board of Supervisors should take similar action in the unincorporated areas. Additionally, such actions would improve the quality of life in Orange County.

METHOD OF STUDY

The Grand Jury gathered information and data from a variety of sources including:

- Leaf blower manufacturers
- California Air Resources Board (ARB)
- South Coast Air Quality Management District (AQMD)
- U.S. Environmental Protection Agency (EPA)
- American Lung Association
- Consumer Reports magazine
- Various newspaper and magazine articles
- Personal activities and observations

Quantitative assessments were made of the nature and scope of leaf blower pollution to the Orange County environment. The contribution of an individual leaf blower was easy to determine. The Grand Jury utilized data obtained from the Air Resources Board, the EPA and the Air Quality Management District to establish the *total* pollution contributed by leaf blowers to the county environment.

BACKGROUND AND HISTORY

Two-cycle gasoline-powered leaf blowers were introduced into the United States in the 1970s. By 1985, 75,000 blowers were sold and by 1989, 464, 000 were sold. California leads the nation in the number of leaf blowers used, estimated to be in the millions, and sales are growing at 6 to 8 percent a year.

The city of Laguna Beach bans the use of leaf blowers, and over a dozen other California cities have done likewise. Health and quality of life concerns related to leaf blower use became an issue in California cities prior to 1975.

LEAF BLOWER OUTPUT

Leaf blowers are usually powered by a 2-cycle gasoline engine that provides the motive power for a high velocity stream of air guided by a tubular duct toward the leaves or debris to be swept or blown. The blower unit is either carried by hand or back-mounted on the operator depending on the size of the engine and the power desired. Generic output characteristics (averaged over several manufacturers) include:

LEAF BLOWER NOISE OUTPUT

TABLE 1

| | Hand Held | Back Pack |
|---------------------------|----------------------|--------------------------|
| Noise level at blower | >95 dBA ¹ | >90 dBA |
| Noise level @ 50 feet | >65 dBA | >75dBA |
| Airjet velocity at nozzle | ~180 miles per hour | up to 250 miles per hour |

¹dBA = acoustic decibels, frequency-weighted measures of audible noise volume or power used in noise analysis.

HAZARDS FROM BLOWER OPERATIONS

There are four major health hazards from the use of leaf blowers. They are

- exhaust pollution
- particulate pollution
- quantity of pollutants
- noise

EXHAUST POLLUTION

One gasoline-powered leaf blower generates as much exhaust pollution in one hour as would 17 cars traveling slowly. Cars disperse their pollutants over long stretches of road, while a blower concentrates its pollutants in one neighborhood. Two-stroke engine fuel is a gas-oil mixture that is especially toxic compared to automobile emissions.

Exhaust pollution from two-cycle engines is a large contributor of carbon monoxide (CO), nitrous oxides (NO_x), hydrocarbons (HC), and particulate matter (PM). The particulate matter from combustion is small in size (2.5 or microns or less).² Combustion exhaust particulate matter remains suspended in the air for hours—sometimes days—and is easily assimilated in the lungs. The EPA and ARB state that such PM can increase the number and severity of asthma attacks, bronchitis and other lung diseases and reduce ability to fight infections. Those particularly effected are children and the elderly.

² PM2.5 microns refers to particulate matter size diameter in millionths of a meter or microns. PM2.5 particles are 2.5 microns in diameter or smaller. PM10 particles are 10 microns in diameter or smaller and include PM2.5 particles. A PM10 particle is about 1/17th the diameter of a human hair.

PARTICULATE POLLUTION

The airjet generated by blowers with velocities of 185 miles per hour or more spreads dust, dirt, pollens, animal droppings, herbicides and pesticides into the air. The effect lasts for hours on particulate matter that is 10 microns in diameter or smaller. The ARB has estimated that each leaf blower entrains (puts into the atmosphere) 5 pounds of particulate matter per hour about half of which is 10 microns or smaller. The EPA and ARB state that such particulate matter can create the same health risks as does the exhaust pollution.

QUANTITY OF POLLUTANTS

The ARB calculates that leaf blowers inject some 2.11 *tons* of combustion pollutants per day into Orange County air. These pollutants contain organic gases, carbon monoxide, nitrous oxides and exhaust-size particulate matter (PM2.5) as described previously. Additionally, twenty *tons* per day of small size particulate matter (PM10) are swept into the air by blower airflow.

