City Council Staff Report

Date: July 19, 2017 LEGISLATIVE

Subject: INTRODUCTION OF AN ORDINANCE OF THE CITY OF PALM SPRINGS, CALIFORNIA, ADDING SUBSECTION (k) TO SECTION 11.74.043 AND SECTION 5.78.050, AND AMENDING SECTION 5.78.010 OF THE PALM SPRINGS MUNICIPAL CODE, REGARDING LOUD, UNUSUAL NOISES AND LANDSCAPE RELATED BUSINESSES, PROHIBITING GASOLINE POWERED LEAF BLOWERS AND ALTERNATIVELY ALSO PROHIBITING ELECTRICAL OR BATTERY POWERED LEAF BLOWERS IN THE CITY AS A PER SE NUISANCE COMMENCING ON JANUARY 1, 2019

From: David H. Ready, City Manager

Initiated by: Edward Z. Kotkin, City Attorney
Marcus L. Fuller, Assistant City Manager

SUMMARY

On June 23, 2016, at a joint meeting of the City Council and Sustainability Commission, the City Council received a presentation on development of regulations limiting the use of leaf blowers throughout the City, and directed the Sustainability Commission to conduct studies and develop options for the reductions and/or elimination of gas powered leaf blowers.

Subsequently, following Council's direction, at its meeting of December 20, 2016, the Sustainability Commission unanimously approved a recommendation that the City Council phase out gas powered leaf blowers and eliminate them in all areas/zoning of the City by December 31, 2018. The Sustainability Commission also recommended a program to test battery powered blowers and other maintenance equipment by City employees and contractors, and that the City provide an exchange program for gardener/landscaper-owned gas powered leaf blowers.

At its meeting of May 17, 2017, the City Council considered an Ordinance to amend the Palm Springs Municipal Code to prohibit the use of gasoline-powered leaf blowers with an effective date of January 1, 2019. At that time, the Council directed staff to review and return for consideration an Ordinance prohibiting the use of both gasoline-powered and electrical/battery-powered leaf blowers within the City.

ITEM NO. 3.A

This item has returned to Council upon its direction and will allow Council to consider adopting an Ordinance to regulate the operation of leaf blowers (either gasoline-powered, or both gasoline-powered and electrical/battery-powered).

RECOMMENDATION:

If the Council desires to adopt regulations limiting the use of gasoline-powered leaf blowers only, staff recommends the following action:

Waive the reading of text in its entirety, read by title only, and introduce for first reading Ordinance No. _____, "AN ORDINANCE OF THE CITY OF PALM SPRINGS, CALIFORNIA, ADDING SUBSECTION (k) TO SECTION 11.74.043 AND SECTION 5.78.050, AND AMENDING SECTION 5.78.010 OF THE PALM SPRINGS MUNICIPAL CODE, REGARDING LOUD, UNUSUAL NOISES AND LANDSCAPE RELATED BUSINESSES, PROHIBITING GASOLINE POWERED LEAF BLOWERS IN THE CITY AS A PER SE NUISANCE COMMENCING ON JANUARY 1, 2019, AND PROVIDING FOR REGULATION OF ELECTRICAL OR BATTERY POWERED LEAF BLOWERS."

Or,

If the Council desires to adopt regulations limiting the use of both gasoline-powered leaf blowers and electrical/battery-powered leaf blowers, staff recommends the following action:

Waive the reading of text in its entirety, read by title only, and introduce for first reading Ordinance No. _____, "AN ORDINANCE OF THE CITY OF PALM SPRINGS, CALIFORNIA, ADDING SUBSECTION (k) TO SECTION 11.74.043 AND SECTION 5.78.050, AND AMENDING SECTION 5.78.010 OF THE PALM SPRINGS MUNICIPAL CODE, REGARDING LOUD, UNUSUAL NOISES AND LANDSCAPE RELATED BUSINESSES, PROHIBITING GASOLINE POWERED AND ELECTRICAL/BATTERY-POWERED LEAF BLOWERS IN THE CITY AS A PER SE NUISANCE COMMENCING ON JANUARY 1, 2019, AND PROVIDING FOR REGULATION OF ELECTRICAL OR BATTERY POWERED LEAF BLOWERS."

Or, provide alternative direction to staff.

BACKGROUND:

At the June 23, 2016, joint meeting of the City Council and Sustainability Commission, the City Council received a presentation on development of regulations limiting the use of leaf blowers throughout the City. A copy of the June 23, 2016, staff report is included as **Attachment 1**. At that time, the City Council directed staff and the Sustainability Commission to continue to conduct studies and develop options for the reductions and/or elimination of gas powered leaf blowers including grant or incentive options, educational component, health protections for workers, and potential phased-in regulations.

At its July 19, 2016, meeting, the Sustainability Commission appointed an Ad-Hoc Subcommittee to review, research and develop recommendations for limiting the use of leaf blowers within the City. The Ad-Hoc Subcommittee reviewed data from the prior work of the Sustainability Commission in 2012/2013 and 2015/2016 regarding leaf blower regulations, researched other City regulations, reviewed the ONE-PS Ecology Committee meeting minutes on the issue, leaf blower manufacturer noise and emission specifications, and South Coast Air Quality Management District ("AQMD") information related to leaf blowers.

On October 24, 2016, the Sustainability Commission conducted a public workshop at the City Council Chambers of City Hall; public notices and invitations were sent to all applicable licensed gardening/landscaping business owners and community organizations. On-line notices of the public workshop were sent through the City's website, distributed via ONE-PS, Nextdoor, Facebook, and other social media outlets. Sustainability Commission Chair also wrote an article published in the *Desert Sun* on October 20, 2016, inviting the public to participate at the workshop held on October 24, 2016; a copy of the article is included as **Attachment 2**.

At the October 24, 2016, workshop, 28 people attended and 13 speakers commented on the item. City staff provided a Spanish-speaking employee for translation purposes.

The Sustainability Commission considered the Ad-Hoc Subcommittee's recommendations at its November 15, 2016, meeting. At its December 20, 2016, meeting, the Sustainability Commission unanimously approved the Ad-Hoc Subcommittee's recommendations, which generally include the following:

- Phase out gas powered leaf blowers and eliminate their use and operation in all areas/zoning within the City by December 31, 2018
- Implement a testing program of battery powered leaf blowers and other maintenance equipment on City property by City employees and contractors during the phase-out period
- Develop an exchange program of gas-powered leaf blowers for battery-powered leaf blowers, with priority on less efficient / higher polluting 2-stroke gasoline-powered leaf blower engines
- Implement requirements for all employees of gardening/landscaping business to be trained on the proper use of leaf blowers

The Ad-Hoc Subcommittee's recommendation, supported by the Sustainability Commission and recommended to the City Council, rejected possible restrictions on leaf blowers by noise/decibel level, or by hours or days of the week, or by zoning.

A copy of the Sustainability Commission Ad-Hoc Subcommittee's report is included as **Attachment 3**.

At the direction of the California Legislature, in 2000 the California Air Resources Board ("CARB") published a comprehensive report on the potential health and environmental impacts of leaf blowers, (the "2000 CARB report"); a copy of the report is included as **Attachment 4**.

Noise

The City of Palm Springs 2007 General Plan includes Chapter 8 – Noise Element, which outlines a set of noise control policies, programs, and implementation measures for solving noise-related issues and problems. According to the General Plan, the City uses the "Community Noise Equivalent Level (CNEL)" factor which is defined as: *the average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and after the addition of 10 decibels to sound levels in the night from 10:00 p.m. to 7:00 a.m. CNEL and Ldn are the metrics used in (the General Plan) to describe annoyance due to noise and to establish land use planning criteria for noise*. Figure 8-1 from the General Plan depicts the typical sources of sound and how they vary in intensity, as shown here:

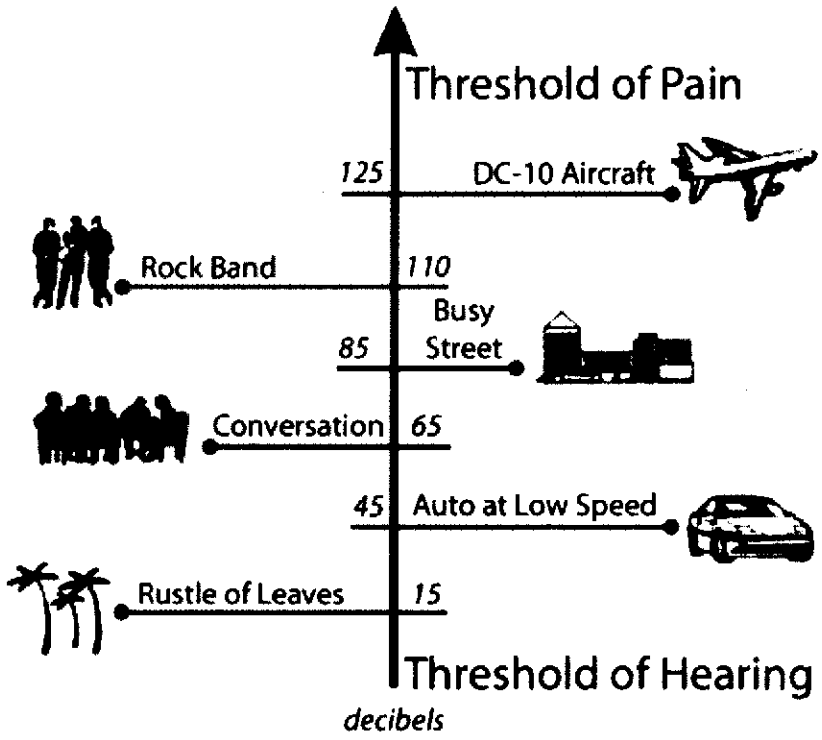
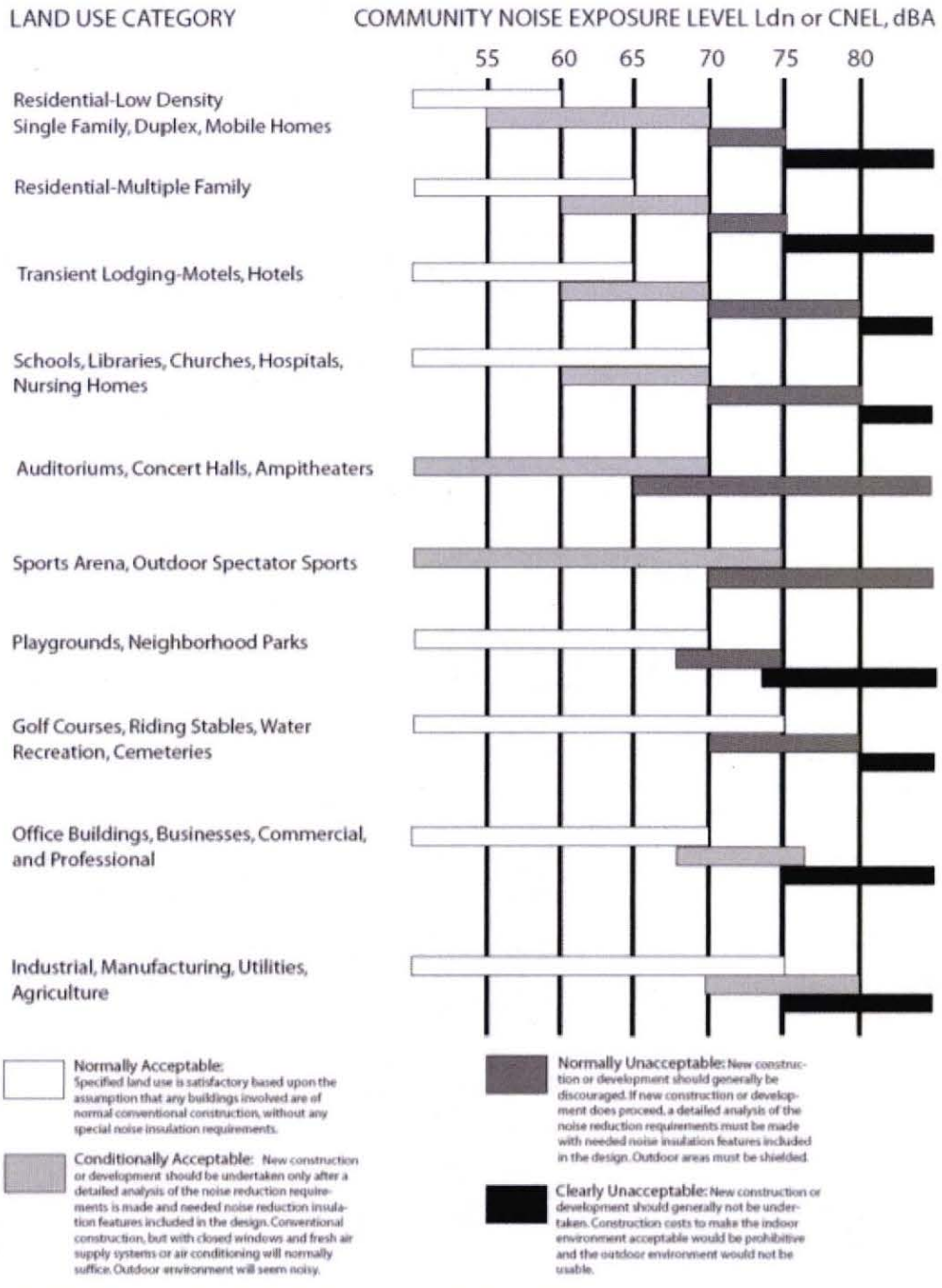


Figure 8-1 Sources of Sound

Figure 8-2 from the General Plan also depicts the range of CNEL based on land use category, as shown here:



As shown in Figure 8-2 of the General Plan, depending upon the type of land use, generally 55-70 decibels determines the point at which noise levels are acceptable or unacceptable.

Action NS 3.5 from the Noise Element of the City's General Plan provides guidance on regulating noises generated by leaf blowers, and states:

NS3.5 Incorporate provisions into the City Noise Ordinance to regulate noise impacts of domestic portable power equipment, such as power tools, lawn mowers, and leaf blowers.

Chapter 11.74 of the Palm Springs Municipal Code is identified as the "Noise Ordinance" and establishes allowable noise levels by time of day and by zoning districts throughout the City, as shown in Table 1.

Zone	Time	Sound Level (A-weighted) Decibels
Residential	7 a.m. to 6 p.m.	50
Low Density	6 p.m. to 10 p.m.	45
	10 p.m. to 7 a.m.	40
Residential	7 a.m. to 6 p.m.	60
High Density	6 p.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
Commercial	7 a.m. to 6 p.m.	60
	6 p.m. to 10 p.m.	55
	10 p.m. to 7 a.m.	50
Industrial	7 a.m. to 6 p.m.	70
	6 p.m. to 10 p.m.	60
	10 p.m. to 7 a.m.	55

Table 1- Noise Ordinance

Section 11.74.032 "Time Duration Correction Table" provides allowances for increased noise levels or short durations during daytime hours, as shown in Table 2.

Duration of Sound	dB(A) Allowance
Up to 30 minutes per hour	+3
Up to 15 minutes per hour	+6
*Up to 10 minutes per hour	+8
Up to 5 minutes per hour	+11
Up to 2 minutes per hour	+15
Up to 1 minute per hour	+18
Up to 30 seconds per hour	+21
Up to 15 seconds per hour	+24

Table 2- Time Duration Correction Table

*An assumption is being made in this staff report that leaf blower operations during routine landscape maintenance might occur within 10 minutes of each hour of gardening. Therefore, the maximum noise levels applicable during daytime hours (7 AM to 6 PM) applicable to leaf blower operations may be adjusted as shown in the following Table 3.

Zone	Sound Level (A-weighted) Decibels
Low Density Residential	58
High Density Residential	68
Commercial	68
Industrial	78

Table 3- Adjusted Maximum Noise Levels

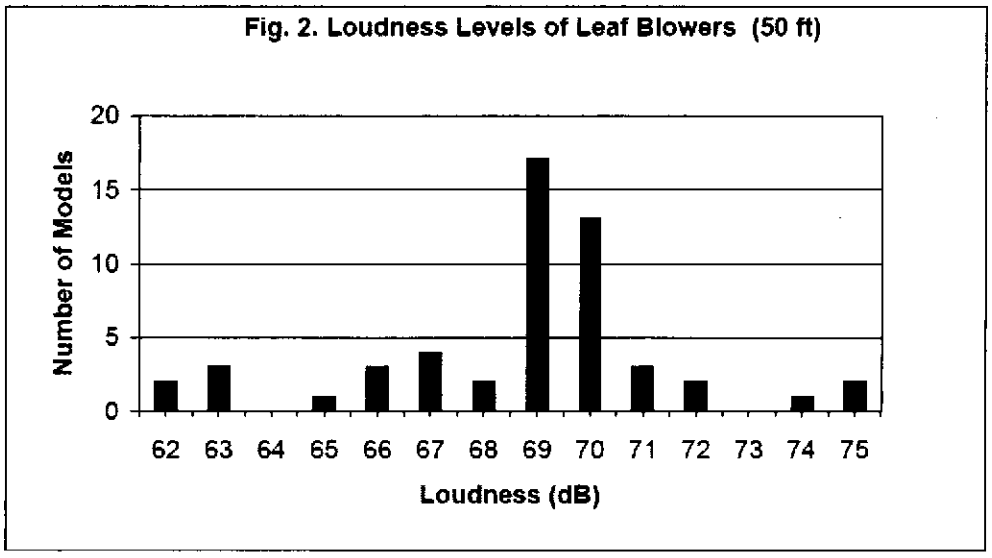
Section 11.74.041 further defines "controlled hours of operation," and restricts the use of certain noise producing equipment or activities between the hours of 8:00 PM and 8:00 AM in residential zones, and 8:00 PM and 7:00 AM in all other zones (excepting operation by the City or its officers, employees, or agents). Specifically, the City's regulation states:

(a) It shall be unlawful for any person to operate, permit, use or cause to operate, any of the following between the hours of eight p.m. to eight a.m. in residential zones and between the hours of eight p.m. to seven a.m. in all other zones:
(1) Powered model vehicles;
(2) Loading and unloading vehicles such as trash collectors, fork lifts, or cranes within one thousand feet of a residence;
(3) Domestic power tools;
*(4) **Non-emergency exterior hardscape and landscape activities, including without limitation** tree trimming, re-seeding, lawn mowing, **leaf blowing**, dust and debris clearing, and any other landscaping or nonemergency exterior hardscape maintenance activities which would utilize any motorized saw, sander, drill, grinder, leaf-blower, lawn mower, hedge trimmer, edger, or any other similar tool or device.*
(b) Notwithstanding the foregoing, this Section shall not prohibit the operation or use of any such equipment at any time within said zones by the city, its officers or employees, or any agent or franchisee of the city.
(c) The regular mowing or grooming of golf courses, grass tennis courts, grass croquet courts, and lawn bowling areas shall be exempt from the restrictions set forth in this Section. The allowed work hours for mowing or green preparation for golf courses, grass tennis courts, grass croquet courts, and lawn bowling areas shall be between five-thirty a.m. and eight p.m., seven days per week and during all seasons of the year.

Therefore, the City's current regulations allow for the use of leaf blowers throughout the City every day of the week, between 7:00 AM and 8:00 PM in commercial/industrial zones, and between 8:00 AM and 8:00 PM in residential zones.

As reported to the City Council at the study session held on June 23, 2016, leaf blowers can generate noise levels varying from 70 to 90 decibels. Depending on the distance from a dwelling area the noise level may be considered a disturbance. The U.S. Department of Labor Occupational Safety & Health Administration ("OSHA") requires a hearing protection program for employees when sound exposures equal or exceed an eight-hour, time-weighted average sound level of 85 decibels.

According to the 2000 CARB report, noise levels from backpack and hand-held leaf blowers (measured at 50 feet from the blower) varied from 62 to 75 decibels (dBA), with more than half registering 69-70 dBA. As emphasized in the 2000 CARB report: *Bearing in mind the logarithmic decibel scale, the difference in a leaf blower at 62 dBA and one at 75 dBA, a 13 dBA range, represents more than a quadrupling of the sound pressure level, and would be perceived by a listener as two to three times as loud. The rule of thumb is that when a sound level increases by ten dB, the subjective perception is that loudness has doubled.* Included in the 2000 CARB report, is the following Figure 2:



As the maximum noise level permitted by the City's Noise Ordinance is 50 dB (adjusted to 58 dB for up to 10 minutes of leaf blower operation) for low-density residential and 60 dB (adjusted to 68 dB for up to 10 minutes of leaf blower operation) for high-density residential or commercial zones, operating the leaf blowers reviewed in the 2000 CARB report would violate the City's Noise Ordinance.

Staff has completed a general comparison of leaf blowers commercially sold by a national hardware chain and the noise generated by each, as shown in the following Table 4:

Model Number	Type	Size	Noise Level	Meets Code?
PB580T	Back Pack / Gas	215 MPH, 510 CFM	70.0 dB	Yes/No[1]
PB7704	Back Pack / Gas	234 MPH, 756 CFM	70.0 dB	Yes/No[1]
RYO8420A	Back Pack / Gas	185 MPH, 510 CFM	73.4 dB	Yes/No[1]
PB755ST	Back Pack / Gas	233 MPH, 651 CFM	74.0 dB	Yes/No[1]
BHX2500CA	Hand Held / Gas	145 MPH, 356 CFM	67.0 dB	Yes/No[2]
LB1M16	Hand Held / Gas	155 MPH, 1250 CFM	77.0 dB	No
S1988	Hand Held / Gas	150 MPH, 460 CFM	77.1 dB	No
WG509	Electric	210 MPH, 350 CFM	50.0 dB	Yes
GW24072	Electric	235 MPH, 380 CFM	60.0 dB	Yes/No[2]
51585 (#4)	Electric	160 MPH, 155 CFM[3]	63.5 dB	Yes/No[2]
LB6004	Electric	145 MPH, 600 CFM	64.0 dB	Yes/No[2]
LB5302 (#1)	Electric	110 MPH, 530 CFM[4]	64.0 dB	Yes/No[2]
UT42100B	Electric	150 MPH, 233 CFM	65.0 dB	Yes/No[2]
LSWV36	Electric	120 MPH, 90 CFM	65.0 dB	Yes/No[2]
P2105 (#5)	Electric	120 MPH, 120 CFM[5]	67.0 dB	Yes/No[2]
51618 (#3)	Electric	225 MPH, 330 CFM[6]	67.0 dB	Yes/No[2]
51619 (#2)	Electric	250 MPH, 350 CFM[7]	68.0 dB	Yes/No[2]

Table 4 – Leaf Blower Noise Levels

Based on staff's cursory review of the various models of leaf blowers commercially sold by Home Depot, very few leaf blowers operated with a noise level at or below 58 dB, the adjusted maximum noise level allowed in low density residential zones from 7AM to 6PM. If leaf blower operations is limited to 5 minutes per hour, the adjusted maximum noise level increases to 61 dB, and if leaf blower operations is limited to 2 minutes per hour, the adjusted maximum noise level increases to 65 dB, which would allow for use of many more electrical/battery-powered leaf blowers.

[1] Adjusted Maximum of 78 dB is allowed in Industrial Zones only from 7AM to 6PM; this product could be used in that Zone only

[2] Adjusted Maximum of 68 dB is allowed in High Density Residential Zones and Commercial Zones from 7AM to 6PM, and would also be allowed in Industrial Zones, but not Low Density Residential Zones which has adjusted maximum of 58 dB allowed.

[3] This model is the fourth highest rated and popular blower sold at Home Depot.

[4] This model is the highest rated and popular blower sold at Home Depot.

[5] This model is the fifth highest rated and popular blower sold at Home Depot.

[6] This model is the third highest rated and popular blower sold at Home Depot.

[7] This model is the second highest rated and popular blower sold at Home Depot.

Air Quality

The City of Palm Springs 2007 General Plan includes Chapter 7 – Air Quality Element, and notes that the preservation of the City's air quality plays a significant role in the community's health and overall quality of life. Further, the City's General Plan notes that the esence of air pollution in a community reduces visibility, increases the occurrence of respiratory illness and disease, increases absences from work and school, and is detrimental to the natural environment. The Air Quality Element provides policy and action items to ensure that the City is striving, in collaboration with regional agencies, to implement measures to preserve and improve air quality in the Coachella Valley to the greatest extent possible.

Policy AQ 2.7 from the Air Quality Element of the City's General Plan provides guidance on regulating air quality generated by leaf blowers, and states:

AQ2.7 Consider adding provisions to the City's Municipal Code to phase out the use of gas-powered lawn mowers and replace them with electric mowers and to prohibit the use of leaf blowers.

The 2000 CARB report identified that gasoline-powered leaf blowers are most often powered by two-stroke engines of less than 25 horsepower (hp) which generate high exhaust emissions. According to the 2000 report, CARB estimated there were approximately 410,000 gasoline-powered leaf blowers in use, with only 5,000 (1.2%) using more efficient and environmentally friendly four-stroke engines; the 2000 report also disclosed that 60% of handheld leaf blowers sold were electric. Included in its 2000 report, CARB identified a statewide inventory of leaf blower exhaust emissions (tons per day) as shown in Table 2 from the CARB report.

Table 2. Statewide Inventory of Leaf Blower Exhaust Emissions (tons per day)

	Leaf blowers 2000	Leaf blowers 2010	All Lawn & Garden, 2000	All Small Off-Road, 2000
Hydrocarbons. reactive	7.1	4.2	50.24	80.07
Carbon Monoxide (CO)	16.6	9.8	434.99	1046.19
Fine Particulate Matter (PM10)	0.2	0.02	1.05	3.17

Thus, in the 2000 CARB report it was estimated that leaf blowers generated 7.1 tons per day of hydrocarbons, and 16.6 tons per day of Carbon Monoxide. However, these levels were anticipated to reduce by 2010 as a result of CARB's adoption of new air quality standards for leaf blowers effective in 2000, as identified in Table 3 from the CARB report.

Table 3
Exhaust Emissions Per Engine for Leaf Blowers
(grams per brake-horsepower-hour, g/bhp-hr)

	Uncontrolled Emissions	1995-1999 Standards[2]	2000 and later Standards
HC+NOx	283 + 1.0	180 + 4.0	54[3]
CO	908	600	400
PM	3.6	---[4]	1.5

At the time, the 2000 CARB report drew comparisons to the air quality impacts associated with leaf blowers to those associated with a new light duty (1999 model) and older light duty (1975 model) vehicle. As shown in the table on the following page, the 2000 CARB report demonstrated that exhaust emissions from leaf blowers were significantly more than those generated by "new light duty" vehicles. As emissions regulations on new vehicles have changed significantly since 2000, the difference in emissions generated from leaf blowers to emissions generated by 2017 or newer model year vehicles would likely be that much more increased.

	Exhaust Emissions, g/hr	Exhaust Emissions, new light duty vehicle,* g/hr	Exhaust Emissions, older light duty vehicle,** g/hr
Hydrocarbons	199.26	0.39	201.9
Carbon Monoxide	423.53	15.97	1310
Particulate Matter	6.43	0.13	0.78
Fugitive Dust	48.6-1031	N/A	N/A

*New light duty vehicle represents vehicles one year old. 1999 or 2000 model year. driven for one hour at 30 mph.
**Older light duty vehicle represents vehicles 1975 model year and older. pre-catalytic vehicle. driven for one hour at 30 mph.

The 2000 CARB report summarized this comparison of air quality emissions by stating that for the average 1999 leaf blower and new light duty vehicle, the hydrocarbon emissions from one-half hour of leaf blower operation equal about 7,700 miles of driving, at 30 miles per hour average speed. The comparison for carbon monoxide emissions was equivalent to driving 440 miles at 30 miles per hour average speed.

Although Table 3 from the 2000 CARB report estimated significant improvements with air quality emissions from gasoline-operated leaf blowers following implementation of CARB's air quality standards for new leaf blowers manufactured after 2000, current leaf blowers continue to generate air quality emissions that greatly exceed air quality emissions generated by modern vehicles. A study published by edmunds.com on December 5, 2011, drew comparisons with air quality emissions generated by modern vehicles: a 2011 Ford F-150 SVT Raptor and 2012 Fiat 500, and air quality emissions generated by two commercially available leaf blowers: two-stroke backpack gasoline-powered Echo PB-500T model and four-stroke handheld gasoline-powered Ryobi RYO9440 model.

As noted in the study: *Two-stroke engines have high power density, making them the engine of choice among commercial and prosumer-grade leaf blowers, but they emit more pollutants than four-strokes.*

The edmunds.com study summarized the comparison results, as shown in the following table:

	NMHC	NOx	CO
2011 Ford Raptor	0.005	0.005	0.276
2012 Fiat 500	0.016	0.010	0.192
Ryobi 4-stroke leaf blower	0.182	0.031	3.714
Echo 2-stroke leaf blower	1.495	0.010	6.445

NMHC = non-methane hydrocarbons, NOx = nitrogen oxides, CO = carbon monoxide

The study summarized these results by stating: *Distilling the above results, the four stroke Ryobi leaf blower kicked out 6.8 times more NOx, 13.5 times more CO and more than 36 times more NMHC than the Raptor. The two stroke leaf blower was worse still, generating 23 times the CO and nearly 300 times more NMHC than the crew cab pickup. Let's put that in perspective. To equal the hydrocarbon emissions of about a half hour of yard work with this two stroke leaf blower, you'd have to drive a Raptor for 3,887 miles, or the distance from Northern Texas*
to Anchorage, Alaska.

A copy of the full report by edmunds.com is included as **Attachment 5**.

In addition to the air quality emissions associated with hydrocarbons, nitrogen oxides, and carbon monoxide, leaf blowers also contribute to fugitive dust emissions. As noted in the 2000 CARB report: *A leaf blower moves debris such as leaves by pushing relatively large volumes of air, typically between 300-700 cubic feet per minute, at a high wind speed, typically 150 to 280 miles per hour (hurricane wind speed is >117 mph). A typical surface is covered with a layer of dust that is spread, probably non-uniformly, along the surface being cleaned. While the intent of a leaf blower operator may not be to move dust, the high wind speed and volume result in small particles being blown into the air.*

The 2000 CARB report determined that fugitive dust impacts generated by leaf blowers represented a small, but probably significant amount (ranging from 1% to 5%) of fugitive dust emissions statewide.

Local Regulations Limiting Leaf Blower Operation

In response, partially, to the 2000 CARB report, various local agencies have adopted regulations that limit leaf blower operation, either by type, day or hour of operation, or a complete ban. The September 2010 Consumer Reports Magazine listed 55 local agencies in California (cities or counties) that had enacted some form of regulations, including 26 of which had banned all gasoline-powered leaf blowers. A copy of the listing from the September 2010 Consumer Reports Magazine is included as **Attachment 6**.

In reviewing restrictions on leaf blower operations adopted recently by local agencies, staff identified significant research performed by the Town of Los Gatos in 2013, leading to its adoption on June 2, 2014, of an ordinance prohibiting the use of gasoline-powered leaf blowers in all areas, and restrictions on electric-powered leaf blowers (limited to 65 decibels or lower). All of the reference information associated with the Town of Los Gatos' process to adopt its regulations are available online at:

http://www.losgatosca.gov/2059/Leaf-Blower-Ordinance

Of relevance here was the research performed by staff from the Town of Los Gatos summarized in their December 16, 2013, council agenda report, included as reference as **Attachment 7**.

Briefly, as summarized here, the Town of Los Gatos noted the following policy issues and code enforcement practices conducted by various cities that had enacted leaf blower regulations:

Los Altos (28,976 residents; 6.5 square miles)

Gas powered leaf blower ban since 1991, (electric allowed); complaint based enforcement is given lower priority call with the violation often no longer occurring by the time officer arrives; 348 complaints received in last year (October 2012 – October 2013); responses to complaints require significant time (10-15 hours/month), solutions involving prevention encouraged; "yellow card" warnings issued for first time offenders.

Palo Alto (66,642 residents; 25.8 square miles)

Gas powered leaf blower ban since 2005 (residential zones only), (electric allowed); complaint based enforcement handled by Police Department is given lower priority call with violation often no longer occurring by the time officer arrives; 15-30 complaints annually; warnings issued for first time offenders, second violation may result in $100 administrative citation;

Beverly Hills (34,658 residents; 5.7 square miles)

Gas powered leaf blower ban since 1976, (electric allowed); complaint based enforcement, letters issued to property owners violating ordinance – no officer is dispatched, however, code enforcement officers follow up with property owner's gardener; 256 complaints in 2012, 291 complaints in 2013;

Santa Monica (92,742 residents; 8.4 square miles)

Gas and electric powered leaf blower ban since 1991; original enforcement provided by Police Department, which required Police Officer to witness the violation; in 2010, complaint based enforcement assigned to Office of Sustainability; in 2013, complaint based enforcement assigned to Code Enforcement; 5-10 complaints received daily, considered mid-level priority (3 out of 5-tier priority system); initial warning letter issued, administrative citation issued if Code Enforcement Officer observes the violation; upon receipt of complaint, Code Enforcement Officer visits property twice within two weeks to observe if violation is occurring, otherwise closes file on complaint; biggest barrier to enforcement is lack of staffing;

In 2011, the City of Santa Monica issued a staff report disclosing efforts on a 6-month evaluation on implementation of its amended leaf blower regulations. At that time, Santa Monica's Office of Sustainability dedicated leaf blower patrols at least two day per week, lasting 4-5 hours by a staff member. Observed violations were handled with warnings, with two warnings issued prior to any issuance of an administrative citation. The Santa Monica staff report cited 1,133 complaints received in 6-months (November 2010 through April 2011), with 167 violations directly observed during regular patrols in that same time frame; no administrative citations were issued during this time frame.

A copy of the Santa Monica staff report is included as **Attachment 8.**

Enforcement Challenges

Staff contacted various cities that have enacted bans on leaf blowers, and discussed procedures and potential challenges for enforcement personnel. All cities contacted stated that that enforcement was on a complaint driven basis. They stated that it was difficult to actually catch people using the leaf blowers, but would try to find out what days and time of day violations were taking place to attempt to catch violators in the act.

The City of Manhattan Beach began their enforcement by issuing $100 citations and confiscating blowers. Currently, violations are a misdemeanor and result in $500 citations to the persons using the blowers. There is discussion that they may cite property owners as necessary in the future.

Del Mar has had a ban since the 1980s and claim that due to the fast turn-over of gardening personnel, they send letters to property owners that explain the ordinance and ask for compliance. They write citations without actually witnessing a violation if there are multiple reports of a property being in violation.

The City of Santa Monica changed their procedure two years ago. Currently they issue $500 citations with no warning. They also have the landscapers sign a form at business license renewal stating that they understand that there is a ban on leaf blowers. They claim that the no warning and $500 fine (increased two years ago) has drastically reduced the number of violations.

Locally, the only City that has enacted a ban on gasoline-powered leaf blowers is Indian Wells. Staff contacted Indian Wells Code Enforcement, who stated that they take complaints and try to catch violators. They do not issue violations to property owners for noise generated by their gardeners.

Leaf Blower Exchange Program

The Sustainability Commission has recommended that as part of its leaf blower regulations that the City develop an exchange program of gas-powered leaf blowers for battery-powered leaf blowers, with priority on less efficient / higher polluting 2-stroke gasoline-powered leaf blower engines. If an exchange program was implemented by the City, budget for the program would need to be established and funding appropriated from the Sustainability Fund.

Since 2006, AQMD has sponsored an annual Leaf Blower Exchange Program that funds the exchange of backpack leaf blowers. ***AQMD's program has been available only to commercial landscapers and gardeners operating within AQMD's territory, at a discounted price. It is not available to the general public***. Since AQMD's Leaf Blower Exchange Program began in 2006, AQMD reports that 12,000 older technology leaf blowers have been replaced, reducing 138,729 pounds of hydrocarbon and NOx emissions, and has reduced smog-forming pollutants by 88,282 pounds per year within the AQMD basin.

AQMD's 2017 Leaf Blower Exchange Program was recently approved April 7, 2017, by the AQMD Board, and accommodated exchange of up to 2,300 older two-stroke leaf blowers with new four-stroke gasoline and zero emission leaf blowers at a cost to AQMD of $563,400. The Leaf Blower Exchange Program does not provide free leaf blowers to commercial landscapers and gardeners, but did facilitate negotiated reduced pricing from the two awarded vendors (STIHL and DeWALT).

AQMD's 2017 Leaf Blower Exchange Program provides the following discounted pricing to commercial landscapers, on the condition that participating landscapers forfeit and exchange their existing older-technology two-stroke gasoline leaf blowers at the participating dealerships:

- Stihl Model BGA 85 (Electric-Powered Handheld):
  Retail Price: $479.93
  Reduced Price: $200
  Discount: $279.93

- Stihl Model BGA 100 (Electric-Powered Backpack)
  Retail Price: $1,419.92
  Reduced Price: $500
  Discount: $919.92

- Stihl Model BR 500 (Gasoline-Powered Backpack)
  Retail Price: $479.95
  Reduced Price: $250
  Discount: $229.95

- Dewalt Model DCBL790X1 (Electric-Powered Handheld)
  Retail Price: $349
  Reduced Price: $147.49
  Discount: $201.51

- Dewalt Model DCBL590X2 (Electric-Powered Backpack)
  Retail Price: $699
  Reduced Price: $249.99
  Discount: $449.01

A copy of the AQMD staff report is included as **Attachment 9**.

AQMD has just announced its 2017 program opening on July 11, and released an information brochure included as **Attachment 10**. AQMD's 2017 program continues the exchange program from August 14-31, with pre-registration required, and is only available to commercial landscapers and gardeners.

NOTE: There is only one exchange date scheduled for the Coachella Valley in Palm Springs on Monday, August 14, 2017, at the Palm Springs STIHL dealer – Yoshi Lawnmower located at 652 Williams Road, hours 7:00AM to 5:00PM.

The AQMD website providing full details on its exchange program is also found here:

http://www.aqmd.gov/home/programs/community/community-detail?title=lawn-equipment

In reviewing the product specifications for the leaf blowers provided through the 2017 AQMD Exchange Program, we noted the following with regard to the noise levels:

- Dewalt Model DCBL790X1: 67 dB
- Dewalt Model DCBL590X2: 63 dB
- Stihl Model BGA 85: 64 dB
- Stihl Model BGA 100: 56 dB*, or 90 dB in "Boost Mode"
- Stihl Model BR 500: 65 dB

It should be noted that all but one of these products exceed the adjusted maximum noise level of 58 dB allowed in low density residential areas, but would satisfy the adjusted maximum noise level of 68 dB allowed in high density residential and commercial areas. All of these products are allowed to be used in the City's industrial areas.

Development of a City-administered exchange program would require further consideration of the logistics, including amount of funding, type of discount available to participants, vendors available for the exchange, how the exchange is administered, etc. Offering a City-administered exchange program identical to AQMD's program would require the City to solicit proposals from similar leaf blower vendors, to accept older-technology two-stroke gasoline leaf blowers from residents, with requirements to dismantle and legally dispose of the equipment. The 2017 AQMD Exchange Program costs AQMD $563,400 for 2,300 units – or a cost of $245 per unit, and includes the discounted pricing for new leaf blowers and obligation to accept and dispose of the old leaf blowers. For budgeting purposes, offering a similar program in Palm Springs, with up to 500 units exchanged, would cost the City $125,000 (assuming all pricing is equal).

LEGAL ANALYSIS:

The status quo is that all leaf blowers are allowed throughout the City every day of the week, between 7:00 a.m. and 8:00 p.m. in commercial/industrial zones and between 8:00 a.m. and 8:00 p.m. in residential zones.

Based on direction given at the Council's May 17, 2017, meeting, staff is providing two alternative Ordinances for consideration: (1) prohibiting gasoline-powered leaf blowers and regulating battery/electric-powered leaf blowers, or (2) prohibiting gasoline-powered and battery/electric-powered leaf blowers.

In the proposed Ordinance, the Council makes a factual finding that as of the date of this Ordinance's adoption, there is no technology or practice that will prevent gasoline powered leaf blowers and/or battery/electric-powered leaf blowers from constituting a "noise disturbance" as that term is defined under the Palm Springs Municipal Code. That said, as the Council knows from its review of the comprehensive report in February, newer electrical/battery powered leaf blowers emit noise at only a slightly lower level than newer gas powered blowers. As the age of a gas powered blower increases, so does the noise differential. To address the challenges presented by the continued use of

electrical/battery powered leaf blowers, the Ordinance provides the City with authority to develop and issue regulations applicable to all leaf blowers.

Based upon consideration of the positive environmental impact of electrical/battery powered blowers as a tool to maintain the health, safety and welfare of the community, the Council has the discretion to legislate the exemption specified in this proposed Ordinance as to electrical/battery powered leaf blowers.

The City of Palm Springs currently uses gas powered leaf blowers in its operations within several departments, and has engaged a contractor to assist the City in providing essential landscape maintenance services throughout the City. This Ordinance may impact the City of Palm Springs in its maintenance activities, as well as property owners either performing their own landscape maintenance or contracting with private landscape contractors. Based upon Council's past direction, staff undertook an informal but simple empirical study to help the Council evaluate the fiscal and other impacts of this Ordinance. Data is detailed below in the Fiscal Impact section of this report.

The "phase-out" period, as well as the "grace" period during which this Ordinance will be enforceable but not prompt the issuance of any citations, will provide staff with the time to educate affected users, implement a leaf blower exchange program to the extent that the City determines it can proceed with one, commence landscaping classes as they may relate to diminution of the necessity of leaf blowing in general, and continue to research the availability of grant funds to help offset costs the City may incur as detailed below.

ALTERNATIVES:

The following alternatives are available for City Council consideration:

1. Do not adopt regulations limiting the use of leaf blowers;
2. Adopt an Ordinance prohibiting gasoline-powered leaf blowers;
3. Adopt an Ordinance prohibiting gasoline-powered and battery/electric-powered leaf blowers;
4. Provide alternative direction to staff.

AGUA CALIENTE BAND OF CAHUILLA INDIANS:

The consideration of any regulations affecting Tribal allotted/leased lands will require prior review by Tribal staff and the Tribal Planning Commission/Council.

ENVIRONMENTAL IMPACT:

This Ordinance will actually have a positive impact on the environment. As an example of this impact, since the AQMD's Leaf Blower Exchange Program began in 2006, 12,000 old leaf blowers have been replaced, reducing 138,729 pounds of hydrocarbon and NOx emissions per year. The AQMD exchange program has also reduced smog-forming pollutants by 88,282 pounds per year in Southern California.

Furthermore, this Ordinance is not a "project" for purposes of the California Environmental Quality Act (CEQA), as that term is defined by CEQA guidelines (Guidelines) section 15378. This Ordinance is organizational or administrative activity by the City of Palm Springs in furtherance of its police power, and will not result in a direct or indirect physical change in the environment, per section 15378(b)(5) of the Guidelines.

FISCAL IMPACT:

One estimate that city staff secured from a local vendor indicates that an electrical/battery powered leaf blowing unit that the City of Palm Springs will use pursuant to this Ordinance cost around one thousand four hundred twenty dollars ($1,420.00) per unit inclusive of a single battery, and a high-speed charger and adapter for that battery. Each battery costs approximately four hundred twenty-five dollars ($425.00). Each battery adapter, apparently necessary as an accessory to each battery, costs around a hundred dollars ($100.00). Battery life for these units is approximately forty-five (45) minutes; depending upon the nature and extent of each unit's use, at least one "back-up" battery (and adapter) should be acquired along with each unit purchased. In addition, the batteries do not tolerate heat well, and will need to either be stored by the City in a reasonably cool location, or appropriately stored in portable coolers. Although it is not a direct expenditure, this fact may reduce efficiency in the City's leaf-blowing operations because users will have to periodically return from the field to a battery-storage location to change the battery, or retrieve batteries from portable coolers. Potentially, more hours will be spent blowing leaves.

Significant cost savings may be realized in the purchase of new electrical/battery powered leaf blowers through an AQMD leaf blower exchange opening July 11. The AQMD website indicates that on the model referenced in the estimate procured, the City would save nine hundred twenty dollars ($920.00) on the purchase of the blower with a single battery, with a charger and adapter.

The City's downtown maintenance team engages in three (3) to four (4) hours per day of work involving leaf blowers. That team requires two (2) leaf blowing units, and will require the acquisition of not less than three (3) back-up batteries, and presumably adapters for each unit. That yields a cost of almost three thousand two hundred dollars ($3,200.00) for the downtown maintenance team.

The City has other teams that use blowers that would need to be replaced – for streets, a single blower, for parks two (2) additional blowers, and for facilities, one (1) more blower. The other teams require fewer replacement batteries than the downtown maintenance team. The City's landscape maintenance contractor also uses leaf blowers. Staff estimates that the contractor employs the use of a dozen blowers in its work.

The City staff cannot provide certainty at this time as to precisely how AQMD and/or other program funds available may mitigate the direct financial impacts described above, or the indirect financial impacts that may arise from any City leaf blower exchange program implemented in the private sector.

Enforcement costs associated with banning gasoline-powered leaf blowers will vary depending upon the specific policy adopted by City Council. Considering a complaint-based code enforcement program, pursuing violations of leaf blower regulations will add to the current workload and assignments of the City's Code Enforcement staff. However, it is recommended that any new restrictions should be preceded with a well-resourced community education program to reduce enforcement requirements.

Costs to property owners for landscape maintenance services, and costs to commercial gardeners/landscapers for business operations would likely increase from new leaf blower regulations. This is due primarily to increased time and labor required with less powerful equipment to complete the cleanup and removal of landscape debris that would ordinarily have been blown and swept, collected and removed by gasoline-powered leaf blowers.

Costs associated with a leaf blower exchange program will vary dependent upon the amount of discount or incentive offered, and the total number of exchanges authorized. As an example, the City previously funded a low-flow toilet voucher program implemented through the City's Wastewater Fund, offering $100 vouchers on a first-come first-served basis; a total of $10,000 (or 100 vouchers) was authorized, and were often exhausted quickly each year. A similar program might be developed where the City offers vouchers (in addition to any AQMD incentives) of a specific amount for exchange of 2-cycle gasoline-powered leaf blowers. Details on the logistics of an exchange program will require further analysis, however, for such a program to be effective, initial funding including an educational component, should be anticipated in the $100,000 range as a pilot program. It is recommended that funding for this type of program be appropriated from available reserves in the Sustainability Fund.