NOISE

Noise interferes with communications, sleep, and work. The EPA claims noise degrades quality of life by impairing social interaction. It also reduces work accuracy and creates stressful levels of frustration and aggravation. The average blower generates noise that measures 65 to 75 dBA or more at 50 feet, and even louder at close range. Leaf blowers are often used fewer than 50 feet from non-consenting people. Neighboring homes may be occupied by home workers, retirees, day sleepers, children and the ill or disabled. The World Health Organization (WHO) recommends general outdoor noise levels of 55 dBA or less, and 45 dBA or less for sleeping. Thus, a 65-decibel leaf blower would be 100 times too loud³ for healthful sleep. Blower noise can, and probably does, impair the user's hearing. A blower generates upward of 95 decibels of noise at the operator's ear (see Table 1 above). Office of Safety and Health Administration requires hearing protection for noise over 85 dBA. Hearing protectors as worn in the field provide only a fraction of the attenuation needed for hearing protection. There is an increased risk of hearing damage and deafness from repeated exposure to noise above 75 dBA. Deafness caused by noise is irreversible.

³ A decibel change from 45 to 65 dBA, is a 100-fold change in volume.

ALTERNATE EQUIPMENT AND TECHNIQUES

Rakes, brooms and electric blowers are alternate equipment that can perform leaf cleanup tasks. The first two have been in use since antiquity and have been proven performers since that time. Rakes and brooms are quiet and consume no resources. They produce minimal dust and little debris into the atmosphere and no pollutants from the power source. Electric blowers are a recent technical innovation that minimize engine pollution, lessen noise, but leave intact the hazards associated with airjet entrained particulate matter.

ECONOMICS

It has been argued by leaf blower operators that the use of rakes and brooms would cause cleanup jobs to take up to twice as long to complete. This allegation is not supported by facts. For example, the city of Claremont decided not to use leaf blowers (1990) in the maintenance of city property. They quantified the increase in workload using rakes and brooms as 1/16 over using blowers, an increase of about 6%. Other jurisdictions banning leaf blowers have experienced no increase in cleanup-job hours.

COMPLIANCE IN CITIES BANNING LEAF BLOWERS

The Grand Jury surveyed four cities that banned or partially banned leaf blowers in or near Orange County.

1. Los Angeles (population ~3.6 million) banned gasoline powered leaf blowers on July 1, 1998. The city reported that compliance is good despite the fact that the police enforce violations as an infraction, which puts them as a low priority. Alternatively, the Public Works Department uses street enforcement inspectors as citing officials. Citizen participation provides license plate numbers and times of violations for subsequent violation citations.
2. Santa Barbara banned gasoline leaf blowers and regulated other types of blowers since 1997. The city Parks Department incurred a one-time cost of \$90,000 out of a budget of \$4 million (2.25%) to replace equipment and has seen little or no additional impact on city cleanup.
3. Laguna Beach has banned all types of blowers since 1993 and enjoys 95% compliance. The city uses brooms and rakes to maintain city parks with no impact on costs or cleanliness.
4. Claremont banned gas-powered blowers in 1991, but allows electric blowers. Positive citizen involvement is high.

FINDINGS

Under *California Penal Code* § 933 and §933.05, responses are required to all findings.

Based on documented evidence, it is the finding of the Grand Jury that leaf blower operations represent health hazards to the citizens of Orange County. The hazards include pollution from engine exhaust and the pollution caused by entrained particulate matter being discharged from the blowers. The quantity of pollution injected into the air represents health dangers to all citizens of the county. Additionally, operators risk suffering permanent hearing loss from the high noise levels in close proximity to the blowers. Non-consenting citizens are subject to loss of quality of life from the noise forced upon them by blower operation in their area.

1. Exhaust pollution from two-cycle engines is a large contributor of carbon monoxide (CO), nitrous oxides (NO_x), hydrocarbons (HC), and particulate matter (PM). Exhaust pollution *per leaf blower* per hour is the equivalent to the amount of smog from 17 cars driven one hour. Leaf blower exhaust pollution remains localized in the neighborhood in which it is generated. Combustion exhaust PM remains suspended in the air for hours and is easily assimilated in the lungs. Leaf blowers contribute to total Orange County pollution.