SUBMITTED

Marcus L. Fuller, MPA, P.E., P.L.S.
Assistant City Manager

Jay Virata, Community & Economic Development Director

David H. Ready, Esq., Ph.D.
City Manager

Edward Z. Kotkin
City Manager

Attachment:

1. June 23, 2016, staff report
2. October 20, 2016, *Desert Sun* article
3. Sustainability Commission Ad-Hoc Subcommittee's report
4. 2000 CARB report
5. Edumonds.com December 5, 2011, report
6. September 2010 Consumer Reports list of CA agencies regulating leaf blowers
7. Town of Los Gatos December 16, 2013, staff report
8. Santa Monica May 24, 2011, staff report
9. AQMD's 2017 Leaf Blower Exchange Program
10. AQMD's 2017 Leaf Blower Exchange Program Brochure
11. Ordinances (2)

Attachment 1

CITY COUNCIL STAFF REPORT

DATE: June 23, 2016 STUDY SESSION

SUBJECT: DISCUSS REGULATIONS RELATED TO LEAF BLOWERS

FROM: David H. Ready, City Manager

BY: Office of Sustainability, Michele Mician, Sustainability Manager

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SUMMARY:

In 2012, members of the public, sustainability commissioners and city council members requested that the Office of Sustainability initiate a study on the use of leaf blowers and a review of regulations by various local agencies limiting their use. The Sustainability Commission assigned a subcommittee on the issue, and in coordination with staff, prepared a draft ordinance limiting leaf flower operation for discussion and public review. At that time, the draft regulations considered prohibiting the use and operation of gasoline leaf blowers in residential areas of the City; however, the draft regulations were not supported and approved by the Sustainability Commission. The purpose of this study session item is to reconsider initiating efforts to draft new regulations limiting the use of leaf blowers within the City.

RECOMMENDATION:

Provide direction to staff as appropriate.

BACKGROUND:

In 2012 the Office of Sustainability facilitated the formation of a leaf blower subcommittee of the Sustainability Commission as a response to a City Council request to investigate leaf blower regulations. The subcommittee met throughout the year to analyze the subject and review leaf blower ordinances enacted by cities throughout the country.

Educational materials and a draft ordinance regulating leaf blower operation were prepared for presentation at a Sustainability Commission study session that was open to the public and held on February 27, 2013. A power point (included as Attachment 1) was presented that detailed the impacts of leaf blowers as well as the results of

research on other city's leaf blower ordinances. Over 100 people attended the meeting. The session was conducted in English and Spanish, and due to overwhelming opposition from commercial landscape maintenance businesses, the Sustainability Commission at that time did not take action to approve the draft ordinance and regulations limiting leaf blower operation. The Sustainability Commission requested that staff continue to increase education regarding the potential health issues associated with leaf blower operation, the use of proper safety gear when using leaf blowers, and promoting the use of alternative options to leaf blowers such as rakes and brooms. The Sustainability Commission also increased outreach encouraging use of electric rather than gasoline powered leaf blowers, and promoted the Air Quality Management District (AQMD) rebate programs. In furtherance of this direction, the City of Palm Springs has converted several gasoline powered landscape maintenance equipment to electrically powered.

In 2015 the Sustainability Commission initiated a new review of regulations limited the use of leaf blowers. The Sustainability Commission assigned review of the issue to the Health and Wellness Subcommittee, and the Subcommittee researched the issue and surveyed the various City neighborhood organizations on their support for or opposition to implementing regulations on the use of leaf blowers. Discussion of leaf blower regulations was held at a ONE-PS meeting, however, at that time there was not definitive support from the various neighborhoods on implementing restrictions on leaf blower use.

Proceeding with further review and consideration regulations limiting leaf blower use is pending direction at this Study Session.

STAFF ANALYSIS:

The purpose of this study session item is to discuss and consider regulations limiting the use and operation of gasoline leaf blowers in the City. There are various alternative approaches to implementing regulations limiting leaf blower use, including (but not limited to):

1. Limiting the use of all leaf blowers (gasoline and electrically powered) within the City, or
2. Limiting the use of gasoline powered leaf blowers within the City, or
3. Limiting the use of gasoline powered leaf blowers within certain areas of the City (i.e. residential, school sites, public facilities, etc.), or
4. Implementing a phased approach over a certain period of time to eliminate the use of gasoline and/or electrically powered leaf blowers within the City.

The Sustainability Commission has appointed a "Leaf Blower and Health and Wellness Subcommittee" to review the issue. A summary of research completed on the issue, and examples of regulations adopted by other cities, is included as Attachment 1.

The use of leaf blowers has been associated with potentially negative impacts associated with noise, air quality, and public health (particularly with those operating the leaf blowers). A 1999 California Air Resources Board report on Potential Health and Environmental Impacts of Leaf Blowers suggests that leaf blowers may be associated with potentially adverse effects, and the public perception of these adverse effects associated with leaf blower use has resulted in restrictions on their use in certain jurisdictions. The 1999 report is available at the following website:

http://www.arb.ca.gov/msprog/leafblow/leafblow.htm

The Sustainability Commission's Subcommittee's recommendation for a regulation limiting gasoline powered leaf blowers in residential areas is justified in part by the air quality impacts due to emissions caused by their use. A February 2000 report prepared by the California Environmental Protection Agency Air Resources Board estimated at that time that there were more than 400,000 gasoline-powered leaf blowers, plus approximately 600,000 electric leaf blowers, that were operating at an estimated 114,000 hours per day in California. The 2000 report is available at the following website:

http://www.noiseoff.org/document/cepa.report.pdf

The 2000 report provides an example of how to visualize the potential adverse effects of leaf blower operation by comparing their operation to miles traveled by car. The Air Resources Board calculated that hydrocarbon emissions from one-half hour of leaf blower operation equals about 7,700 miles of driving, at 30 miles per hour average speed.

Leaf blowers may also create excessive and unusual amounts of noise, operating at anywhere from 70 to up to 90 decibels. Depending on the distance from a dwelling area the noise level may be considered a disturbance. The U.S. Department of Labor Occupational Safety & Health Administration (OSHA) requires a hearing protection program for employees when sound exposures equal or exceed an eight-hour, time-weighted average sound level of 85 decibels. Most of the newer leaf blower machines are rated at, or less than, 70 decibels at 50 feet at full throttle.[1]

The Sustainability Commission Subcommittee conducted research and found evidence of various ordinances throughout the state of California. These ordinances varied in that some implemented limitations on gasoline powered leaf blowers in both residential and commercial areas, while others ordinances limited the use of gasoline powered leaf blowers in only residential areas. Several cities have implemented further restrictions and banned the use of all leaf blowers entirely (gasoline or electrically powered).

[1] California Landscape Contractors Association website: http://www.clca.org/leaf-blowers/index.php

After its review of the issue, the Sustainability Commission Subcommittee is recommending that the City consider implementing regulations that limit the use of gasoline powered leaf blowers within residential areas of the City.

Proceeding with further review and consideration of regulations limiting the use of leaf blowers within the City will require additional coordination with the City's various neighborhood organizations via ONE-PS, as well as public outreach with the commercial landscape maintenance industry.

FISCAL AND STAFF IMPACTS:

Staff time and associated fiscal impacts are yet to be determined.

ENVIRONMENTAL IMPACT:

Staff finds that discussion of leaf blower regulations is not a "project" under the California Environmental Quality Act, because the it does not involve any commitment to a specific project which may result in a potentially significant physical impact on the environment, as contemplated by Title 14, California Code of Regulations, Section 15378(b)(4). Therefore no negative environmental impact is noted and there is a negative declaration.

SUBMITTED:

Michele C. Mician, LEED GA
Sustainability Manager

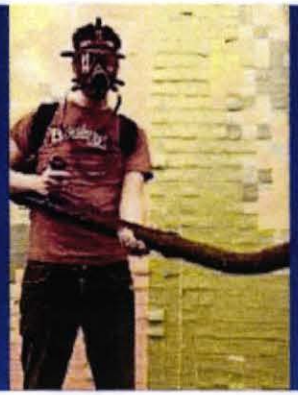
Marcus Fuller, PE, PLS
Assistant City Manager/City Engineer

David H. Ready, Esq. PhD.
City Manager

Attachments:

1. Research Materials – Power Point

ATTACHMENT 1

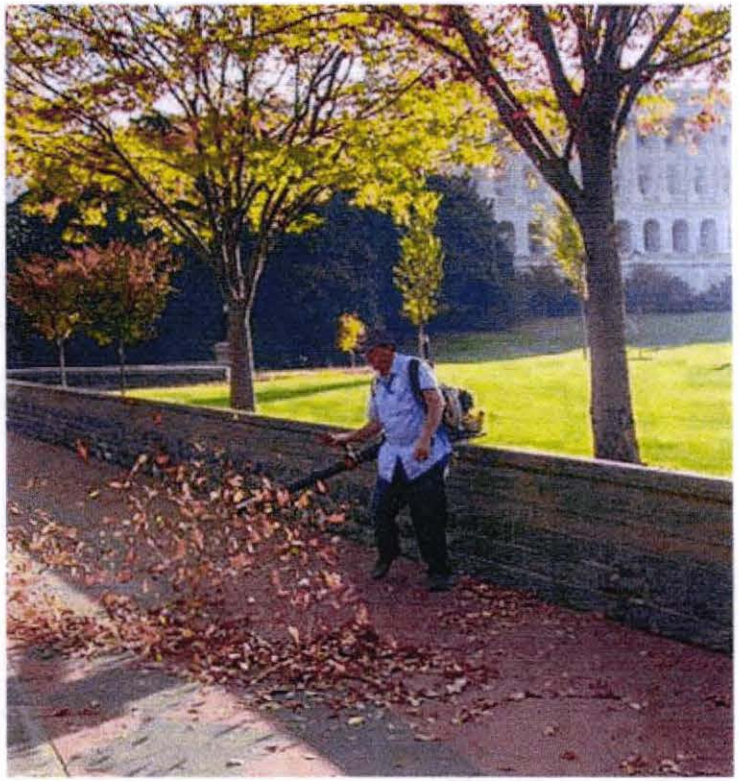


Other City Actions

Current Leaf Blower Bans – Laguna Beach

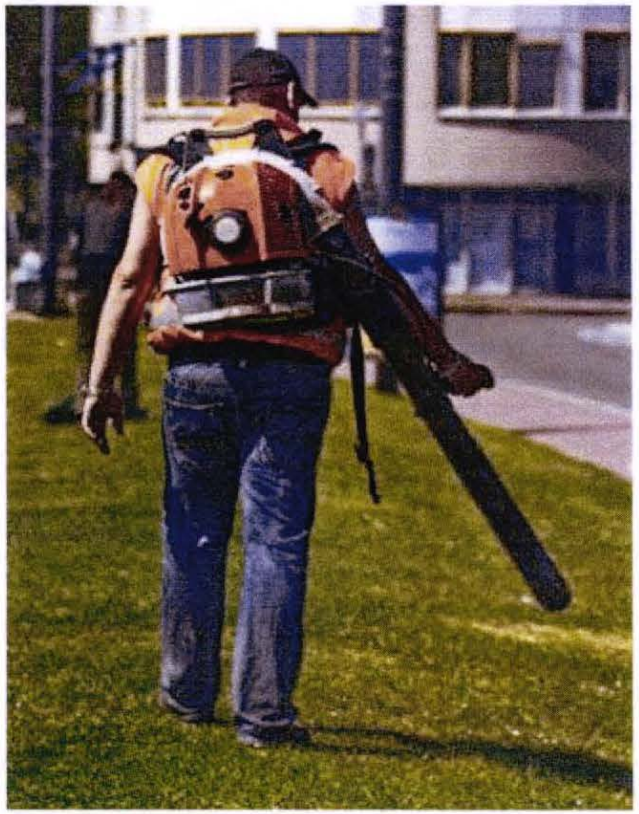
- Garden/debris blowers prohibited.

  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).



Current Leaf Blower Bans – Berkeley

- 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**



Leaf Blower Use: Other Cities

- **Indian Wells (1990):** "Leaf blowers shall be prohibited in all zones within the City except: (i) individual property occupants may operate a single electrically powered leaf blower with use confined to his/her property; (ii) golf course operators may operate gasoline powered leaf blowers during the month of September 15th through December 1st of each year.
- **Hermosa Beach:** It is unlawful to use within the city limits or cause to be used electrical or gasoline powered backpack/leaf blower. Such as commonly used by gardeners, landscapers and other persons
- **Beverly Hills (1976):** 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, and other surfaces.

Other Cities (cont'd)

- **West Hollywood (1986): The purpose of this Ordinance is to prohibit the use and operation of gasoline blowers in the City of West Hollywood.** These devices, used to blow leaves, dirt and debris, create an excessive and unusual amount of noise, often operating at up to ninety decibels. The sustained operation of leaf blowers at this decibel level is literally deafening to persons who reside and work within earshot of many gardeners not only causes disturbance of those in the vicinity of users of leaf blowers but has the potential to cause hear damage. In additional, leaf blower tends to blow dirt, dust and other particulate matter in the air, thereby reducing the air quality in West Hollywood, aggravating persons with allergies and asthmatic conditions and depositing such debris on other public and private property. There are many alternate methods of methods disposing of leaves available to gardeners and property owners, including electrical blowers, rakes, brooms, vacuums and water. The use of gasoline powered blowers is hereby declared to constitute a public nuisance by virtue of the detrimental effect such blowers have on the community and residents of West Hollywood.

Leaf Blower Ban in California Cities

Summary of California Cities that have Leafblower Ban Ordinances

Ban Provisions	Ban on all Leaf blowers (Gas & Electric)	Ban on Gas- Powered Leaf blowers	Ban during Time Restrictions
Percentage	11%	47%	40%

Source: 2011 Consumer Report; Based on 55 California cities

Leaf blowers have an impact on Greenhouse Gas Emissions; currently contribute to emissions (statewide) in the following ways:
Hydrocarbons (reactive): 4.2 tons per day
Carbon Monoxide (CO): 9.8 tons per day
Fine Particulate Matter: 0.02 tons per day
(Source: California Environmental Protection Agency/Air Resources Board)

What are the Alternatives ?

- Rakes
- Brooms
- Outdoor Vacuum
- Electric powered leafblowers

Strategy: Leaf blower Alternatives and Impact

- **Educate residents and contractors (and their workers) regarding the hazards and impact of leafblower utilization**
  a. Impact on environment
  b. Impact on Leaf blower workers and compliance with OSHA requirements
  c. Impact on health and well being of the workers, residents and surrounding community
  d. Possibly create a "buy-back" or a "discount coupon" program to offer residents and others encouraging the trade in gasoline leaf blowers for a commercial grade push brooms and dust pans and electric powered leafblowers.

Key Elements of Leaf blower Ordinance

1. Propose ban on all gasoline powered leaf blowers; encourage the conversion to electric powered leaf blowers
2. The Office of Sustainability and the Sustainability Commission would be responsible for education and increasing public awareness and educational outreach campaign of residents and businesses
3. Investigate the feasibility of proposing and implementing a buy-back and/or discount coupon program to facilitate use of alternative method of debris clean up supported by the Sustainability funds.
4. Enforcement of the ordinance through infraction citation and subsequent fines for ordinance violations. Fines could vary from $25 to $250 per infraction.
5. Develop a phase-in "roll-out" ban approach during a one year period. Phase 1 could restrict use of leaf blowers during specified hours of the day; Phase 2 to restrict specified days of the week and final Phase 3 complete ban.

Attachment 2

Palm Springs resident views sought on leaf blowers

Joseph C. Jackson, Special to The Desert Sun Published 4:15 p.m. PT Oct. 20, 2016 | **Updated 4:16 p.m. PT Oct. 20, 2016**

(Photo: Courtesy)

Leaf blowers – pro and con – have been a topic of discussion in neighborhoods, in social media, across our Coachella Valley and statewide.

In 1990, the city of Indian Wells banned gasoline-powered leaf blowers, with a Sept. 15-Dec. 1 exemption for use by golf course operators. Indian Wells is the only valley city to have taken such action, although in California at least 55 cities have some sort of leaf blower ban.

In 2012-13, and again in 2015-16, the Sustainability Commission of the city of Palm Springs discussed a possible ban of leaf blowers. Recently, in June, the Palm Springs City Council directed the Sustainability Commission to study options for reducing or eliminating gas-powered leaf blowers, with a possible phased-in approach.

A closer look: City revisits potential leaf blower ban (/story/news/2016/06/23/ps-council-discuss-leaf-blowers-and-solar-panels/86301804/)

A study session with public comment will be held at Palm Springs City Hall Council Chambers on Monday, Oct. 24, at 5 pm, so that residents, business owners, and all interested persons can express their opinions. Spanish translation will be provided.

The California Air Resources Board has stated what we all know: that leaf blowers emit more pollution than most gas engine cars; that they are noisy, and that the dust they create worsens allergies, asthma, and clouds our already compromised air quality in the desert. Despite these concerns, many property and business owners insist on using the more powerful gas blowers as the only effective way to clean large expanses of parking lots, desertscape and lawn. Rakes, brooms, outdoor vacuums and the more environmentally friendly electric-powered leaf blowers are some of the solutions possible.

No decisions have been made for Palm Springs. The Sustainability Commission hopes to make a recommendation to the City Council by year's end. That is why we need to hear from you next Monday at our study session.

Please tell us:

- What do you like about leaf blowers? What don't you like?
- How do you (or your gardeners) currently clean your property? What kinds of equipment are used and are needed?
- If gas-powered leaf blowers were to be banned, how would you clean your property?
- What experience have you had with the newer, low-emission and quieter electric battery leaf blowers and vacuums?

Thank you for helping us to move the conversation to the next step. Even though this topic may be divisive, we can model discourse the way it should happen in our city.

Email Joseph C. Jackson, chairman of the sustainability commission for the city of Palm Springs, at CapriJoePS@gmail.com.

Attachment 3

Report to the Palm Springs Sustainability Commission
Ad Hoc Subcommittee on Leaf Blowers

Date of Subcommittee Meeting: October 26, 2016
Members: Roy Clark, Jen Futterman, Joe Jackson

Bottom Line Up Front. The Leaf Blower Subcommittee recommends that the City of Palm Springs immediately start to phase out gas powered leaf blowers and eliminate them in all areas/zoning of the City by December 31, 2018. The two-year phase-out period will include testing battery powered blowers and other maintenance equipment by City employees and contractors and an exchange program for gardener/landscaper-owned gas powered leaf blowers.

Background. On June 23, 2016, the Palm Springs City Council directed staff and the Sustainability Commission "to continue to conduct studies and develop options for the reductions and/or elimination of gas powered leaf blowers including grant or incentive options, educational components, health protection for workers, and a potential phased-in regulations." At the regular Sustainability Commission meeting, July 19, 2016, an ad hoc subcommittee was appointed. It is comprised of members of the Health and Wellness Subcommittee and the Outreach Subcommittee.

Over the summer months, the ad hoc subcommittee reviewed data from prior work of the Sustainability Commission in 2012-13 and 2015-16; staff reports, which included research on action by other California cities; ONE-PS Ecology Committee minutes; leaf blower manufacturer noise and emission specifications; and South Coast Air Quality Management District (SCAQMD) communications.

A public study session was set for October 24, 2016. Postcards were sent to all applicable licensed gardening/landscaping business owners and community organizations. On-line notices were sent through the City website, ONE-PS, Nextdoor, Facebook, and other social media outlets. The *Desert Sun* printed an invitation to the study session on the Opinion Page, October 21. People were also invited to submit comments in writing to city staff and the Commission chair.

Approximately 28 people attended the study session and 13 people spoke in public comment. Translation into Spanish was available at the meeting. Over 65 emails were received in advance of the meeting, as well as many other messages through social media. The subcommittee reviewed all of these comments. The responses were approximately 70% for some sort of ban of leaf blowers.

Subcommittee Recommendations. Based on all the information we have reviewed to this time, the members of the ad hoc subcommittee are in consensus on these statements:

1. Gas powered leaf blowers should be phased out in the City of Palm Springs. Corded electric blowers and vacuums, rakes, and brooms are options for maintenance in settings such as individual yards. Battery powered blowers may be a solution for

maintenance in larger settings such as City, HOA, and commercial properties. Current battery technology may not be sufficiently advanced at this time to provide a viable solution in larger settings or in environments with temperatures above 100 degrees, which we experience in the City about one-third of the year. Lithium-ion batteries used in some blowers are advertised as capable of keeping their charge up to 5 hours. However, additional testing of battery-powered blowers in the real settings and environments of Palm Springs is necessary before they can be widely adopted. The testing will show how long batteries keep their charge in practice and how well they operate at high temperatures.

2. The City of Palm Springs can show leadership as a "sustainable city" by testing battery-powered blowers and other maintenance equipment on City property. The City staff and contractors can obtain equipment through a pilot project with the SCAQMD and/or purchase battery powered equipment so that City employees and contractors can demonstrate how to clean City parks, medians, and streets and other properties without gas powered blowers. We commend City staff for already pursuing a pilot project with the SCAQMD. We recommend follow-through by Facilities management on this pilot project and funding by City Council to purchase current state-of-the-art equipment as needed and more capable equipment as it becomes available.

3. We expect that after two years of testing and demonstration, acceptable equipment options and operating procedures for maintaining individual yards and City, HOA, and commercial properties will be identified. Therefore, we recommend that the City eliminate gas powered blowers in all areas/zoning of Palm Springs by December 31, 2018. We believe this to be in the best interest of the health and well-being of all of our residents.

4. We recommend that the City and the Sustainability Commission should begin an immediate exchange program for gardener/landscaper-owned gas powered leaf blowers, especially for the less efficient and higher-polluting leaf blowers with 2-stroke engines. This program could be in partnership with the SCAQMD, CVAG, and other regional bodies, and perhaps with City grant assistance for more robust funding. Our preference is that a special price could be available for battery or corded equipment when a gas-powered blower is returned.

5. Training of professional gardeners and landscapers on the use of leaf blowers (whether gas or electric) is currently required of gardening/landscaping business owners at the time of their City license renewal. We believe that the current requirement for training just one representative or supervisor from each business is not sufficient for a thorough communication of proper leaf blower use and safety. City contractors have demonstrated that proper training can minimize noise, dust emissions, and the oft-cited problem of just "blowing debris from one place to another". We recommend that all employees in a business get appropriate training on leaf blower use, including how to collect green waste in one place and use rakes and brooms to clean it up and dispose of it. A possible medium for this training is an independently produced bi-lingual video. It is recognized that employee turnover in

gardening/landscaping businesses will provide a challenge to consistently applying the training.

6. Finally, we have rejected, at this point, possible restrictions on leaf blowers by noise/decibel level, emissions levels, or by hours or days of the week, or by zoning. Many people expressed concern regarding including unenforceable or half-measures in our recommendations, which we believe would be the case by implementing restrictions. We recognize the ability of any homeowner, HOA, or business to move forward at any time with other solutions, which we commend and encourage. It would be helpful if residents could also adjust their expectations for "perfection" in landscape maintenance as we move forward in this transition.

We wish to acknowledge that many in our city have responded heartily to the drought by eliminating unnecessary and water-thirsty turf. A relevant metric from the Desert Water Agency is that about one million square feet of turf were removed (and replaced with desert landscape) in Palm Springs in 2014-15 and 2015-16 rebate programs. This represents over 500 projects. As many people have written, this conservation movement toward new desert landscape, which is difficult to clean without some kind of blower, means leaf blower use is more necessary now than when maintaining turf. This acknowledgment strongly influenced our recommendation. Were it practical to eliminate all leaf blowers due to health concerns, we would recommend it.

As an ad hoc subcommittee, we move this report for approval by the Sustainability Commission, to be forwarded to the City Council with supporting staff reports as required.

Attachment 4

California Environmental Protection Agency

AIR RESOURCES BOARD

A REPORT TO THE CALIFORNIA LEGISLATURE ON THE POTENTIAL HEALTH AND ENVIRONMENTAL IMPACTS OF LEAF BLOWERS

Mobile Source Control Division

February 2000

State of California

AIR RESOURCES BOARD

A REPORT TO THE CALIFORNIA LEGISLATURE ON THE POTENTIAL HEALTH AND ENVIRONMENTAL IMPACTS OF LEAF BLOWERS

Public Hearing: January 27, 2000
Date of Revision: February 29, 2000

ACKNOWLEDGMENTS

This report on potential health and environmental impacts of leaf blowers was developed by the following Air Resources Board staff:

Mobile Sources Control Division:
Nancy L.C. Steele, D.Env. (Lead)
Scott Rowland
Michael Carter (Branch Chief)

Research Division:
Hector Maldonado
Cindy Stover

And with the assistance of additional staff: Cresencia Gapas-Jackson, Leslie Krinsk, Jeff Long, Keith Macias, Angela Ortega, Muriel Strand, John Swanton, Maggie Wilkinson, and Walter Wong.

The many other individuals who provided information and assistance for this report are listed in Appendix B.

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EXECUTIVE SUMMARY

Background and Overview

California Senate Concurrent Resolution No. 19 (SCR 19) requests the Air Resources Board (ARB) to prepare and submit a report to the Legislature on or before January 1, 2000, summarizing the potential health and environmental impacts of leaf blowers and including recommendations for alternatives to the use of leaf blowers and alternative leaf blower technology, if the ARB determines that alternatives are necessary. The goal of this report is to summarize for the California Legislature existing data on health and environmental impacts of leaf blowers, to identify relevant questions not answered in the literature, and suggest areas for future research.

The leaf blower was invented in the early 1970s and introduced to the United States as a lawn and garden maintenance tool. Drought conditions in California facilitated acceptance of the leaf blower as the use of water for many garden clean-up tasks was prohibited. By 1990, annual sales were over 800,000 nationwide, and the tool had become a ubiquitous gardening implement. In 1998, industry shipments of gasoline-powered handheld and backpack leaf blowers increased 30% over 1997 shipments, to 1,868,160 units nationwide.

Soon after the leaf blower was introduced into the U.S., its use was banned as a noise nuisance in two California cities, Carmel-by-the-Sea in 1975 and Beverly Hills in 1978. By 1990, the number of California cities that had banned the use of leaf blowers was up to five. There are currently twenty California cities that have banned leaf blowers, sometimes only within residential neighborhoods and usually targeting gasoline-powered equipment. Another 80 cities have ordinances on the books restricting either usage or noise level or both. Other cities have considered and rejected leaf blower bans. 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.

The issues usually mentioned by those who object to leaf blowers are health impacts from noise, air pollution, and dust. Municipalities regulate leaf blowers most often as public nuisances in response to citizen complaints. Two reports were located that address environmental concerns: the Orange County Grand Jury Report, and a series of reports from the City of Palo Alto City Manager's office. The City of Palo Alto reports were produced in order to make recommendations to the City Council on amending their existing ordinance. The Orange County Grand Jury took action to make recommendations to improve the quality of life in Orange County, and recommended that cities, school districts, community college districts, and the County stop using gasoline-powered leaf blowers in their maintenance and clean-up operations. The major findings of each are similar: leaf blowers produce exhaust emissions, resuspend dust, and generate high noise levels.

As per SCR 19, this report includes a comprehensive review of existing studies of the impacts of leaf blowers on leaf blower operators and on the public at large, and of the availability and actual use of protective equipment for leaf blowers. The receptors identified by the resolution are humans and the environment; sources of impacts are exhaust, noise, and dust. Because the Legislature specified that ARB use existing information, staff conducted no new studies. In order to locate existing data, staff searched the published literature, contacted potential resources and experts, and requested data from the public via mail and through a web page devoted to the leaf blower report. Two public workshops were held in El Monte, California, to facilitate further discussions with interested parties.

The methodology followed for this report depends on both the objectives of SCR 19 and available data. As staff discovered, in some areas, such as exhaust emissions, much is known; in other areas, such as fugitive dust emissions, we know very little. For both fugitive dust and noise, there are few or no data specifically on leaf blower impacts. For all hazards, there have been no dose-response studies related to emissions from leaf blowers, we do not know how many people are affected by those emissions, and no studies were located that address potential health impacts from leaf blowers. Therefore, staff determined to provide the Legislature with a report that has elements of both impact and risk assessments.

The body of the report comprises three components, following the introduction: hazard identification, review of health effects, and a characterization of the potential impacts of leaf blowers on operators and bystanders. In Section II, the emissions are quantified as to specific hazardous constituents, the number of people potentially exposed to emissions is discussed, and laws that seek to control emissions are summarized. Section III reviews health effects, identifying the range of potential negative health outcomes of exposure to the identified hazards. Section IV is a synthesis of hazard identification and health effects, characterizing potential health impacts that may be experienced by those exposed to the exhaust emissions, fugitive dust, and noise from leaf blowers in both occupational and non-occupational setting. Section V discusses recommendations. Additional information, including a discussion of research needs to make progress toward answering some of the questions raised by this report, a description of engine technologies that could reduce exhaust emissions and alternatives to leaf blowers, and a complete bibliography of materials received and consulted but not cited in the report, is found in the appendices.

Description of the Hazards

Hazard identification is the first step in an impact or risk assessment. Each of the three identified hazards are examined in turn, exhaust emissions, dust emissions, and noise. For each, the hazard is described and quantified, to the extent possible, and the number of people potentially exposed to the hazard is discussed. For exhaust emissions, the number of people potentially impacted is as high as the population of the state, differing within air basins. Fugitive dust emissions impact a varying number of people, depending on one's proximity to the source, the size of the particles, and the amount of time since the source resuspended the particles. Finally, we also discuss laws that control the particular hazard.

Exhaust emissions from leaf blowers consist of the following specific pollutants of concern: hydrocarbons from both burned and unburned fuel, and which combine with other gases in the atmosphere to form ozone; carbon monoxide; fine particulate matter; and other toxic air contaminants in the unburned fuel, including benzene, 1,3-butadiene, acetaldehyde, and formaldehyde. Exhaust emissions from these engines, while high compared to on-road mobile sources on a per engine basis, are a small part of the overall emission inventory. Emissions have only been controlled since 1995, with more stringent standards taking effect in 2000. The exhaust emissions from leaf blowers are consistent with the exhaust emissions of other, similar off-road equipment powered by small, two-stroke engines, such as string trimmers. Manufacturers have developed several different methods to comply with the standards and have done an acceptable job certifying and producing engines that are below the regulated limits. Electric-powered models that are exhaust-free are also available.

Data on fugitive dust indicate that the PM10 emissions impacts from dust suspended by leaf blowers are small, but probably significant. Previous emission estimates range from less than 1% to 5% of the statewide PM10 inventory. The ARB previously estimated statewide fugitive dust emissions to be about 5 percent of the total, the Sacramento Metropolitan AQMD estimated leaf blower fugitive dust emissions to be about 2 percent of the Sacramento county PM10 air burden, and AeroVironment estimated dust attributable to leaf blowers in the South Coast Air Basin to be less than 1% of all fugitive dust sources. Dust emissions attributable to leaf blowers are not part of the inventory of fugitive dust sources. ARB, therefore, does not have official data on the quantity of fugitive dust resuspended by leaf blowers. A more definitive estimate of leaf blower fugitive dust emissions will require verification of appropriate calculation parameters and representative silt loadings, measurement of actual fugitive dust emissions through source testing, and identification of the composition of leaf blower-generated fugitive dust.

Noise is the general term for any loud, unmusical, disagreeable, or unwanted sound, which has the potential of causing hearing loss and other adverse health impacts. While millions of Californians are likely exposed to noise from leaf blowers as bystanders, given the ubiquity of their use and the increasing density of California cities and towns, there is presently no way of knowing for certain how many are actually exposed, because of the lack of studies. In contrast, it is likely that at least 60,000 lawn and garden workers are daily exposed to the noise from leaf blowers. Many gardeners and landscapers in southern California are aware that noise is an issue and apparently would prefer quieter leaf blowers. Purchases of quieter leaf blowers, based on manufacturer data, are increasing. While little data exist on the noise dose received on an 8-hr time-weighted-average by operators of leaf blowers, data indicate that some operators may be exposed above the OSHA permissible exposure limit. It is unlikely that more than 10% of leaf blower operators and members of the gardening crew, and probably a much lower percentage, regularly wear hearing protection, thus exposing them to an increased risk of hearing loss. The sound quality of gasoline-powered leaf blowers may account for the high level of annoyance reported by bystanders.

Review of Health Effects

Potential health effects from exhaust emissions, fugitive dust, and noise range from mild to serious. Fugitive dust is not a single pollutant, but rather is a mixture of many subclasses of pollutants, each containing many different chemical species. Many epidemiological studies have shown statistically significant associations of ambient particulate matter levels with a variety of negative health endpoints, including mortality, hospital admissions, respiratory symptoms and illness, and changes in lung function. Carbon monoxide is a component of exhaust emissions which causes health effects ranging from subtle changes to death. At low exposures, CO causes headaches, dizziness, weakness, and nausea. Children and people with heart disease are particularly at risk from CO exposure. Some toxic compounds in gasoline exhaust, in particular benzene, 1,3-butadiene, acetaldehyde, and formaldehyde, are carcinogens. Ozone, formed in the presence of sunlight from chemical reactions of exhaust emissions, primarily hydrocarbons and nitrogen dioxide, is a strong irritant and exposures can cause airway constriction, coughing, sore throat, and shortness of breath. Finally, noise exposures can damage hearing, and cause other adverse health impacts, including interference with communication, rest and sleep disturbance, changes in performance and behavior, annoyance, and other psychological and physiological changes that may lead to poor health.

Potential Health and Environmental Impacts of Leaf Blowers

Health effects from hazards identified as being generated by leaf blowers range from mild to serious, but the appearance of those effects depends on exposures: the dose, or how much of the hazard is received by a person, and the exposure time. Without reasonable estimates of exposures, ARB cannot conclusively determine the health impacts from leaf blowers; the discussion herein clearly is about potential health impacts. The goal is to direct the discussion and raise questions about the nature of potential health impacts for those exposed to the exhaust emissions, fugitive dust, and noise from leaf blowers in both occupational and non-occupational settings.

For the worker, the analysis suggests concern. Bearing in mind that the worker population is most likely young and healthy, and that these workers may not work in this business for all of their working lives, we nonetheless are cautioned by our research. Leaf blower operators may be exposed to potentially hazardous concentrations of CO and PM intermittently throughout their work day, and noise exposures may be high enough that operators are at increased risk of developing hearing loss. While exposures to CO, PM, and noise may not have immediate, acute effects, the potential health impacts are greater for long term exposures leading to chronic effects. In addition, evidence of significantly elevated concentrations of benzene and 1,3-butadiene in the breathing zone of operators leads to concern about exposures to these toxic air contaminants.

Potential noise and PM health impacts should be reduced by the use of appropriate breathing and hearing protective equipment. Employers should be more vigilant in requiring and ensuring their employees wear breathing and hearing protection. Regulatory agencies should conduct educational and enforcement campaigns, in addition to exploring the extent of the use of protective gear. Exposures to CO and other air toxics are more problematic because there is no effective air filter. More study of CO and other air toxics exposures experienced by leaf blower

operators is warranted to determine whether the potential health effects discussed herein are actual effects or not.

Describing the impacts on the public at large is more difficult than for workers because people's exposures and reactions to those exposures are much more variable. Bystanders are clearly annoyed and stressed by the noise and dust from leaf blowers. They can be interrupted, awakened, and may feel harassed, to the point of taking the time to contact public officials, complain, write letters and set up web sites, form associations, and attend city council meetings. These are actions taken by highly annoyed individuals who believe their health is being negatively impacted. In addition, some sensitive individuals may experience extreme physical reactions, mostly respiratory symptoms, from exposure to the kicked up dust.

On the other hand, others voluntarily purchase and use leaf blowers in their own homes, seemingly immune to the effects that cause other people such problems. While these owner-operators are likely not concerned about the noise and dust, they should still wear protective equipment, for example, eye protection, dust masks, and ear plugs, and their exposures to CO are a potential problem and warrant more study.

Recommendations

The Legislature asked ARB to include recommendations for alternatives in the report, if ARB determines alternatives are necessary. This report makes no recommendations for alternatives. Based on the lack of available data, such conclusions are premature at this time. Exhaust standards already in place have reduced exhaust emissions from the engines used on leaf blowers, and manufacturers have significantly reduced CO emissions further than required by the standards. Ultra-low or zero exhaust emitting leaf blowers could further reduce public and worker exposures. At the January 27, 2000, public hearing, the Air Resources Board directed staff to explore the potential for technological advancement in this area.

For noise, the ARB has no Legislative mandate to control noise emissions, but the evidence seems clear that quieter leaf blowers would reduce worker exposures and protect hearing, and reduce negative impacts on bystanders. In connection with this report, the Air Resources Board received several letters urging that the ARB or another state agency set health-based standards for noise and control noise pollution.

A more complete understanding of the noise and the amount and nature of dust resuspended by leaf blower use and alternative cleaning equipment is suggested to guide decision-making. Costs and benefits of cleaning methods have not been adequately quantified. Staff estimates that a study of fugitive dust generation and exposures to exhaust emissions and dust could cost $1.1 million, require two additional staff, and take two to three years. Adding a study of noise exposures and a comparison of leaf blowers to other cleaning equipment could increase study costs to $1.5 million or more (Appendix H).

Fugitive dust emissions are problematic. The leaf blower is designed to move relatively large materials, which requires enough force to also blow up dust particles. Banning or restricting the use of leaf blowers would reduce fugitive dust emissions, but there are no data on fugitive dust emissions from alternatives, such as vacuums, brooms, and rakes. In addition, without a more complete analysis of potential health impacts, costs and benefits of leaf blower use, and potential health impacts of alternatives, such a recommendation is not warranted.

Some have suggested that part of the problem lies in how leaf blower operators use the tool, that leaf blower operators need to show more courtesy to passersby, shutting off the blower when people are walking by. Often, operators blow dust and debris into the streets, leaving the dust to be resuspended by passing vehicles. Interested stakeholders, including those opposed to leaf blower use, could join together to propose methods for leaf blower use that reduce noise and dust generation, and develop and promote codes of conduct by workers who operate leaf blowers. Those who use leaf blowers professionally would then need to be trained in methods of use that reduce pollution and potential health impacts both for others and for themselves.

I. INTRODUCTION

A. Background

California Senate Concurrent Resolution No. 19 (SCR 19) was introduced by Senator John Burton February 23, 1999, and chaptered May 21, 1999 (Appendix A). The resolution requests the Air Resources Board (ARB) to prepare and submit a report to the Legislature on or before January 1, 2000, "summarizing the potential health and environmental impacts of leaf blowers and including recommendations for alternatives to the use of leaf blowers and alternative leaf blower technology if the state board determines that alternatives are necessary." The Legislature, via SCR 19, raises questions and concerns about potential health and environmental impacts from leaf blowers, and requests that ARB write the report to help to answer these questions and clarify the debate. The goal of this report, then, is to summarize for the California Legislature existing data on health and environmental impacts of leaf blowers, to identify relevant questions not answered in the literature, and suggest areas for future research.

As per SCR 19, this report includes a comprehensive review of existing studies of the impacts of leaf blowers on leaf blower operators and on the public at large, and of the availability and actual use of protective equipment for leaf blowers. The receptors identified by the resolution are humans and the environment; sources of impacts are exhaust, noise, and dust. Because the Legislature specified that ARB use existing information, staff conducted no new studies. In order to locate existing data, staff searched the published literature, contacted potential resources and experts, and requested data from the public via mail and through a web page devoted to the leaf blower report.

B. History of the Leaf Blower and Local Ordinances

The leaf blower was invented by Japanese engineers in the early 1970s and introduced to the United States as a lawn and garden maintenance tool. Drought conditions in California facilitated acceptance of the leaf blower as the use of water for many garden clean-up tasks was prohibited. By 1990, annual sales were over 800,000 nationwide, and the tool had become a ubiquitous gardening implement (CQS 1999a). In 1998, industry shipments of gasoline-powered handheld and backpack leaf blowers increased 30% over 1997 shipments, to 1,868,160 units nationwide (PPEMA 1999).

Soon after the leaf blower was introduced into the U.S., its use was banned in two California cities, Carmel-by-the-Sea in 1975 and Beverly Hills in 1978, as a noise nuisance (CQS 1999a, Allen 1999b). By 1990, the number of California cities that had banned the use of leaf blowers was up to five. There are currently twenty California cities that have banned leaf blowers, sometimes only within residential neighborhoods and usually targeting gasoline-powered equipment. Another 80 cities have ordinances on the books restricting either usage or noise level or both. Other cities have considered and rejected leaf blower bans. 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).

Many owners of professional landscaping companies and professional gardeners believe that the leaf blower is an essential, time- and water-saving tool that has enabled them to offer services at a much lower cost than if they had to use rakes, brooms, and water to clean up the landscape (CLCA 1999). A professional landscaper argues that the customer demands a certain level of garden clean-up, regardless of the tool used (Nakamura 1999). The issues continue to be debated in various public forums, with each side making claims for the efficiency or esthetics of leaf blower use versus rakes and brooms. Leaf blower sales continue to be strong, however, despite the increase in usage restrictions by cities.

C. Environmental Concerns

The issues usually mentioned by those who object to leaf blowers are health impacts from noise, air pollution, and dust (Orange County Grand Jury 1999). The Los Angeles Times Garden Editor, Robert Smaus (1997), argues against using a leaf blower to remove dead plant material, asserting that it should be left in place to contribute to soil health through decomposition. Municipalities regulate leaf blowers most often as public nuisances in response to citizen complaints (for example, City of Los Angeles 1999). Two reports were located that address environmental concerns: an Orange County Grand Jury report (1999), and a series of reports written by the City Manager of Palo Alto (1999a, 1998a, 1998b). The purpose of the City of Palo Alto reports is to develop recommendations to the City Council on amending its existing ordinance. The Orange County Grand Jury took action to make recommendations that would "improve the quality of life in Orange County," and recommended that cities, school districts, community college districts, and the County stop using gasoline-powered leaf blowers in their maintenance and clean-up operations. The major findings of each are similar (Table 1).

Table 1. Major Findings of the Orange County Grand Jury and City of Palo Alto

Orange County Grand Jury Report (1999)	City of Palo Alto City Manager's Report (1999a)
(1) Toxic exhaust fumes and emissions are created by gas-powered leaf blowers.	(1) Gasoline-powered leaf blowers produce fuel emissions that add to air pollution.
(2) 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.	(2) Leaf blowers (gasoline and electric) blow pollutants including dust, animal droppings, and pesticides into the air adding to pollutant problems.

(3) 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.	(3) Leaf blowers (gasoline and electric) do produce noise levels that are offensive and bothersome to some individuals.

As will be discussed in more detail later in this report, the findings in these two reports about exhaust emissions and noise are substantiated in the scientific literature. The report's findings regarding dust emissions, however, were not documented or based on scientific analysis of actual emissions, but were based on common sense knowledge. The City of Palo Alto continued to examine the issue, at the behest of council members, and reported revised recommendations for the use of leaf blowers in Palo Alto in September (City of Palo Alto 1999b) and January 2000 (City of Palo Alto 2000). The City of Palo Alto subsequently voted to ban the use of fuel-powered leaf blowers throughout the city as of July 1, 2001 (Zinko 2000).

D. Health and Environmental Impacts

SCR 19 asks ARB to summarize potential health and environmental impacts of leaf blowers, and thus our first task is to determine what information and analysis would comprise a summary of health and environmental impacts. The methodology followed for this report is dependent both on the objectives of SCR 19 and on the available data. As staff discovered, in some areas, such as exhaust emissions, we know much; in other areas, such as fugitive dust emissions, we know very little. For both fugitive dust and noise, there are few or no data specifically on leaf blower impacts. For all hazards, there have been no dose-response studies related to emissions from leaf blowers and we do not know how many people are affected by those emissions. Therefore, staff determined to provide the Legislature with a report that has elements of both impact and risk assessments, each of which is described below.

1. Life-cycle Impact Assessment

Life-cycle impact assessment is the examination of potential and actual environmental and human health effects related to the use of resources and environmental releases (Fava et al. 1993). A product's life-cycle is divided into the stages of raw materials acquisition, manufacturing, distribution/transportation, use/maintenance, recycling, and waste management (Fava et al. 1991). In this case, the relevant stage of the life-cycle is use/maintenance. Life-cycle impact assessment tends to focus on relative emission loadings and resources use and does not directly or quantitatively measure or predict potential effects or identify a causal association with any effect. Identification of the significance and uncertainty of data and analyses are important (Barnthouse 1997).

2. Risk Assessment

A traditional risk assessment, on the other hand, seeks to directly and quantitatively measure or predict causal effects. A risk assessment evaluates the toxic properties of a chemical or other hazard, and the conditions of human exposure, in order to characterize the nature of effects and determine the likelihood of adverse impacts (NRC 1983). The four components of a risk assessment are:

> *Hazard identification*: Determine the identities and quantities of chemicals present, the types of hazards they may produce, and the conditions under which exposure occurs.
> *Dose-response assessment*: Describe the quantitative relationship between the amount of exposure to a substance (dose) and the incidence of adverse effects (response).
> *Exposure assessment:* Identify the nature and size of the population exposed to the substance and the magnitude and duration of their exposure.
> *Risk characterization*: Integrate the data and analyses of the first three components to determine the likelihood that humans (or other species) will experience any of the various adverse effects associated with the substance.

The goal of risk assessment is the quantitative characterization of the risk, i.e., the likelihood that a certain number of individuals will die or experience another adverse endpoint, such as injury or disease. A risk assessment is ideally followed up by risk management, which is the process of identifying, evaluating, selecting, and implementing actions to reduce risk to human health and ecosystems (Omenn et al. 1997). While a risk assessment appears to be preferable because it allows us to assign an absolute value to the adverse impacts, a quantitative assessment is difficult, if not impossible, to perform when data are limited.