A response is required to Finding 1 from **Board of Supervisors** and the Cities of **Anaheim, Brea, Buena Park, Costa Mesa, Cypress, Dana Point, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, Irvine, Laguna Hills, Laguna Niguel, La Habra, Lake Forest, La Palma, Los Alamitos, Mission Viejo, Newport Beach, Orange, Placentia, San Clemente, San Juan Capistrano, Santa Ana, Seal Beach, Stanton, Tustin, Villa Park, Westminster, and Yorba Linda**, and School Districts of **Anaheim City, Anaheim Union High, Brea-Olinda Unified, Buena Park, Capistrano Unified School District, Centralia, Cypress, Fountain Valley, Fullerton Joint Union High, Fullerton, Garden Grove Unified, Huntington Beach City, Huntington Beach Union High, Irvine Unified, La Habra City, Laguna Beach Unified, Los Alamitos Unified, Lowell Joint, Magnolia, Newport-Mesa Unified, Ocean View, Orange Unified, Placentia-Yorba Linda Unified, Saddleback Valley Unified, Santa Ana Unified, Savanna, Tustin Unified, Westminster**, and Community College Districts **Coastline Community, North Orange County, Santiago, and South Orange County**.

2. The particulate matter swept into the air by the high velocity air jet used in sweeping or blowing leaves is composed of dust, fecal matter, pesticides, fungi, chemicals, fertilizers, and street dirt consisting of lead and organic and elemental carbon. These PM constituents are documented health hazards.

A response is required to Finding 2 from **Board of Supervisors** and the Cities of **Anaheim, Brea, Buena Park, Costa Mesa, Cypress, Dana Point, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, Irvine, Laguna Hills, Laguna Niguel, La Habra, Lake Forest, La Palma, Los Alamitos, Mission Viejo, Newport**

Beach, Orange, Placentia, San Clemente, San Juan Capistrano, Santa Ana, Seal Beach, Stanton, Tustin, Villa Park, Westminster, and Yorba Linda, and School Districts of Anaheim City, Anaheim Union High, Brea-Olinda Unified, Buena Park, Capistrano Unified School District, Centralia, Cypress, Fountain Valley, Fullerton Joint Union High, Fullerton, Garden Grove Unified, Huntington Beach City, Huntington Beach Union High, Irvine Unified, La Habra City, Laguna Beach Unified, Los Alamitos Unified, Lowell Joint, Magnolia, Newport-Mesa Unified, Ocean View, Orange Unified, Placentia-Yorba Linda Unified, Saddleback Valley Unified, Santa Ana Unified, Savanna, Tustin Unified, Westminster, and Community College Districts Coastline Community, North Orange County, Santiago, and South Orange County.

3. Noise from gasoline-powered leaf blowers is a significant danger to the health of the blower operator and a severe annoyance to the non-consenting citizens nearby.

A response is required to Finding 3 from **Board of Supervisors** and the Cities of **Anaheim, Brea, Buena Park, Costa Mesa, Cypress, Dana Point, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, Irvine, Laguna Hills, Laguna Niguel, La Habra, Lake Forest, La Palma, Los Alamitos, Mission Viejo, Newport Beach, Orange, Placentia, San Clemente, San Juan Capistrano, Santa Ana, Seal Beach, Stanton, Tustin, Villa Park, Westminster, and Yorba Linda, and School Districts of Anaheim City, Anaheim Union High, Brea-Olinda Unified, Buena Park, Capistrano Unified School District, Centralia, Cypress, Fountain Valley, Fullerton Joint Union High, Fullerton, Garden Grove Unified, Huntington Beach City, Huntington Beach Union High, Irvine Unified, La Habra City, Laguna Beach Unified, Los Alamitos Unified, Lowell Joint, Magnolia, Newport-Mesa Unified, Ocean View, Orange Unified, Placentia-Yorba Linda Unified, Saddleback Valley Unified, Santa Ana Unified, Savanna, Tustin Unified, Westminster, and Community College Districts of Coastline Community, North Orange County, Santiago, and South Orange County.**

RECOMMENDATIONS

Under *California Penal Code* § 933 and §933.05, the Grand Jury requires responses from the appropriate agencies and officials to each of the following recommendations.