E. Public Involvement

To facilitate public involvement in the process of preparing the leaf blower report, staff mailed notices using existing mailing lists for small off-road engines and other interested parties, posted a leaf blower report website, met with interested parties, and held two public workshops, in June and September, 1999. In addition to face-to-face meetings and workshops, staff contacted interested parties through numerous telephone calls and e-mails. A list of persons contacted for this report is found in Appendix B. Letters and documents submitted to the Air Resources Board as of December 15, 1999, are listed in Appendix K. The vast majority of those contacted were very helpful, opening their files and spending time answering questions. ARB staff were provided with manufacturer brochures; unpublished data; old, hard-to-find reports and letters; and given briefings and demonstrations. Many reports have been posted on the Internet, for downloading at no cost, which considerably simplified the task of tracking down significant works and greatly reduced the cost of obtaining the reports.

F. Overview of this Report

The main body of this report comprises four additional sections, followed by the references cited and appendices. Section II describes the hazards, as identified in SCR 19, from leaf blowers. Hazardous components of exhaust emissions, fugitive dust emissions, and noise are covered in turn, along with who is exposed to each hazard and how society has sought to control exposure to those hazards through laws. Section III reviews health effects of each of the hazards, with exhaust emissions subdivided into particulate matter, carbon monoxide, ozone, and toxic constituents of burned and unburned fuel. Health effects from fugitive dust are covered in the subsection on particulate matter. Section IV discusses the potential health and environmental impacts of leaf blowers, synthesizing the information presented in Sections II and III. Section V discusses recommendations. Additional information, including a discussion of research needs to make progress toward answering some of the questions raised by this report, a description of engine technologies that could reduce exhaust emissions and alternatives to gasoline-powered leaf blowers, and a complete bibliography of materials received and consulted but not cited in the report, is found in the appendix.

II. DESCRIPTION OF THE HAZARDS

This section of the report describes the three potential hazards identified by SCR 19 as resulting from leaf blowers. This report examines the three hazards that have been of most concern of the public and the Legislature. Hazard identification is the first step in an impact or risk assessment. In this section, then, each of the three identified hazards are examined in turn, exhaust emissions, dust emissions, and noise. For each, the hazard is described and quantified, and the number of people potentially exposed to the hazard is discussed. For exhaust emissions, the number of people potentially impacted is as high as the population of the state, differing within air basins. Fugitive dust emissions impact a varying number of people, depending on one's proximity to the source, the size of the particles, and the amount of time since the source resuspended the particles. Finally, in this section we also discuss laws that control the particular hazard.

A. Exhaust Emissions

Exhaust emissions are those emissions generated from the incomplete combustion of fuel in an engine. The engines that power leaf blower equipment are predominantly two-stroke, less than 25 horsepower (hp) engines. This section describes the two-stroke engine technology prevalent in leaf blower equipment and associated emissions, reviews the leaf blower population and emission inventory data approved by the Board in 1998, and describes federal, state, and local controls on small off-road engines.

1. Characterization of Technology

Small, two-stroke gasoline engines have traditionally powered leaf blowers, and most still are today.[1] The two-stroke engine has several attributes that are advantageous for applications such as leaf blowers. Two-stroke engines are lightweight in comparison to the power they generate, and operate in any position, allowing for great flexibility in equipment applications. Multi-positional operation is made possible by mixing the lubricating oil with the fuel; the engine is, thus, properly lubricated when operated at a steep angle or even upside down.

A major disadvantage of two-stroke engines is high exhaust emissions. Typical two-stroke designs feed more of the fuel/oil mixture than is necessary into the combustion chamber. Through a process known as scavenging, the incoming fuel enters the combustion chamber as the exhaust is leaving. This timing overlap of intake and exhaust port opening can result in as much as 30% of the fuel/oil mixture being exhausted unburned. Thus, exhaust emissions consist of both unburned fuel and products of incomplete combustion. The major pollutants from a two-stroke engine are, therefore, oil-based particulates, a mixture of hydrocarbons, and carbon monoxide. A two-stroke engine forms relatively little oxides of nitrogen emissions, because the extra fuel absorbs the heat and keeps peak combustion temperatures low.

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[1]Unless otherwise referenced, this section makes use of material in the ARB's Small Off Road Engine staff report and attachments, identified as MSC 98-02; 1998a.

Hydrocarbon emissions, in general, combine with nitrogen oxide emissions from other combustion sources to produce ozone in the atmosphere. Thus ozone, although not directly emitted, is an additional hazard from leaf blower exhaust. In addition, some of the hydrocarbons in fuel and combustion by-products are themselves toxic air contaminants, such as benzene, 1,3-butadiene, acetaldehyde, and formaldehyde (ARB 1997). The major sources of benzene emissions are gasoline fugitive emissions and motor vehicle exhaust; about 25% of benzene emissions are attributed to off-road mobile sources. Most 1,3-butadiene emissions are from incomplete combustion of gasoline and diesel fuels from mobile sources (about 96%). Sources of acetaldehyde include emissions from combustion processes and photochemical oxidation. The ARB has estimated that acetaldehyde emissions from off-road motor vehicles comprise about 27% of the total emissions. Finally, formaldehyde is a product of incomplete combustion and is also formed by photochemical oxidation; mobile sources appear to contribute a relatively small percentage of the total direct emissions of formaldehyde. Data do not exist to allow reliable estimation of toxic air contaminant emissions from small, two-stroke engine exhaust.

A small percentage of blowers utilize four-stroke engines. These blowers are typically "walk-behind" models, used to clean large parking lots and industrial facilities, rather than lawns and driveways. Overall, the engines used in these blowers emit significantly lower emissions than their two-stroke counterparts, with significantly lower levels of hydrocarbons and particulate matter. These four-stroke blower engines have a significantly lower population than the traditional two-stroke blowers and only peripherally fit the definition or commonly-accepted meaning of the term "leaf blower." They are mentioned here only for completeness, but are not otherwise separately addressed in this report.

2. Exhaust Emissions

a. Leaf Blower Population

The best estimates available indicate that there are approximately 410,000 gasoline-powered blowers in use in the state today. Less than 5,000 of those use four-stroke engines; the remainder (99%) utilize two-stroke engines. These data have been developed from information gathered through the development and implementation of ARB's small off-road engine regulation. Since the small off-road engine regulation does not apply to blowers powered by electric motors, data regarding the number of electric blowers are not as extensive. However, information shared by the handheld power equipment industry indicates that approximately 60 percent of blowers sold are electric. This would indicate that there are approximately 600,000 electric blowers in California. It must be stressed that the majority of the blower population being electric does not imply that the majority of usage accrues to electric blowers. In fact, electric blowers are more likely to be used by homeowners for occasional use, whereas virtually all professional gardeners use engine-powered blowers.

b. Emission Inventory

California's emission inventory is an estimate of the amount and types of criteria pollutants and ozone precursors emitted by all sources of air pollution. The emission inventory method and inputs for small off-road engines, with power ratings of less than 25 hp, were approved by the Board in 1998 (ARB 1998b) (Table 2). Exhaust emissions from leaf blowers contribute from one to nine percent of the small-off road emissions, depending on the type of pollutant, based on the 2000 emissions data. Exhaust emission standards for small off-road engines, which will be implemented beginning in 2000, will result in lower emissions in the future. By 2010, for example, hydrocarbon emissions are expected to shrink by 40% statewide, while CO declines by 35% and PM10 drops 90%. The reductions reflect the replacement of today's blowers with cleaner blowers meeting the 2000 standards.

Table 2. Statewide Inventory of Leaf Blower Exhaust Emissions (tons per day)

	Leaf blowers 2000	Leaf blowers 2010	All Lawn & Garden, 2000	All Small Off-Road, 2000
Hydrocarbons, reactive	7.1	4.2	50.24	80.07
Carbon Monoxide (CO)	16.6	9.8	434.99	1046.19
Fine Particulate Matter (PM10)	0.2	0.02	1.05	3.17

3. Regulating Exhaust Emissions

a. State Regulations

The California Clean Air Act, codified in the Health and Safety Code Sections 43013 and 43018, was passed in 1988 and grants the ARB authority to regulate off-road mobile source categories, including leaf blowers. The federal Clean Air Act requires states to meet national ambient air quality standards (Appendix C) under a schedule established in the Clean Air Act Amendments of 1990. Because many air basins in California do not meet some of these standards, the State regularly prepares and submits to the U.S. EPA a plan that specifies measures it will adopt into law to meet the national standards. Other feasible measures not specified in the state implementation plan may also be adopted as needed.

In December 1990, the Board approved emission control regulations for new small off-road engines used in leaf blowers and other applications. The regulations took effect in 1995, and include exhaust emission standards, emissions test procedures, and provisions for warranty and production compliance programs. In March of 1998, the ARB amended the standards to be implemented with the 2000 model year (ARB 1998a). Table 3 illustrates how the standards compare with uncontrolled engines for leaf blower engines. Note that there was no particulate

matter standard for 1995-1999 model year leaf blowers, but that a standard will be imposed beginning with the 2000 model year.

Among other features of the small off-road engine regulations is a requirement that production engines be tested to ensure compliance. Examination of the certification data confirms that manufacturers have been complying with the emissions regulations; in fact, engines that have been identified as being used in blowers tend to emit hydrocarbons at levels that are 10 to 40 percent below the existing limits. This performance is consistent with engines used in string trimmers, edgers, and other handheld-type equipment, which are, in many cases, the same engine models used in leaf blowers.

Table 3
Exhaust Emissions Per Engine for Leaf Blowers
(grams per brake-horsepower-hour, g/bhp-hr)

	Uncontrolled Emissions	1995-1999 Standards[2]	2000 and later Standards
HC+NOx	283 + 1.0	180 + 4.0	54[3]
CO	908	600	400
PM	3.6	---[4]	1.5

b. Federal Regulations

Although the federal regulations for mobile sources have traditionally followed the ARB's efforts, the U.S. EPA has taken advantage of some recent developments in two-stroke engine technology. Specifically, compression wave technology has been applied to two-stroke engines, making possible much lower engine emissions. Bolstered by this information, the U.S. EPA (1999a) has proposed standards for blowers and other similar equipment that would be more stringent than the ARB standards. ARB plans a general review of off-road engine technology by 2001, and will consider the implications of this new technology in more detail then. A short description is included in Appendix I.

c. South Coast AQMD Emissions Credit Program

[2]Applicable to engines of 20-50 cc displacement, used by the vast majority of leaf blowers.

[3]For yr 2000, the HC + NOx standards have been combined.

[4]There was no particulate standard for this time period.

The South Coast Air Quality Management District (SCAQMD), an extreme non-attainment area for ozone, has promulgated Rule 1623 - Credits for Clean Lawn and Garden Equipment. Rule 1623 provides mobile source emission reduction credits for those who voluntarily replace old high-polluting lawn and garden equipment with new low- or zero-emission equipment or who sell new low- or zero-emission equipment without replacement. The intent of the rule is to accelerate the retirement of old high-polluting equipment and increase the use of new low- or zero-emission equipment. In 1990, volatile organic carbon emissions from lawn and garden equipment in the South Coast Air Basin were 22 tons per day (SCAQMD 1996). To date, no entity has applied for or received credits under Rule 1623 (V. Yardemian, pers. com.)

4. Summary

Exhaust emissions from leaf blowers consist of the following specific pollutants of concern: hydrocarbons from both burned and unburned fuel, and which combine with other gases in the atmosphere to form ozone; carbon monoxide; fine particulate matter; and other toxic air contaminants, including benzene, 1,3-butadiene, acetaldehyde, and formaldehyde. Exhaust emissions from these engines, while high compared to on-road mobile sources on a per engine basis, are a small part of the overall emission inventory. Emissions have only been controlled since 1995, with more stringent standards taking effect in 2000. The exhaust emissions from leaf blowers are consistent with the exhaust emissions of other, similar off-road equipment powered by small, two-stroke engines, such as string trimmers. Manufacturers have developed several different methods to comply with the standards and have done an acceptable job certifying and producing engines that are below the regulated limits. Electric-powered models that are exhaust-free are also available.

B. Fugitive Dust Emissions

"Blown dust" is the second of the hazards from leaf blowers specified in SCR 19. For the purposes of this report, we will use the term "fugitive dust," which is consistent with the terminology used by the ARB. This section, in addition to defining fugitive dust emissions, characterizes fugitive dust resuspended by leaf blowers by comparing previous estimates of emission factors (amount emitted per hour per leaf blower) and emissions inventory (amount resuspended per day by all leaf blowers statewide) to a current estimate, developed for this report. In addition, the potential composition of leaf blower dust and fugitive dust controls at the state and local levels are described.

1. Definition of Fugitive Dust Emissions

From the Glossary of Air Pollution Terms, available on the ARB's website,[5] the following definitions are useful:

Fugitive Dust: Dust particles that are introduced into the air through certain activities such as soil cultivation, or vehicles operating on open fields or dirt roadways; a subset of fugitive emissions.

Fugitive Emissions: Emissions not caught by a capture system (often due to equipment leaks, evaporative processes, and windblown disturbances).

Particulate Matter (PM): Any material, except uncombined water, that exists in the solid or liquid state in the atmosphere. The size of particulate matter can vary from coarse, wind-blown dust particles to fine particle combustion products.

Fugitive dust is a subset of particulate matter, which is a complex mixture of large to small particles that are directly emitted or formed in the air. Current control efforts focus on PM small enough to be inhaled, generally those particles smaller than 10 micrometers (μm). So-called coarse particles are those larger than 2.5 μm in diameter, and are directly emitted from activities that disturb the soil, including construction, mining, agriculture, travel on roads, and landfill operations, plus windblown dust, pollen, spores, sea salts, and rubber from brake and tire wear. Those with diameters smaller than 2.5 μm are called fine particles. Fine particles remain suspended in the air for long periods and can travel great distances. They are formed mostly from combustion sources, such as vehicles, boilers, furnaces, and fires, with a small dust component. Fine particles can be directly emitted as soot or formed in the atmosphere as combustion products react with gases from other sources (Finlayson-Pitts & Pitts 1986).

Dust emissions from leaf blowers are not part of the inventory of fugitive dust sources. ARB, therefore, does not have official data on the quantity of fugitive dust resuspended by leaf blowers. No data on the amount and size distributions of resuspended dust from leaf blower activities have been collected, although estimates have been made. ARB evaluated three previous estimates (McGuire 1991, Botsford et al. 1996, Covell 1998) and developed a proposed methodology for estimating fugitive dust emissions from leaf blowers. The estimate presented below begins with the assumptions and calculations contained in the study conducted for the SCAQMD by AeroVironment (Botsford et al. 1996). Additional methodologies and data have been reviewed and derived from the U.S. EPA document commonly termed AP-42, and reports by the Midwest Research Institute; University of California, Riverside; and the Desert Research Institute.

[5] http://arbis.arb.ca.gov/html/gloss.htm

2. Calculating Leaf Blower Emissions

There are more than 400,000 gasoline-powered leaf blowers, plus approximately 600,000 electric leaf blowers, that are operated an estimated 114,000 hours per day in California. The fundamental premise in the calculations below is that leaf blowers are designed to move relatively large materials such as leaves and other debris, and hence can also be expected to entrain into the air much smaller particles, especially those below 30 μm diameter, which are termed total suspended particulate (PMtsp). Subsets of PMtsp include PM10, particulates with diameters less than or equal to 10 μm, and PM2.5, particulates with diameters less than or equal to 2.5 μm. Particles below 30 μm are not visible to the naked eye. Note that PM10 includes PM2.5 particles, and PMtsp includes PM10 and PM2.5 particles.

a. Generation of Fugitive Dust by Leaf Blowers

The leaf blower moves debris such as leaves by pushing relatively large volumes of air, typically between 300-700 cubic feet per minute, at a high wind speed, typically 150 to 280 miles per hour (hurricane wind speed is >117 mph). A typical surface is covered with a layer of dust that is spread, probably non-uniformly, along the surface being cleaned. While the intent of a leaf blower operator may not be to move dust, the high wind speed and volume result in small particles being blown into the air. In order to calculate how much fugitive dust is generated by the action of a blower, we assume that this layer of dust can be represented by a single average number, the silt loading. This silt loading value, when combined with the amount of ground cleaned per unit time and the estimated PM weight fractions, produces estimates of fugitive dust emissions from leaf blowers.

Staff have located no fugitive dust measurement studies on leaf blowers, but have found previous calculations of fugitive dust estimates from leaf blowers. Based on a review of those estimates, staff applied the latest knowledge and research in related fields in order to derive a second-order approximation. This section presents the best estimates using existing data, while recognizing that estimates are only approximations. Variables that would affect fugitive dust emissions, and for which ARB has little or no empirical data, include, for example:

(1) the specific surface types on which leaf blowers are used;
(2) the percentage of use on each specific surface type;
(3) effects of moisture, humidity, and temperature;
(4) silt loading values for surfaces other than paved roadways, shoulders, curbs, and gutters and in different areas of the state; and
(5) measurements of the amount of surface cleaned per unit time by the average operator.

Other variables are not expected to greatly influence fugitive dust emissions; the hurricane-force winds generated by leaf blowers are expected to overcome such influences, for example, as the roughness of relatively flat surfaces and the effect of particle static charge.

b. Size Segregation of Particulate Matter

PM emissions can be subdivided into the following three categories, operator emissions, local emissions, and regional emissions. They are differentiated as follows:

1) Operator emissions. PMtsp emissions approximate emissions to which the operator is exposed. The larger of these particles, between approximately 10 and 30 μm, have relatively short settling times, on the order of minutes to a couple of hours, maximum (Finlayson-Pitts & Pitts 1986, Gillies et al. 1996, Seinfeld & Pandis 1998). These would be emissions to which both the leaf blower operator and passersby would be exposed.

2) Local emissions. PM10 emissions will be used to estimate "local" PM emissions. PM10, which includes particles at or below 10 μm, may remain suspended for hours to days in the atmosphere (Finlayson-Pitts & Pitts 1986, Gillies et al. 1996, Seinfeld & Pandis 1998). These are emissions to which persons in the near-downwind-vicinity would be exposed, for example, residents whose lawns are being serviced and their neighbors, persons in commercial buildings whose landscapes are being maintained or serviced, and persons within a few blocks of the source.

3) Regional emissions. PM2.5 emissions may remain suspended for as long as a week or more (Finlayson-Pitts & Pitts 1986, Gillies, et al. 1996, Seinfeld & Pandis 1998). These particles are sized at or below 2.5 μm, and hence can be considered as contributors to regional PM emissions over a county or air basin because of their long residence time.

c. Calculation Assumptions and Limitations

The method presented uses the following assumptions.

1) Methods used for estimating wind blown dust for paved roads can be applied to estimating fugitive dust emissions from leaf blowers. That is, one can use an "AP-42" type (U.S. EPA 1997) of approach that calculates dust emissions based on the silt loading of the surfaces in question.

2) The typical leaf blower generates sufficient wind speed to cause sidewalk/roadway dust, in particular, particles 30 μm or less in aerodynamic diameter, to become airborne. The AeroVironment study (Botsford et al. 1996) assumed that nozzle air velocities ranged from 120 to 180 mph, and calculated that wind speed at the ground would range from 24 mph to 90 mph, sufficient to raise dust and equivalent, at the middle to high end speeds, to gale-force winds.

3) Currently available paved road, roadside shoulder, and gutter silt loadings (Venkatram & Fitz 1998) can be used to calculate emissions from leaf blowers, as there are no data on silt loadings on other surfaces. Observations and communications with landscapers indicate that leaf blowers are most commonly used to clean hardscape surfaces, such as sidewalks, after lawns and

flower beds have been trimmed and cuttings left on hardscapes. Debris is then frequently blown into the roadway before being collected for disposal.

4) The size fractions for particles for paved road dust can be used to calculate emissions from leaf blowers (G. Muleski, pers. comm.). The ratios of particle size multipliers, or "k" factors, are used to estimate the weight fraction of windblown dust for leaf blower usage. The "k" factor is a dimensionless value that represents the percentage of the total dust loading that is of a certain size fraction (MRI 1997).

5) Silt loading values and usage are assumed to be the same for residential and commercial leaf blower use. In an earlier draft, ARB staff had proposed different silt loading values for residential and commercial leaf blowers; comments were received that indicated that heavier-duty commercial leaf blowers were used in the same way in both residential and commercial settings. In addition, data on nozzle air speeds indicate that most electric leaf blowers, targeted at homeowners, have air speeds at or above 120 mph, the lowest air speed considered in the AeroVironment report (Botsford et al. 1996) as capable of raising dust.

6) The weight of total suspended particulates is equivalent to 100% of the silt loading, the weight fraction that comprises PM10 is 19% of the total, and the weight fraction comprising PM2.5 is 9% of the total (U.S. EPA 1997, MRI 1997, G. Muleski, pers. com). A recent study, however, found that 50-70% of the mass of PMtsp of paved road dust at three southern California locations is present in the PM10 fraction (Miguel et al. 1999), so more data would be helpful.

A final limitation is the recognition that emissions inventories are estimates of the unknown and unknowable actual emissions inventory. An earlier draft of this report was criticized as providing only estimates of emissions, and not actual emissions, when in fact all emissions inventories are based on models developed through scientific research on how the chemicals behave in the atmosphere, limited testing to determine emission factors, and industry-provided data on the population and usage of each particular source of air pollution. Each generation of emission inventories is an improvement over the one previous as assumptions are examined, tested, and modified. As discussed earlier, the estimate in this report builds on previous estimates.

d. Calculation Methodology

The proposed emissions estimation methodology uses measured silt loadings (Venkatram & Fitz 1998) and size fraction multipliers for PM10 and PM2.5 (U.S. EPA 1997, MRI 1997, G. Muleski, pers. com.).

$EF_{size} = (sL)\ (Q)\ (f_{size})$
where:
EF_{size} = PM30, or PM10, or PM2.5 emission factors;
sL = silt loading fraction, from ARB (1998b);

Q = amount of ground cleaned per unit time, estimated to be 1,600 m^2/hr, corresponding to a forward speed of 1 mph, with the operator sweeping the blower in a one meter arc;
f_{size}= fraction of PMtsp dust loading that comprises PM10 (0.19) or PM2.5 (0.09).

Silt loading values are the critical parameter in the calculation. ARB has chosen, for this emissions estimate, to use recent data from a study conducted for the ARB by a team at the University of California, Riverside (Venkatram & Fitz 1998) (Table 4). As data were collected only in Riverside County, it is not known how representative they are of other areas of the state or of substrates cleaned by leaf blowers. The data are, however, the most complete we have to date. Because the data are not normally distributed, the median and 95% percentile samples for silt loading are used to represent the data set in calculations.

Table 4
Silt Loading Values, Riverside County
(grams per square meter, g/m^2)

Roadway Type	Material Loading, Median	Silt Loading, Median (95%)	Range of Silt Loading Values
Paved Road	108.44	0.16 (6.34)	0.003-107.596
Roadway Shoulders	481.08	3.33 (15.73)	0.107-23.804
Curbs and Gutters	144.92	3.39 (132.94)	0.97-556.65

3. Characterization of Fugitive Dust Emissions

This section includes results from this present analysis, as well as results from previous estimates prepared by the ARB and others for comparison.

a. Emission Factors - This Study

Possible emission factors have been calculated for leaf blower use on paved roadways, roadway shoulders, and curbs and gutters (Table 5). Two emission factors are presented for each surface and particle size, based on the median and 95th percentile of the empirical silt loading data. The resulting range for PM10 is from 48.6 to 1030.6 g/hr for PM10, for example, depending on the surface cleaned. Cleaning of curbs and gutters generates the highest emission factors, whereas paved roadways and shoulders are lower. As discussed before, staff have no data on which to base emission factors for sidewalks, driveways, lawns, or flower beds.

Table 5. Leaf Blower Estimated Emission Factors, This Study
(grams per hour, g/hr)

Emission Factor	Paved Roadway, Median (95%)	Shoulders, Median (95%)	Curbs/Gutters, Median (95%)
Total Suspended Particulate	256.0 (10,144.0)	5,328 (25,168)	5,424 (212,704)
PM10	48.6 (1,927.4)	1,012.3 (4,781.9)	1,030.6 (40,413.8)
PM2.5	23.0 (913.0)	479.5 (2,265.0)	488.2 (19,143.4)

b. Statewide Emissions Inventory - This Study

Three potential statewide emissions inventory values (Table 6), in tons per day (tpd), have been calculated by multiplying the median emissions factors, shown above, by the hours of operation for each of three different substrates: paved roadways, paved shoulders, and paved curbs/gutters, based on the Riverside data. From the statewide emissions inventory, the total number of hours of operation in the year 2000 are estimated to be 113,740 hr/day, or 97,302 hr/day for gasoline-powered leaf blowers plus 16,438 hr/day for electric leaf blowers.[6]

Table 6. Leaf Blower Emissions,
Possible Statewide Values, This Study
(tons per day, tpd)

Emissions Inventory	Paved Roadway, Median	Shoulders, Median	Curbs/Gutters, Median
Total Suspended Particulates	32.1	667.4	679.4
PM10	6.1	126.8	129.1
PM2.5	2.9	60.1	61.2

The goal in developing an emissions inventory is to derive one statewide emissions inventory number for each category of particulate sizes, which can then be subdivided by air basin or air district. Ideally, ARB would have developed emissions factors for each surface cleaned by leaf blowers, and apportioned the emissions based on the percentage of hours spent cleaning each surface annually. Table 6, however, presents an array of values because staff have no data on the percentage of time spent cleaning various surfaces. For comparison, the 1996 statewide PM10

[6]On a per-unit basis, electric blowers are assumed to be used 10 hr/yr.

estimated emission inventory was 2,400 tpd; estimates for paved road dust, unpaved road dust, and fugitive windblown dust were 400, 610, and 310 tpd, respectively. Based on the estimates in Table 6, then, PM10 emissions impacts from leaf blower use could range from insignificant (0.25%) to significant (5.4%), on a statewide basis. Additional study is required to refine the analysis and develop a statewide emission inventory.

c. Previous Emissions Estimates: ARB, 1991

The ARB's Technical Support Division, in a July 9, 1991 response to a request from Richard G. Johnson, Chief of the Air Quality Management Division at the Sacramento Metropolitan Air Quality Management District, prepared a leaf blower emissions estimate in grams per hour of dust (McGuire 1991). PM10 emissions were reported as being 1,180 g/hr, or 2.6 lb/hr, which is the same order of magnitude as the present study's calculated emission factors for roadway shoulders and curbs/gutters (Table 5). If this emission factor is combined with current statewide hours-of-operation data of 113,740 hr/day of leaf blower usage, this would produce an emission inventory of 147.8 tpd of PM10, similar to the present study's inventory for shoulders and curbs/gutters (Table 6).

d. Previous Emissions Estimates: SMAQMD

Sacramento Metropolitan Air Quality Metropolitan District (SMAQMD) staff (Covell 1998) estimated that "Dust Emissions (leaf blowers only)" are 3.2 tpd in Sacramento County. The memo included commercial and residential leaf blower populations (1,750 commercial and 15,750 residential), and hours of use (275 hr/yr for commercial and 10 hr/yr for residential). Using these values one can calculate the assumed g/hr emission factor for particulate matter. The resulting emission factor is 1,680 g/hr, or 3.7 lb/hr. The resulting statewide emission inventory is 210.4 tpd, higher than this study's estimates (Tables 5 & 6).

e. Previous Emissions Estimates: AeroVironment

The South Coast AQMD commissioned AeroVironment to determine emission factors and preliminary emission inventories for sources of fugitive dust previously uninventoried; leaf blowers were one of the categories examined (Botsford et al. 1996). The study focused on PM10, and did not include field measurements. The study assumed that each leaf blower was used, at most, one day per week to clean 92.9 m^2 (1000 ft^2) of ground. Silt loading was assumed to be 1.42 g/m^2. Combining these two values yields an emission factor of 5.5 g/hr. With an estimated 60,000 leaf blowers in the South Coast Air Basin, AeroVironment calculated an emission inventory of 8.6 tpd, just for the South Coast AQMD, more than double the basin-wide inventory calculated for the Sacramento Metropolitan AQMD (above). The obvious difference between this estimate and the others summarized herein is the assumption that each leaf blower is used for no more than one day per week and is used to clean an area equivalent to only one front yard (20 ft by 50 ft); as commercial gardeners could not make a living cleaning one front yard once per week, this figure is obviously much too low. It is, however, coincidentally similar to the present study's estimate for paved roadways (Table 6).

4. Particulate Composition

Substances such as fecal material, fertilizers, fungal spores, pesticides, herbicides, pollen, and other biological substances have been alleged to make up the dust resuspended by leaf blower usage (Orange County Grand Jury 1999), and thus staff looked for data on the composition of particulate matter. Little information is available. Suspended paved road dust is a major contributor to airborne particulate matter in Los Angeles and other cities (Miguel et al. 1999). Staff considered, therefore, size-segregated chemical speciation profiles for paved road dust to chemically characterize leaf blower PM emissions. The chemical speciation profiles for paved road dust show small percentages of the toxic metals arsenic, chromium, lead, and mercury. In addition to soil particles, paved road dust emissions may contain contributions from tire and brake wear particles. Paved road dust chemical speciation, however, characterizes the dust by elemental composition, and was not useful in estimating health impacts for this assessment. ARB's chemical speciation profile for paved road dust is presented in Appendix D for information.

Recently, however, researchers published a study on allergans in paved road dust and airborne particles (Miguel et al. 1999). The authors found that biologic materials from at least 20 different source materials known to be capable of causing or exacerbating allergenic disease in humans are found in paved road dust, including pollens and pollen fragments, animal dander, and molds. Allergen concentrations in the air are increased above the levels that would otherwise occur in the absence of suspension by passing traffic. The authors conclude that paved road dust is a ubiquitous mixed source of allergenic material, resuspended by passing traffic, and to which virtually the entire population is exposed. The applicability of this study to particulate matter resuspension by leaf blower usage is unknown, but it is likely that leaf blowers would be as effective at resuspending paved road dust as automobiles. Information on the characteristics of other sources of resuspended particulates, for example lawns and gardens, is unfortunately lacking.

5. Regulating Fugitive Dust Emissions

Fugitive dust emissions are generally regulated as a nuisance, although PM10 and PM2.5 are specifically addressed through the state planning process as criteria air pollutants. There are no explicit federal, state, or local regulations governing leaf blower fugitive dust emissions.

a. State and Federal PM10 and PM2.5 Standards

The California and Federal ambient air quality standards for PM10 and PM2.5 are located in Appendix C. Any state that has air basins not in attainment with the standards must submit a plan to U.S. EPA on how they will achieve compliance. For California, most of the state violates the PM10 standard; attainment status has not yet been determined for the new PM2.5 standard (promulgated July 18, 1997 and under challenge in the courts). California, and its air districts, is therefore required to control sources of PM10, including fugitive dust.

b. Local District Regulations

Many air districts have a fugitive dust control rule that prohibits activities that generate dust beyond the property line of an operation. For example, the SCAQMD Rule 403 states: "A person shall not cause or allow the emissions of fugitive dust from any active operation, open storage pile, or undisturbed surface area such that the presence of such dust remains visible in the atmosphere beyond the property line of the emission source." In addition, rules may place limits on the amount of PM10 that can be detected downwind of an operation that generates fugitive dust; for SCAQMD that limit is 50 $\mu g/m^3$ [SCAQMD Rule 403]. The Mojave AQMD limits PM emissions to 100 $\mu g/m^3$ [Mojave AQMD Rule 403]. Others, such as the San Joaquin Unified APCD, define and limit visible emissions (40% opacity) from activities that generate fugitive dust emissions [SJUAPCD Rule 8020]. Finally, another approach is to simply request individuals take reasonable precautions to prevent visible particulate matter emissions from moving beyond the property from which the emissions originate [Great Basin Unified APCD Rule 401].

6. Summary

Data on fugitive dust indicate that the PM10 emissions impacts from dust suspended by leaf blowers are small, but probably significant. Previous emission estimates range from less than 1% to 5% of the statewide PM10 inventory. The ARB previously estimated statewide fugitive dust emissions to be about 5 percent of the total, the Sacramento Metropolitan AQMD estimated leaf blower fugitive dust emissions to be about 2 percent of the Sacramento county PM10 air burden, and AeroVironment estimated dust attributed to leaf blowers in the South Coast Air Basin to be less than 1% of all fugitive dust sources. Dust emissions attributable to leaf blowers are not part of the inventory of fugitive dust sources. ARB, therefore, does not have official data on the quantity of fugitive dust resuspended by leaf blowers. A more definitive estimate of leaf blower fugitive dust emissions will require research to verify appropriate calculation parameters, determine representative silt loadings, measure actual fugitive dust emissions through source testing, and identify the chemical composition of leaf blower-generated fugitive dust.

C. Noise Emissions

The third of the hazards from leaf blowers identified in SCR 19 is noise. This section defines noise, describes the physical properties of sound and how sound loudness is measured, discusses noise sources, the numbers of Californians potentially exposed to noise, and how noise is regulated at the federal, state, and local levels, and addresses specific sound loudness and quality from leaf blowers. In addition, the incidence of the use of hearing protection, and other personal protective equipment, by leaf blower operators is described.

1. Defining Noise

Noise is the general term for any loud, unmusical, disagreeable, or unwanted sound. In addition to damaging hearing, noise causes other adverse health impacts, including interference with communication, rest and sleep disturbance, changes in performance and behavior, annoyance, and other psychological and physiological changes that may lead to poor health (Berglund & Lindvall 1995). In this report, noise will be used to refer both to unwanted sounds and sounds that damage hearing. The two characteristics, although related, do not always occur together.

The effects of sound on the ear are determined by its quality, which consists of the duration, intensity, frequency, and overtone structure, and the psychoacoustic variables of pitch, loudness, and tone quality or timbre, of the sound. Long duration, high intensity sounds are the most damaging and usually perceived as the most annoying. High frequency sounds, up to the limit of hearing, tend to be more annoying and potentially more hazardous than low frequency sounds. Intermittent sounds appear to be less damaging than continuous noise because the ear appears to be able to recover, or heal, during intervening quiet periods. Random, intermittent sounds, however, may be more annoying, although not necessarily hazardous, because of their unpredictability (Suter 1991).

The context of the sound is also important. While certain sounds may be desirable to some people, for example, music at an outdoor party, others may consider them noise, for example, those trying to sleep. Even desirable sounds, such as loud music, may cause damage to hearing and would be considered noise in this context. Thus, not only do loudness, pitch, and impulsiveness of sound determine whether the sound is noise, but also the time of day, duration, control (or lack thereof), and even one's personality determine whether sounds are unwanted or not.

The physical and psychoacoustic characteristics of sound, and thus noise, are described in more detail in Appendix E. The discussion is focused on information necessary for the reader to understand how sound is measured, and clarify measures of leaf blower sound. The interested reader is referred for more information to any physics or acoustic reference book, or the works referred to herein.

2. Measuring the Loudness of Sound

The weakest intensity of sound a health human ear can detect has an amplitude of 20 millionths of a Pascal[7] (20 μPa). The loudest sound the human ear can tolerate, the threshold of pain, has an amplitude ten million times larger, or 200,000,000 μPa. The range of sound intensity between the faintest and the loudest audible sounds is so large that sound pressures are expressed using a logarithmically compressed scale, termed the decibel (dB) scale. The decibel is simply a unit of comparison between two sound pressures. In most cases, the reference sound pressure is the acoustical zero, or the lower limit of hearing. The decibel scale converts sound pressure levels (SPL) to a logarithmic scale, relative to 20 μPa (Figure 1).

$$\text{SPL, dB} = 10 \log_{10} (P^2/P_o^2)$$

Where P is the pressure fluctuation in Pascals,
P_o is the reference pressure; usually 20 μPa.

Thus, from this relationship, each doubling of sound pressure levels results in an increase of 6 dB. From the relationship between sound intensity and distance (Appendix E), we find also that doubling the distance between the speaker (source) and listener (receiver), drops the level of the sound by approximately 6 dB. Sound pressure levels are not directly additive, however, but must first be expressed as mean square pressures before adding (Berglund & Lindvall 1995). The equation is as follows:

$$\text{SPL} = 10 \log_{10} [10^{\text{SPL}_1/10} + 10^{\text{SPL}_2/10} + ... + 10^{\text{SPL}_x/10}]$$

For example, if two sound sources have SPLs of 80 dB and 90 dB, then the resulting sound pressure is 90.4 dB. Adding two sounds with the same SPL, for example 90 dB, increases the total SPL by 3 dB, to 93 dB.

a. Loudness Description

Sound pressure level, however, does not completely describe loudness, which is a subjective perception of sound intensity. Loudness increases with intensity, but is also dependent on frequency. Thus the human ear may not perceive a six dB increase as twice as loud. In general, people are more sensitive to sounds in the middle of the range of hearing, from around 200 Hz to 5000 Hz. Fletcher and Munson (1933) first established the 1000-Hz tone as the standard sound against which other tones would be judged for loudness. Later, Stevens (1955) proposed that the unit of loudness be termed the sone, and that one sone be ascribed to a 1000-Hz tone set at a SPL

[7]Other units used to represent an equivalent sound pressure include 0.0002 μbar, 0.0002 dyne/cm^2, and 20 μN/m^2.

of 40 dB under specified listening conditions. On the sone scale, a sound twice as loud as one sone would be two sones, four times as loud would be four sones, and so on.

Equal loudness contours, identified in units of phons, demonstrate how the SPL, in dB, of a tone must be varied to maintain the perception of constant loudness. Ideally, sound measurement meters would give a reading equal to loudness in phons, but because phons are based on human perception, and perception process will vary from individual to individual, this has not been practical until recently (Berglund & Lindvall 1995). Loudness is still measured in decibels, however, following past practices. Various filters have been devised to approximate the frequency characteristics of the human ear, by weighting sound pressure level measurements as a function of frequency. Several weighting systems have been developed, but the one in most common use is the A-weighted filter, with sound pressure levels commonly expressed as dBA. Loudness levels range from about 20 dB (24-hr average) in very quiet rural areas, to between 50 and 70 dB during the daytime in cities. Additional examples of typical loudness measures are illustrated in Figure 1.

Perceived Sound Level	Sound Level dB	Sound Level μPa	Examples	Leaf Blower Reference
PAINFULLY LOUD	160	$2x10^9$	fireworks at 3 feet	
	150		jet at takeoff	
	140	$2x10^8$	threshold of pain	OSHA limit for impulse noise
UNCOMFORTABLY LOUD	130		power drill	
	120	$2x10^7$	thunder	
	110		auto horn at 1 meter	90-105 dB leaf blower at operators ear
	100	$2x10^6$	snowmobile	
VERY LOUD	90		diesel truck, food blender	90 dB OSHA permissible exposure limit
	80	$2x10^5$	garbage disposal	
	70		vacuum cleaner	62-75 dB Leaf blower at 50 feet
MODERATELY LOUD	60	$2x10^4$	ordinary conversation	
	50		average home	
QUIET	40	$2x10^3$	library	
	30		quiet conversation	
VERY QUIET	20	$2x10^2$	soft whisper	
	10		rustling leaves	
BARELY AUDIBLE	0	$2x10^1$	threshold of hearing	dB= decibels μPa= micro Pascals

Fig. I. Comparison of sound levels in the environment

b. Sound Level Measurement

The ANSI B175 Accredited Standard Committee, a group that includes government officials, Underwriters Laboratories, leaf blower manufacturers, and trade associations, and which is accredited by the American National Standards Institute, Inc. (ANSI), developed a method for measuring the sound levels from leaf blowers (Appendix F). The purpose of the standard method is to establish sound level labeling requirements for leaf blowers applicable to noise received by bystanders. The standard also includes requirements for safety precautions to be included in manuals for use by operators. The ANSI standard specifies a test area in a field in which natural ground cover does not exceed three inches in height and which is free of any large reflecting surfaces for a minimum of 100 ft from the blower. The sound level meter must be set for slow response and the A-weighting network. Once the blower is adjusted and running properly, the receiver (microphone) is set up 50 ft from the operator and 4 ft above ground. Sound level readings are taken in a circle every 45 degrees for a total of eight readings, as either the operator rotates or the microphone is moved. The eight readings are then averaged and reported to the nearest decibel.

In wide use, the method has been criticized as sometimes generating unreproducible results. Typical comments expressed in meetings with ARB staff were to the effect that the manufacturer-reported sound levels for leaf blowers can be significantly different than those obtained by some third party testers. The standard has been revised (Dunaway 1999) and approved February 11, 2000, which may address the issue of reproducibility. Other comments about the method criticize the fundamental requirements for testing in an open field, with no reflecting surface for 100 ft, and the receiver 50 ft away, as being unrealistic and unrepresentative of real-world use on residential properties (Allen 1999a). A standardized method, however, usually does not reflect real-world conditions, but rather is useful for comparing sound levels from different blowers tested under the same conditions. The complexity and precision required by the method does appear to render it unsuitable as a field enforcement standard (Zwerling 1999).

While the ANSI method yields sound level exposures for a bystander, the noise level exposure for the operator is measured using an audiodosimeter. For occupational exposures, a dosimeter can report the noise dose as a percentage relative to the permissible exposure level of 90 dBA (8 CCR General Industry Safety Orders, Article 105, Appendix A; 29 CFR 1910.25). The eight-hour time-weighted-average sound level experienced by the worker is then calculated from the dose, using a formula specified in regulations. Additional details can be found in the OSHA and Cal/OSHA Technical Manuals.[8]

[8]OSHA's Technical Manual is available on their website (www.osha.gov) and noise measurement is in Section III, Chapter 5. Cal/OSHA's manual is available from Cal/OSHA.

3. Noise in California

a. Noise Sources

By all accounts, noise exposure is increasing both as the number of sources increases and as existing sources get noisier (Berglund & Lindvall 1995). We drive our cars more and take more airplane trips, increasing noise from what have been the two major sources of noise for at least the last two decades; sales of engine-powered lawn and garden equipment continue to increase; and movie theaters and video arcades use noise to increase excitement (Consumer Reports 1999, PPEMA 1999, U.S. EPA 1981). The major sources of noise are transportation, from road, air, and rail traffic, which impact the most people of all noise sources; industrial machinery and facilities; construction; building services and maintenance activities; domestic noise from one's neighbors; and self-inflicted noise from leisure activities, which may quality as domestic noise to one's neighbors (Berglund & Lindvall 1995).

b. Numbers of People Potentially Exposed: the Public

It is not possible to state with any certainty how many people in California are exposed to noise from leaf blowers. Indeed, the most recent nationwide estimate of the number of people exposed to noise from various sources dates from 1981. In that study, the U.S. EPA estimated that 730,000 people were exposed to noise from leaf blowers above the day-night average sound level of 45 dBA (U.S. EPA 1981). The use of leaf blowers has grown tremendously since 1980, however, and thus these numbers cannot be reliably scaled for an estimate of the number of Californians exposed to leaf blower noise today.

As California's population has grown almost 41% since 1970 (CDF 1998, CDF 1999), population density, and thus noise exposure, has increased. California classifies counties as being metropolitan or non-metropolitan, based on the Bureau of the Census categorization of standard metropolitan statistical areas as containing or being close to a large city. As of January 1, 1999, the thirty-four metropolitan counties comprise 96.7% of California's population, or about 32.67 million people. The population of Californians who live in non-metropolitan counties, while small at 3.3% of the total, or 1.11 million people, has increased faster than the population in metropolitan counties (47.1% increase versus 40.5% increase, 1970-1999) and thus even noise exposures in the lowest populated counties have likely increased over the past thirty years.

Unfortunately, without a comprehensive and current survey of noise exposures in California, it is not possible to determine, from available data, how many Californians are exposed to noise, and in particular exposed to noise from leaf blowers. The only conclusion is that the number of people affected by noise is likely increasing as population density increases even in non-metropolitan areas of the state. How many people are exposed to, and annoyed by, noise from leaf blowers is a question for future research.

c. Numbers of People Potentially Exposed: the Operator

In southern California, about 80% of lawn and landscape contracting firms use leaf blowers (Anon 1999), thus one can assume that most gardeners are exposed to the noise from leaf blowers, either as an operator or from working in close proximity to the operator. From the California database of employees covered by unemployment insurance, in the fourth quarter of 1998 there were 59,489 workers reported by 6790 firms, in the SIC Code 0782, Lawn and Garden Services (M. Rippey, pers. com). This number is assumed to be the lower bound of those exposed, as there are an unknown number of self-employed gardeners, who may not report their earnings or be covered by unemployment insurance. Future research could test the hypothesis that all lawn and garden service workers are exposed, as operators or from working in close proximity, to the noise from leaf blowers.

4. Regulating Noise

a. Federal Law

The Noise Control Act of 1972 established a statutory mandated national policy "to promote an environment for all Americans free from noise that jeopardizes their public health and welfare." The Office of Noise Abatement and Control was established within the U.S. EPA to carry out the mandates of the Noise Control Act. The Office of Noise Abatement and Control published public health and welfare criteria; sponsored an international conference; examined dose-response relationships for noise and its effects; identified safe levels of noise; promulgated noise regulations; funded research; and assisted state and local offices of noise control; until funding for the office was removed in 1981-1982 (Suter 1991; Shapiro 1991). In its almost ten years of operation, U.S. EPA produced several documents that are still relevant and were consulted from this report.

The hearing of workers is protected by regulations promulgated under the Occupational Safety and Health Act of 1970. As California employers fall under California's equivalent program, hearing protection law will be covered below under state law.

b. State Law

California enacted the Noise Control Act of 1973 to "establish a means for effective coordination of state activities in noise control and to take such action as will be necessary..." [HSC 46000(g)]; the office was established within the California Department of Health Services. One of the primary functions of the office was to provide assistance to local governmental entities that develop and implement noise abatement procedures, and several guidelines were written. Funding for the office, however, ended beginning in the 1993-1994 fiscal year; no relevant reports or guidelines were located for this report.

California's counterpart to OSHA, the Cal/OSHA, has a General Industry Safety Order [8 CCR Article 105 5095-5100] for the control of noise exposure that is very similar to the federal

OSHA regulations. When sound level exposure exceeds 85 dBA for an 8-hour time-weighted average, employers are required to provide a hearing conservation program at no cost to employees. The hearing conservation program includes audiometric testing of hearing, provision of hearing protectors, training, and record keeping. Employers are required to provide employees with hearing protection when noise exposure exceeds 90 dBA in an eight-hour work day; as noise levels increase, the allowable exposure duration also decreases. The permitted duration for an employee exposed to 103 dBA, for example, is one hour and nineteen minutes in a work day [8 CCR 5096 (a)(b)]. Employers are allowed to use personal protective equipment to reduce sound level exposures if administrative or engineering controls are not feasible or fail to reduce sound levels within permissible levels.

c. Local Ordinances

In contrast to the low level of activity on noise control at the federal and state levels, local California cities and counties have been very active in regulating and enforcing noise standards. About twenty cities have banned the use of gasoline-powered, or gasoline- and electric-powered leaf blowers, from use within their city limits (City of Palo Alto 1999a). Including the recent Los Angeles ban on use within 500 ft of residences, 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, including the cities with bans on leaf blower use (IME 1999).