Based on the findings, the Grand Jury recommends that:

1. The Orange County Board of Supervisors ceases the County use of gasoline-powered leaf blowers in maintenance and cleanup operations in the unincorporated areas of the County. (Findings 1 through 3)

(A response to Recommendation 1 is required from **Orange County Board of Supervisors**.)

- 2 The 30 county cities, except Laguna Beach, which already does so, cease the use of gasoline-powered leaf blowers in their city maintenance and cleanup operations. (Findings 1 through 3)

(A response to Recommendation 2 is required from **Anaheim, Brea, Buena Park, Costa Mesa, Cypress, Dana Point, Fountain Valley, Fullerton, Garden Grove, Huntington Beach, Irvine, Laguna Hills, Laguna Niguel, La Habra, Lake Forest, La Palma, Los Alamitos, Mission Viejo, Newport Beach, Orange, Placentia, San Clemente, San Juan Capistrano, Santa Ana, Seal Beach, Stanton, Tustin, Villa Park, Westminster, and Yorba Linda.**)

- 3 The 28 School Districts cease the use of gasoline powered leaf blowers in their school maintenance and cleaning operations (Findings 1 through 3.)

A response to Recommendation 3 is required from 28 School Districts of **Anaheim City, Anaheim Union High, Brea-Olinda Unified, Buena Park, Capistrano Unified School District, Centralia, Cypress, Fountain Valley, Fullerton Joint Union High, Fullerton, Garden Grove Unified, Huntington Beach City, Huntington Beach Union High, Irvine Unified, La Habra City, Laguna Beach Unified, Los Alamitos Unified, Lowell Joint, Magnolia, Newport-Mesa Unified, Ocean View, Orange Unified, Placentia-Yorba Linda Unified, Saddleback Valley Unified, Santa Ana Unified, Savanna, Tustin Unified, Westminster.**

4. The four Community College Districts cease the use of gasoline powered leaf blowers in their school maintenance and cleaning operations (Findings 1 through 3.)

(A response to Recommendation 4 is required from the four Community College Districts of **Coastline Community, North Orange County, Santiago, and South Orange County.**)

BIBLIOGRAPHY

- Facsimile Transmission from Air Resources Board to the Grand Jury, *Leaf Blowers- 1997 Orange County*, Dec 10, 1998.
- South Coast Air Quality Management District, *Base and Future Year Emission Inventories Report*, Appendix III, November 1996.
- Internet Posting, SCAQMD AQMD *Funds Development of Zero-Emission Mower, Leaf Blower* Website.
- Pamphlet, Best Available Control Method (BACM) *Particulate Matter Air Pollution: A Threat to Our Health Working Group* (Membership includes ARB, SCAQMD, EPA), January 1997.
- California Air Resources Board Public Information Office, *Facts About Air Pollution and Health Pamphlet*, 1991.
- American Lung Association of Sacramento-Emigrant Trails, *Fact Sheet – Leaf Blower Air Pollution Impacts Study Results*, undated.
- Letter, from Technical Support Division, ARB, to Air Quality Management Division, *Air Pollution from Leaf Blowers*, Sacramento Metropolitan Air Quality Management District; July 9, 1991.
- U.S. Environmental Protection Agency, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*, 550/9-74-004, March 1974.
- U.S. Environmental Protection Agency, NTID 300.7, NTIS Document No. PB-206723 *Effects of Noise on People*, December 1971.
- Consumer Reports, *Power Blowers*, September 1995, p. 586-9.
- Consumer Reports, *The world's quietest power blower?* April 1997, p. 8.
- Briggs and Stratton Corporation, *Emissions*, Internet Posting website (www.briggsandstratton.com/emissions), December 1, 1998.
- Tanaka Power Equipment Catalog, *Blowers*, Internet website: (www.tanakapowerequipment.com), 1998, p. 8.
- RedMax Catalog-Part Number A01098, *Pro Power Blowers* Komatsu Zenoah America, Inc., Norcross, Georgia.
- Echo Master Products Catalog, Part No. 999222-02916, *Power Blowers*, Echo Incorporated, Lake Zurich, IL, 1998, p. 16–21.
- Husqvarna Forest and Garden, Charlotte NC, *Blowers*, Husqvarna Catalog #531 03 05-50, 1998, page 22.