The restrictions on leaf blowers fall into four basic categories, with many cities employing a combination of approaches: time of day/day of week, noise levels, specific areas, and educational (City of Palo Alto 1999a). Time of day/day of week ordinances are the most common and are used to control when leaf blowers can be operated. Typically, hours of use are restricted to times between 7:00 a.m. and 7:00 p.m., and days of use are either Monday through Friday or Monday through Saturday, and sometimes including Sunday, with shorter hours on the weekend, based on the assumption that leaf blower noise is most offensive during the evening and night time hours, and on the weekend. There may be exceptions for homeowners doing their own yard work and for work in commercial areas. Time of day/day of week ordinances are relatively easy to enforce. A problem with these ordinances, however, is that they ignore the needs for quiet during the day of babies, young children, and their caretakers; day-sleepers; the ill; the retired; and a growing population of those who work in a home office.

Some cities regulate leaf blower use based on noise levels recorded at a specified distance from the operator. Palos Verdes Estates and Davis, for example, set the noise level at 70 dBA at 50 ft, and Newport Beach and San Diego have a 65 dBA at 50 ft restriction. Davis allows single-family homeowners to avoid the restriction if the leaf blower is operated for less than ten minutes. Palos Verdes Estates requires blowers to be tested and certified by the city. Otherwise, a noise level restriction is very difficult to enforce as the enforcement officer must be trained in the use of sound level meters, carry the meter, and record the sound level before the operator turns off the

leaf blower or moves on. These rules target the control of noise from blowers, and could protect those who are home during the day, if they could be effectively enforced.

Recognizing that leaf blowers are often perceived as most offensive when used in residential areas, many cities stipulate usage restrictions only in residential areas, or within a certain distance of residential areas. The residential use distance restrictions prohibiting the use of leaf blowers range from 100 ft, in Foster City, to 500 ft, in Los Angeles. This type of ordinance protects those who are at home and in need of quiet during the day, but does not address issues of those who work and recreate in commercial or other non-residential areas.

Cities sometimes couple area restrictions with user guidelines, such as prohibitions on blowing debris onto adjacent properties, and require operators be educated on the proper use of leaf blowers so as to minimize noise levels and environmental issues. These educational approaches are generally not oriented towards enforcement, but seek to change operator behavior. Educational approaches are often endorsed by landscapers and manufacturers, who believe that much of the discord over leaf blower usage originates with the few gardeners who use them incorrectly or inconsiderately. For example, an organization calling itself LINK, or Landscapers Involved With Neighborhoods and Kids, promotes educating operators to use their leaf blowers at half-throttle within 150 ft of homes (LINK 1999).

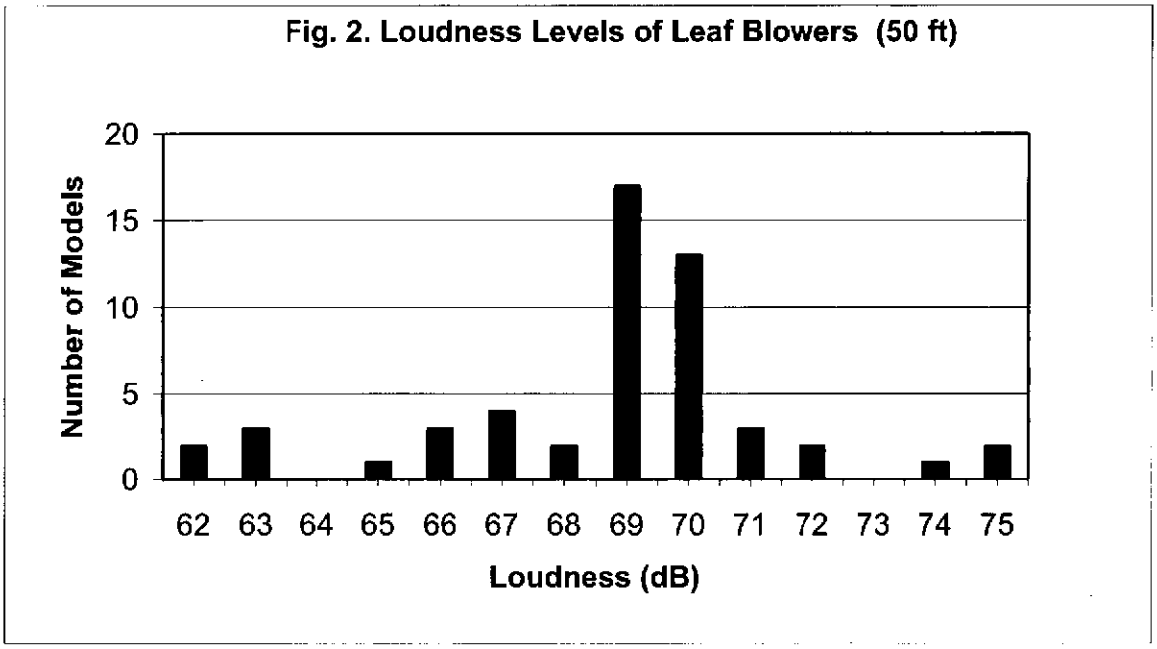
5. Noise From Leaf Blowers

In a survey of Southern Californian gardeners by a consumer products manufacturer (Anon 1999), the top two ranked attributes of a desirable leaf blower were, in order, "powerful" and "quiet." Important features were identified as "backpack mounted," "noise below legal limits," and "variable speed." When asked what they dislike about their leaf blowers, the most commonly cited problem was "noise." Taken together, these answers suggest that loud noise from leaf blowers is not only an issue for the public, but is also a major issue of concern for the gardeners who use them, at least in Southern California. On the other hand, a major manufacturer has indicated that low noise does not even show up in their survey of desirable leaf blower features (Will 1999b), so perhaps low noise is only a concern of California gardeners.

a. Bystander noise exposure

Manufacturer-reported noise levels from leaf blowers are summarized in Appendix G; all reported noise levels are assumed to represent bystander exposure, with the receiver 50 ft from the blower, unless otherwise noted. The reported levels are based on statements in promotional literature or personal communications with manufacturers; some manufacturers did not report the sound levels of most of their models in materials available to the ARB. For backpack and hand held blowers, sound levels range from 62 dBA to 75 dBA, with more than half registering between 69 and 70 dBA (Figure 2). Bearing in mind the logarithmic decibel scale, the difference in a leaf blower at 62 dBA and one at 75 dBA, a 13 dBA range, represents more than a quadrupling of the sound pressure level, and would be perceived by a listener as two to three

times as loud. The rule of thumb is that when a sound level increases by ten dB, the subjective perception is that loudness has doubled (MPCA 1987).



There are presently two gasoline-powered backpack and three hand held electric leaf blowers that are reported by their manufacturers to be very quiet. Maruyama and Toro have the two quietest backpack blowers, and Poulan/Weedeater, Stihl, and Toro have produced the quietest hand held blowers. Echo, Inc., which sells slightly under one-third of the total number of backpack blowers, has a model rated at 65 dB, the PB-46LN. In 1996, the most popular Echo backpack leaf blower, based on sales, was the Echo PB-400E, which is also one of the noisiest at 74 dBA. By 1999, however, the quieter PB-46LN had surpassed the PB-400E in sales (Will, L., pers. com.).

b. Operator Noise Exposure

Data on noise levels at the leaf blower operator' s ear are limited. The League for the Hard of Hearing (1999) publishes a fact sheet in which the noise level of a leaf blower is listed as 110 dBA. Clark (1991) reported that one model by Weedeater emitted a maximum level of 110-112 dBA and an equivalent A-weighted sound level (L_{eq}) of 103.6 dBA. This leaf blower model, however, is no longer available and these data may not be comparable to today's leaf blowers. Other than Clark's report, no other published report could be located, but unpublished data were found.

Schulze and Lucchesi (1997), in an unpublished conference presentation, reported the range and average sound pressure level from four leaf blowers. The four leaf blowers were

unidentified models from Craftsman, Weedeater, and Shop Vac.[9] The authors reported that 3 ft from the leaf blower the sound pressure levels ranged from 80 to 96 dBA, with an average value of 88 dBA, and concluded that leaf blower noise did not violate the OSHA permissible noise exposure limit. Sound pressure levels, however, were not measured at the operator's ear, and thus usefulness of the data is limited. In addition, whether or not the OSHA noise exposure limits are violated depends on the amount of time the listener is exposed, as the action level is an eight-hour time-weighted average. At least one of the leaf blowers had an SPL above the Permissible Exposure Limit of 90; at 96 dBA, the operator would be restricted to a 3 hr, 29 minute daily exposure without hearing protection.

The Portable Power Equipment Manufacturers Association (Hall 1999) conveyed limited, blinded data to the ARB on operator exposures. With no information as to data collection methods (some pages were marked "ISO 7182"), manufacturers, models, or maximum and minimum sound levels, these data are of limited quality. Reported operator sound levels, some of which were identified as "full open throttle" or "full load," ranged from 91.5 dBA to 106 dBA.

A consultant with James, Anderson & Associates, Inc. (Hager 1999), provided ARB with data collected as a part of comprehensive noise exposure studies by the firm (Table 7). As with the PPEMA data, ARB was not given the make or models of leaf blowers tested. Sound levels were recorded in the hearing zone of groundskeepers while they were operating leaf blowers, along with the amount of time the groundskeeper operated the leaf blower in an 8-hr day. Sound levels were measured in dBA per federal OSHA requirements. As shown, duration of use ranged from 15 minutes to 7.6 hours (average 2.1 hr) during the day. Operator exposure ranged from 88.6 to 101.3 dBA. In this data set, only one of the six individuals monitored would have exceeded the protective levels, based on leaf blower use for 7.6 hrs.

[9]ARB was not able to obtain the specific models tested or actual SPLs for each model leaf blower.

Table 7. Leaf Blower Operator Noise Exposures and Duration of Use (Hagar 1999)

Average SPL, dBA	Minimum SPL, dBA	Maximum SPL, dBA	Duration of Leaf Blower use (hr)
99.5	96.4	101.3	0.75
92.0	N/R	N/R	1.0
101.2	N/R	101.9	2.3
101.3	98.3	105.7	7.6
95.9	92.0	97.0	0.25
88.6	85.0	90.4	0.5

N/R = not reported

Eric Zwerling of the Rutgers Noise Technical Assistance Center, along with Les Blomberg, Executive Director of the Noise Pollution Clearinghouse, recently conducted studies of operator exposure and the sound quality of leaf blowers (Zwerling 1999). While the data are still being analyzed, preliminary results were made available to the ARB. Three backpack and one handheld leaf blowers were tested using ANSI B175.2-1996 test method for the bystander exposure and using personal dosimetry for operator exposures (Table 8). All equipment used for tests was certified and calibrated. Zwerling and Blomberg used a 3 dB exchange rate for the operator dosimetry, as recommended by NIOSH, but noted that the data can be reasonably compared to data derived with the OSHA mandated 5 dB exchange rate because of the steady sound emissions of the leaf blowers. Because of this, the OSHA permissible exposure durations, which are based on the 5 dB exchange rate, are noted in Table 8. The difference is most important for the worker, who is allowed, for example, a 1 hr exposure (unprotected) at 105 dB by OSHA, but only 4 min, 43 sec exposure (unprotected) under the more conservative NIOSH-recommended 3 dB exchange rate.

Table 8. Sound Levels of Some Leaf Blowers, E. Zwerling & L. Blomberg

Make/Model	Type	Condition	Bystander Exposure, dB	Operator Exposure,* Leq	OSHA Permissible Exposure Duration (approx)
Stihl BR 400	Backpack	New	73.89	105.7, 105.8, 105.5	52 min
Stihl BR 400	Backpack	Used	74.5, 74.63	103.3, 102.9	1 hr, 19 min
Kioritz DM9	Backpack	Used	76.0	102.0	1 hr, 31 min
Stihl BR 75	Handheld	New	68.4	98.4, 97.9	2 hr, 38 min

*Samples ranged from 5-10 minutes; each reported value is a distinct sample. The microphone was attached to the cap above the operator's ear.

Finally, the Echo *Power Blower Operator's Manual* advises operators to wear hearing protection whenever the unit is used. The user is instructed that "OSHA requires the use of hearing protection if this unit is used 2 hours per day or more." This statement indicates that the operator may be exposed to an SPL of 100 dBA or more during use.

6. Use of Hearing Protectors and Other Personal Protection Gear

When this study was initiated, there were no studies found that documented the incidence of personal protective equipment usage among operators of leaf blowers. Hearing protectors are widely available, and some manufacturers provide an inexpensive foam ear plug set with the purchase. More expensive custom molded ear plugs and ear muffs provide better protection than the moldable foam ear plugs, but again no data were available on usage. Two studies did examine the incidence of usage of hearing protection in other industries. In one study of 524 industrial workers, although 80.5% were provided with hearing protection devices, only 5.1% wore them regularly (Maisarah & Said 1993). In another study of metal assembly workers who worked in a plant where the average noise level was 89 dBA, only 39% of the men reported wearing hearing protection always or almost always (Talbott et al. 1990).

By the end of September 1999, however, three studies were delivered to the ARB that included information on the use of hearing protection by leaf blower operators. Two of the studies consisted of direct observations of operators; the third was a survey that asked people who hire gardeners to recall the use of personal protection gear by their gardeners. Following are summaries of each of the studies.

a. Zero Air Pollution Study (1999)

The goal of this study was to "observe 100 yard maintenance workers to determine the percentage of workers who followed the safety instruction while operating gas powered leaf blowers." Workers were observed from August to October, 1997 in the western portions of the City of Los Angeles, including the San Fernando Valley. Of 100 leaf blower operators observed, none wore hearing protection, one (1%) wore breathing protection (dust mask), and 22 (22%) wore eye protection of some kind. Of the workers observed, 27 (27%) were interviewed; seven of those claimed hearing impairment as a result of using leaf blowers and two claimed to have breathing problems which they attributed to using leaf blowers. Ten of those interviewed (37%) said they were aware of manufacturers' safety instruction but did not feel it was necessary to follow the instructions. The remaining 17 (63%) were unaware of manufacturers' safety instructions.

b. Citizens for a Quieter Sacramento Study (1999b)

The goal of this study, as for the Zero Air Pollution study, was to determine the percentage of leaf blower operators who wear personal protective equipment when using blowers. A total of 64 observations were made during August and September 1999; 12 in Sacramento, 47 in the Los Angeles area, and 5 in other cities. Most (88%) of the observations were of blowers being used on residential properties. Of the 64 observations, there were four (6%) individuals observed wearing hearing protection, 41 (64%) were not wearing hearing protection, and in the remaining cases the observer could not tell whether or not hearing protection was used. Eye protection use was lower, only 3 (5%) operators were wearing glasses, but breathing protection incidence was higher, seven (11%) wore dusk masks. Observations were also made of the incidence of personal protection of other workers, when the crew was larger than one person. Of the 38 observations of other workers, two (5%) were using hearing protection, two (5%) were using eye protection, and two (5%) wore dusk masks.

c. Survey99 Report (Wolfberg 1999)

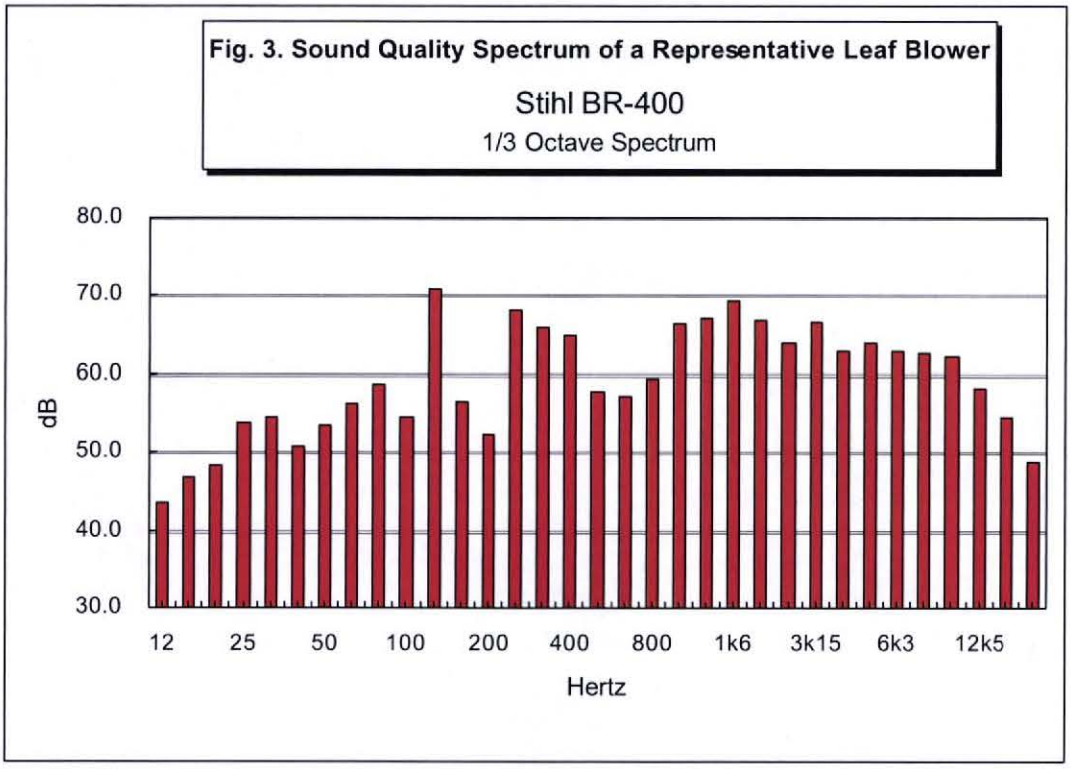
The third study provided to the ARB was authored by Mrs. Diane Wolfberg, Chair of the Zero Air Pollution Education Committee and Mr. George Wolfberg. Although the authors are members of Zero Air Pollution, the study was distinct from the 1997 study summarized above. The goal of this study was to determine "opinions and perceptions of California residents regarding the use of leaf blowers . . . for residential landscape maintenance." Mainly residents of Los Angeles were surveyed. Survey takers asked residents a variety of questions related to the use of leaf blowers on residential properties; in addition, respondents were asked about the incidence of personal protective equipment use by leaf blower operators. Because the data are based on recall rather than direct observations, their usefulness is limited. Data are summarized here, nevertheless, for completeness.

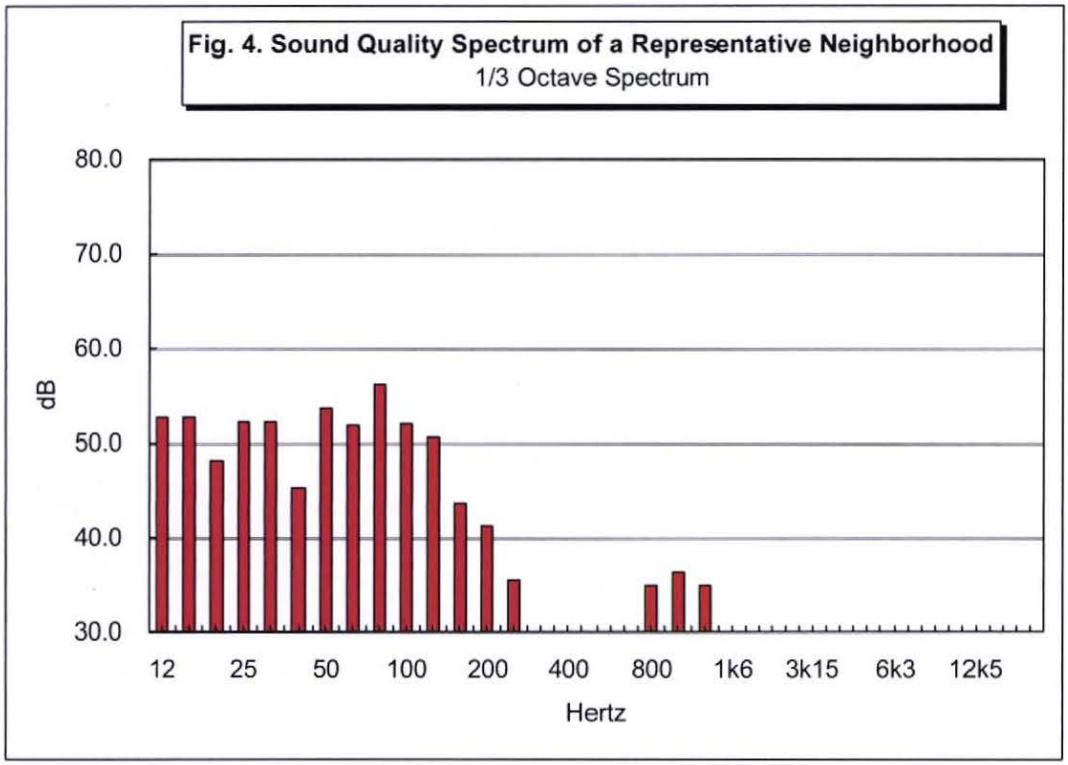
Of respondents who have had leaf blowers used on their properties in the previous 12 months, 53% reported that leaf blower operators never use a face mask, 62% never use eye

protection, and 69% never wear hearing protection. On the positive side, however, respondents reported that 13% of operators always wear a face mask, 19% always wear eye protection, and 9% always wear hearing protection. These percentages are much higher than found in the two direct observation studies.

7. Sound Quality

As discussed earlier, the perceived loudness of noise is dependent on both sound pressure level and frequency, which is termed the sound quality. One study examined sound quality from leaf blowers (Zwerling 1999). While this study is unpublished and data are still being analyzed, the authors have made data and preliminary findings available to the ARB. Figures 3 and 4 illustrate sample sound spectra from a leaf blower and ambient sound, respectively. As shown in Figure 3, the sound spectrum of the gasoline-powered leaf blower contains a significant amount of high intensity and high frequency emissions. In a quiet residential neighborhood (Figure 4), there are few or no natural sources of sound at these high frequencies. Therefore, the sound emissions of gasoline-powered leaf blowers are not only more intense than the ambient sound levels, their spectra are noticeably different than the spectrum for ambient sounds. The high frequency emissions are, therefore, not masked by other sounds and are more noticeable, perhaps accounting for the high level of annoyance reported by bystanders. These data and their implications for annoyance should be confirmed by further study.





8. Summary

Noise is the general term for any loud, unmusical, disagreeable, or unwanted sound, which has the potential of causing hearing loss and other adverse health impacts. While millions of Californians are likely exposed to noise from leaf blowers as bystanders, given the ubiquity of their use and the increasing density of California cities and towns, there is presently no way of knowing for certain how many are actually exposed, because of the lack of studies. In contrast, it is likely that at least 60,000 lawn and garden workers are daily exposed to the noise from leaf blowers. Many gardeners and landscapers in southern California are aware that noise is an issue and apparently would prefer quieter leaf blowers. Purchases of quieter leaf blowers, based on manufacturer data, are increasing. While little data exist on the noise dose received on an 8-hr time-weighted-average by operators of leaf blowers, data indicate that some operators may be exposed above the OSHA permissible exposure limit. It is unlikely that more than 10% of leaf blower operators, and probably a much lower percentage, regularly wear hearing protective gear, thus exposing them to an increased risk of hearing loss. The sound quality of gasoline-powered leaf blowers may account for the high level of annoyance reported by bystanders.

III. REVIEW OF HEALTH EFFECTS

Leaf blower noise, exhaust and fugitive dust emissions, as discussed in previous sections of this report, are health concerns. The goal of this section is to present information on health effects of identified hazards from leaf blowers; this section does not present exposure information or data tying identified hazards to specific health effects in leaf blower operators or bystanders. The following discussion addresses the health effects of particulate matter, carbon monoxide, unburned fuel, and noise. Particulate matter, carbon monoxide, and unburned fuel are components of exhaust emissions; particulate matter is also the major constituent of fugitive dust. Ozone is a pollutant that is formed in the atmosphere through chemical reactions of hydrocarbons (unburned fuel) and nitrogen oxides in the presence of ultraviolet light. Although not directly emitted, ozone is a pollutant of concern because leaf blowers emit hydrocarbons, which react to form ozone. The health effects of nitrogen oxides are not discussed as these emissions from leaf blowers are relatively low, and any health effects would be negligible.

National Ambient Air Quality Standards have been set by the federal government to protect public health and welfare. In addition, California has State ambient air quality standards. These standards include a margin of safety to protect the population from adverse effects of chronic pollutant exposure. The National Ambient Air Quality Standards and California standards are intended to protect certain sensitive and probable risk groups of the general population (Appendix C).

A. Particulate Matter

Fugitive dust is not a single pollutant, but rather is a mixture of many subclasses of pollutants, collectively termed particulate matter (PM), each containing many different chemical species (U.S. EPA 1996). Particles of 10 μm and smaller are inhalable and able to deposit and remain on airway surfaces. The smaller particles (2.5 μm or less) are able to penetrate deep into the lungs and move into intercellular spaces. The respirable particles owe their negative health impacts, in part, to their long residence time in the lung, which allows chemicals time to interact with body tissues. ARB staff could not locate data on the specific chemical and physical make-up of leaf blower dust, although some data are available on paved road dust, thus only generic effects from the respirable fraction (particles 10 μm and smaller) are addressed.

Many epidemiological studies have shown statistically significant associations of ambient PM levels with a variety of negative human health endpoints, including mortality, hospital admissions, respiratory symptoms and illness measured in community surveys, and changes in pulmonary mechanical function. Associations of both short-term, usually days, and long-term, usually years, PM exposure with most of these endpoints have been consistently observed. Thus, the public health community has a great deal of confidence that PM is significantly associated with negative health outcomes, based on the findings of many studies.

There remains uncertainty, however, regarding the magnitude and variability of risk estimates for PM. Additional areas of uncertainty include the ability to attribute observed health effects to specific PM constituents, the time intervals over which PM health effects are manifested, the extent to which findings in one location can be generalized to other locations, and the nature and magnitude of the overall public health risk imposed by ambient PM exposure. While the existing epidemiology data provide support for the associations mentioned above, understanding of underlying biologic mechanisms is incomplete (U.S. EPA 1996).

B. Carbon Monoxide

A component of exhaust, carbon monoxide (CO) is a colorless, tasteless, odorless, and nonirritating gas that is a product of incomplete combustion of carbon-containing fuels. With exposure to CO, subtle health effects can begin to occur, and exposure to very high levels can result in death. The public health significance of CO in the air largely results from CO being absorbed readily from the lungs into the bloodstream, forming a slowly reversible complex with hemoglobin, known as carboxyhemoglobin. The presence of significant levels of carboxyhemoglobin in the blood reduces availability of oxygen to body tissues (U.S. EPA 1999b).

Symptoms of acute CO poisoning cover a wide range depending on severity of exposure, from headache, dizziness, weakness, and nausea, to vomiting, disorientation, confusion, collapse, coma, and at very high concentrations, death. At lower doses, central nervous system effects, such as decreases in hand-eye coordination and in attention or vigilance in healthy individuals, have been noted (Horvath et al. 1971, Fodor and Winneki 1972, Putz et al. 1976, 1979, as cited in U.S. EPA 1999b). These neurological effects can develop up to three weeks after exposure and can be especially serious in children.

National Ambient Air Quality Standards have been set to protect public health and welfare and are intended to protect certain sensitive and probable risk groups of the general population. The sensitive and probable risk groups for CO include anemics, the elderly, pregnant women, fetuses, young infants, and those suffering from certain blood, cardiovascular, or respiratory diseases. People currently thought to be at greatest risk from exposure to ambient CO levels are those with ischemic heart disease who have stable exercise-induced angina pectoris (cardiac chest pain) (ARB 1992, U.S. EPA 1999b). In one study, high short-term exposures to CO were found in people operating small gas-powered garden equipment (ARB 1992).

C. Unburned Fuel

Some toxic compounds are present in gasoline and are emitted to the air when gasoline evaporates or passes through the engine as unburned fuel (ARB 1997). Benzene, for example, is a component of gasoline. Benzene is a human carcinogen and central nervous system depressant. The major sources of benzene emissions in the atmosphere are from both unburned and burned gasoline. The amount of benzene in gasoline has been reduced in recent years through the

mandated use of California Reformulated Gasoline (ARB undated fact sheet[10]). Other toxic compounds that are emitted from vehicle exhaust include formaldehyde, acetaldehyde, and 1,3-butadiene. Acetaldehyde is a probable human carcinogen (Group B2) and acute exposures lead to eye, skin, and respiratory tract irritation. 1,3-Butadiene is classified as a probable human carcinogen, is mildly irritating to the eyes and mucous membranes, and can cause neurological effects at very high levels. Formaldehyde is highly irritating to the eyes and respiratory tract and can induce or exacerbate asthma. It is classified as a probable human carcinogen (Group B1).

D. Ozone

Ozone is a colorless, odorless gas and is the chief component of urban smog. It is by far the state's most persistent and widespread air quality problem. Ozone is formed from the chemical reactions of hydrocarbons and nitrogen dioxide in the presence of sunlight. Leaf blowers emit substantial quantities of hydrocarbons, primarily from unburned fuel, which can react to form ozone. Ozone is a strong irritant and short-term exposures over an hour or two can cause constriction of the airways, coughing, sore throat, and shortness of breath. Ozone exposure may aggravate or worsen existing respiratory diseases, such as emphysema, bronchitis, and asthma. Chronic exposure to ozone can damage deep portions of the lung even after symptoms, such as coughing, disappear. Over time, permanent damage can occur in the lung, leading to reduced lung capacity.

E. Noise

The literature on health effects of noise is extensive. Exposure of adults to excessive noise results in noise-induced hearing loss that shows a dose-response relationship between its incidence, the intensity of exposure, and duration of exposure. Noise-induced stimulation of the autonomic nervous system reportedly results in high blood pressure and cardiovascular disease (AAP 1997). In addition there are psychological effects. The following subsections will first discuss noise-induced hearing loss and physiological stress-related effects. Adverse impacts on sleep and communication, effects of performance and behavior, annoyance, and effects on wildlife and farm animals are also described. These are not perfect divisions between discreet affects: nighttime noises can cause sleep-deprivation, for example, which can lead to stress, elevated blood pressure, and behavioral changes, especially if the effect is repeated and uncontrollable. But first, before discussing effects, the reader should have an understanding of how the ear functions.

[10]http://arbis.arb.ca.gov/cbg/pub/cbgbkgr1.htm

1. Hearing and the Ear

A detailed discussion of the ear's anatomy and the mechanism by which we hear is beyond the scope of this report, but a basic level of understanding is necessary so that later discussions of damage to hearing will be better understood. For further information, the reader is referred to any basic acoustics or biology text.

The ears are paired sensory organs that serve two functions, to detect sound and to maintain equilibrium; only sound detection will be addressed in this report. The ears are composed of the external ear, middle ear, and the inner ear. With the assistance of the external ear in collecting and focusing sound, vibrations are transmitted to the middle ear via the ear canal and the eardrum. The vibrations of the eardrum are transmitted by the bones of the middle ear to the fluid-filled sensory organ of the inner ear, the cochlea. As the fluid of the inner ear vibrates, the hair cells located in the cochlea bend, stimulating sensory receptors, and leading to nerve impulses being transmitted to the brain via the auditory nerve. The greater the hair cell displacement, the more sensory receptors and neurons are stimulated, resulting in the perception of an increase in sound intensity.

Hearing loss can result from damage or growths in any portion of the ear and the part of the brain that processes the nerve impulses. Damage to the outer and middle ear result in conductive hearing loss, in which case the vibrations can still be perceived and processed if they can be transmitted by another means to the inner ear. Damage to the inner ear and auditory nerve result in sensorineural hearing loss. Sensorineural hearing loss can be temporary, if the body's mechanisms can repair the damage, but cumulative inner ear damage will result in permanent hearing loss. Aging, diseases, certain medications, and noise cause the majority of sensorineural hearing loss, which is not reversible by surgery or medication, and is only partially restored by hearing aids.

2. Noise-Induced Hearing Loss

Roughly 25% of all Americans aged 65 and older suffer from hearing loss. Contrary to common belief, hearing loss is not part of the natural aging process, but is caused by preventable, noise-induced wear and tear on the auditory system (Clark & Bohne 1999). Noise-induced hearing loss develops gradually over years and results from damage to the inner ear. Sensory cells within the cochlea are killed by exposure to excessive noise. These cells do not regenerate but are replaced with scar tissue. After weeks to years of excessive noise, the damage progresses to the point where hearing loss occurs in the high-frequency range and is detectable audiometrically; speech comprehension is not usually affected and so at this level hearing loss is goes unnoticed by the individual. Eventually, with continued exposure, the hearing loss spreads to the lower pitches necessary to understand speech. At this point, the impairment has proceeded to the level of a handicap and is quite noticeable. The damage is not reversible and is only poorly compensated for by hearing aids.

There is considerable variability among individuals in susceptibility to hearing loss. Based on major field studies conducted in the late 1960s and early 1970s, the U.S. EPA suggested that a 24-hour equivalent sound level of 70 dBA would protect 96% of the population, with a slight margin of safety, from a hearing loss of less than five dBA at 4000 Hz (U.S. EPA 1974). This 24-hour, year-round equivalent sound level is based on a forty-year work-place noise level exposure (250 working days per year) of 73 dBA for eight hours and 60 dBA for the remaining 16 hours.

The National Institute for Occupational Safety and Health reviewed the recommended occupational noise standard recently (NIOSH 1996) and reaffirmed its recommended exposure limit of 85 dBA for occupational noise exposure. The report concluded that the excess risk of developing occupational noise-induced hearing loss for a 40-hr lifetime exposure at 85 dBA is 8%. In comparison, the OSHA regulation [29 CFR 1910.95] allowing a 90 dBA permissible exposure limit results in a 25% excess risk of developing hearing loss. The OSHA regulation, however, has not been changed to reflect the recommendation of the National Institute for Occupational Safety and Health.

NIOSH also recommended changing the exchange rate, which is the increment of decibels that requires the halving or doubling of exposure time, from the OSHA mandated 5 dBA to 3 dBA. This would mean that if the worker was permitted to be exposed to 85 dBA unprotected for 8 hr, then a noise exposure level of 88 dBA would be limited to 4 hr per day. The 3-dBA exchange rate is supported by acoustics theory, and by national and international consensus. OSHA, however, continues to mandate a 5 dBA exchange rate in its regulations. In addition, the American Academy of Pediatrics (1997) has asked the National Institute of Occupational Safety and Health to conduct research on exposure of the fetus to noise during pregnancy and recommends that the OSHA consider effects on the fetus when setting occupational noise standards.

3. Non-Auditory Physiological Response

In addition to hearing loss, other physiologic and psychological responses resulting from noise have been noted and are termed non-auditory effects. Noise is assumed to act as a non-specific biological stressor, eliciting a "fight or flight" response that prepares the body for action (Suter 1991). Research has focused on effects of noise on blood pressure and changes in blood chemistry indicative of stress. Despite decades of research, however, the data on effects are inconclusive. While many studies have shown a positive correlation between hearing loss, as a surrogate for noise exposure, and high blood pressure, others have shown no correlation (Suter 1991; Kryter 1994). The National Institutes of Occupational Safety and Health (1996) has called for further research to define a dose-response relationship between noise and non-auditory effects, such as hypertension and psychological stress.

4. Interference with Communication

The inability to communicate can degrade the quality of living directly, by disturbing social and work-related activities, and indirectly, by causing annoyance and stress. The U.S. EPA (1974), in developing its environmental noise levels, determined that prolonged interference with speech was inconsistent with public health and welfare. Noise that interferes with speech can cause effects ranging from slight irritation to a serious safety hazard (Suter 1991), and has been shown to reduce academic performance in children in noisy schools, as reviewed by Kryter (1994). The U.S. EPA, therefore, developed recommended noise levels that are aimed at preventing interference with speech and reduced academic performance. An outdoor yearly average day-night sound level of 55 dBA permits adequate speech communication at about 9-10 ft, and also assures that outdoor noise levels will not cause indoor levels to exceed the recommended level of 45 dBA.

5. Interference with Sleep

It is common experience that sound rouses sleepers. Noise that occurs when one is trying to sleep not only results in repeated awakenings and an inadequate amount of sleep, but is also annoying and can increase stress. Noise that is below the level that awakens, however, also changes the sleep cycle, reduces the amount of "rapid eye movement" sleep, increases body movements, causes cardiovascular responses, and can cause mood changes and performance decreases the next day (Suter 1991). The U.S. EPA recommended an indoor average yearly day-night level of 45 dBA, which translates into a night time average sound level of 35 dBA, to protect most people from sleep disturbance.

An average sound level, however, does not adequately account for peak sound events that can awaken and disturb sleep. Continuous noise has a significantly smaller sleep disturbance effect than intermittent noise. Research has found that subjects in sleep laboratory experiments will gradually reduce the number of awakenings throughout the night in response to noise, but other physiological changes, including a momentary increase in heart rate, indicative of arousal do not change. The question is whether physiological arousal, short of awakening, has a negative health effect. While study results are inconclusive on this issue, it is clear that noise above a certain level, about 55 dBA L_{eq} according to Kryter (1994), will awaken people, even after long periods of repeated exposures. Repeated awakenings reduce feelings of restedness and cause feelings of annoyance, leading to stress responses and associated health disorders.

6. Effects on Performance and Behavior

The working hypothesis in this area has been that noise can cause adverse effects on task performance and behavior at work, in both occupational and non-occupational settings. Results of studies, however, have not always been as predicted. Sometimes noise actually improves performance, and sometimes there are no measurable differences in performance between noisy and quiet conditions (Suter 1991). Kryter (1994) concluded that masking by noise of other

auditory signals is the only inherent auditory variable responsible for observed effects of noise on mental and psychomotor tasks.

The effect of noise on "helping behavior" in the presence and absence of noise is more clear. Mathews and Canon (1975) tested the hypothesis that high noise levels may lead to inattention to the social cues that structure and guide interpersonal behavior. In a laboratory study in which subjects did not know they were being studied, they found that fewer persons were willing to help someone who had "accidentally" dropped materials when background noise levels were 85 dB than when they were 65 dB or 48 dB. In a subsequent field study, similar results were demonstrated with background noise from a lawn mower. Initially, subjects were tested as to their willingness to help a man who had dropped books and papers while walking from his car to a house; in this test, helping behavior was low both in ambient (50 dB) and high (87 dB) noise conditions. When the test was repeated with a cast on the arm of the man who dropped the books, helping behavior was high under ambient noise (80%) and low under high noise (15%) conditions. These and other studies lead to the conclusion (Suter 1991) that even moderate noise levels can increase anxiety, decrease the incidence of helping behavior, and increase the likelihood of hostile behavior.

7. Annoyance and Community Response

Annoyance is a response to noise that has been extensively studied for years. Various U.S. government agencies began investigating the relationships between aircraft noise and its effect on people in the early 1950's. Annoyance is measured as an individual response to survey questions on various environmental factors, including as noise (Suter 1991). The consequences of noise-induced annoyance are privately held dissatisfaction, publicly expressed complaints, and possibly adverse health effects. Fidell et al. (1991) reviewed and synthesized the relationship between transportation noise and the prevalence of annoyance in communities based on over 30 studies. The relationship is an exponentially increasing function, with less than 10% of respondents reporting themselves to be highly annoyed at noises under an average day-night sound level of 56 dB. Fifty percent responded they were highly annoyed at sound levels approaching 79 dB, and nearly every person was highly annoyed at sound levels above 90 dB.

Suter (1991) concluded that throughout decades of study, community annoyance has been positively correlated with noise exposure level, and that although variables such as ambient noise level, time of day, time of year, location, and socioeconomic status are important, the most important variable is the attitude of the affected residents. Kryter (1994) further elaborates that interference by noise, and the associated annoyance, depends on the activity of an individual when the noise event occurs, and the intensity and duration of the noise. People have different beliefs about noise, which are also important. Those most annoyed share similar beliefs that the noise may be dangerous, is probably preventable, are aware that non-auditory effects are associated with the noise source, state they are sensitive to noise, and believe that the economic benefit represented by the source is not important for the community (Fields 1990).

8. Effects of Noise on Animals

Kryter (1994) reviewed studies on the effects of noise both on wildlife and farm animals. None of these studies examine noise-induced hearing loss, but rather looked at effects of noise on litter size, prevalence of wildlife, and milk production. Most of the studies were conducted to examine the effects of airport noise, including noise from landings and takeoffs and sonic booms near commercial and military airports, and noise from construction activities during laying of pipelines across wilderness areas. Negative impacts on wildlife and farm animals, due to noise, were not supported by the studies. In the airport studies, the absence of human activities in the areas surrounding the high noise exposure zones appeared to be more important than noise, resulting in abundant wildlife. Farm animals exposed to frequent sonic booms showed little or no negative effects, again using such criteria as reproduction, milk production, and growth rate. No study, however, has examined the effects of leaf blower noise on animals.

IV. POTENTIAL HEALTH AND ENVIRONMENTAL IMPACTS OF LEAF BLOWERS

This section of the report synthesizes the information presented in the two previous sections, hazard identification and health effects, and characterizes the potential health impacts of leaf blowers on operators and bystanders. As discussed previously, there are no studies of the health impacts of leaf blowers, and essential information is missing that prevents ARB from preparing a quantitative risk characterization. There is, for example, no information on the quantitative relationship between exposure to hazards from leaf blowers and adverse effects. The size of the exposed population and the magnitude and duration of exposures are also unknown. The goal of this section, then, is to point the discussion in directions dictated by the findings of the two previous sections, and to raise questions about the nature of health impacts that may be experienced by those exposed to the exhaust emissions, fugitive dust, and noise from leaf blowers in both occupational and non-occupational settings.

Leaf-blower operators and bystanders have two different types of exposures to exhaust and fugitive dust emissions: exposures that occur on a regional basis and exposures that occur when one is within a short distance of the leaf blower. Regional exposures are those exposures to air pollution that occur as a result of leaf blowers contributing to the basin-wide inventory of ozone, carbon monoxide, particulates, and toxic air pollutants. While leaf blowers contribute a small percentage to the basin-wide air pollution, they are nonetheless a source of air pollution that can be, and is, controlled through exhaust emission standards.

The second type of exposure is of greater concern. Lawn and landscape contractors, homeowners using a leaf blower, and those in the immediate vicinity of a leaf blower during and shortly after operation, are exposed to potentially high exhaust, fugitive dust, and noise emissions from leaf blowers on a routine basis. While ARB staff have not located conclusive data on how often, how long, and at what concentrations exposures occur, the ARB off-road model assumes that each commercial leaf blower is used for 275 hr/yr, and each residential leaf blower is used for 10 hr/yr. These figures do not tell us, however, how long each leaf blower operator is exposed.

Because of the highly speculative nature of the data on operator and bystander exposure time, staff have been unable to develop estimates of the quantities of chemicals individuals could be exposed to per amount of time. Instead, impacts are presented somewhat qualitatively, with recommendations for appropriate personal protection or controls from hazards that staff have found to be significant.

A. The Leaf Blower Operator

In this section, data are presented that apply to the commercial leaf blower operator, a person who regularly uses the leaf blower in the course of a landscaping or gardening job. Staff assume that a commercial leaf blower operator will use equipment with a higher horsepower than a residential, or homeowner, operator.

1. Exhaust Emissions

The typical leaf blower owned and operated by commercial lawn and landscape contractors, with an average horsepower of three and a load factor of 50% based on the ARB off-road emissions model, produces the estimated average emissions for a one hour usage as shown in Table 9. Actual operator usage apparently ranges from 15 minutes to a full work day (Table 7). To illustrate the magnitude of potential exhaust and fugitive dust emissions, staff have compared the estimated leaf blower emissions to the emissions from one hour of operation of two different types of light duty vehicles, one new and one old. A comparison of emissions from leaf blowers to vehicle engines is relevant to provide some sense of the relative quantities of pollutants.

Table 9. Commercial Leaf Blower Emissions Compared to Light Duty Vehicle Emissions 3 hp average, 50% load factor, 1999 emissions data

	Exhaust Emissions, g/hr	Exhaust Emissions, new light duty vehicle,* g/hr	Exhaust Emissions, older light duty vehicle,** g/hr
Hydrocarbons	199.26	0.39	201.9
Carbon Monoxide	423.53	15.97	1310
Particulate Matter	6.43	0.13	0.78
Fugitive Dust	48.6-1031	N/A	N/A

*New light duty vehicle represents vehicles one year old, 1999 or 2000 model year, driven for one hour at 30 mph.
**Older light duty vehicle represents vehicles 1975 model year and older, pre-catalytic vehicle, driven for one hour at 30 mph.

For CO (Table 9), the estimated 423 g emitted by one hour of leaf blower use is approximately 26 times the amount emitted by a new vehicle, but approximately one-third of the CO emissions of an older vehicle. While not implying that the operator will inhale this amount of CO, these data do suggest concern about the relatively large amount of CO emitted directly into the air space surrounding the operator. For particulate matter exhaust emissions, the leaf blower emits eight to 49 times the particulates of a light duty vehicle, primarily because of the large amount of unburned fuel directly released by the two-stroke engine.

Another way to visualize the data is to compare emissions for a given amount of leaf blower operation to miles traveled by car. The Air Resources Board regularly publishes such emissions benchmarks. Thus, for the average 1999 leaf blower and car data presented in Table 9, we calculate that hydrocarbon emissions from one-half hour of leaf blower operation equal about 7,700 miles of driving, at 30 miles per hour average speed. The carbon monoxide emission benchmark is signficantly different. For carbon monoxide, one-half hour of leaf blower useage

(Table 9) would be equivalent to about 440 miles of automobile travel at 30 miles per hour average speed.

Exposure data are necessary to determine potential health impacts of the pollutants. Since few exposure data exist, staff have developed a model that estimates potential exposures based on 10 minutes of leaf blower operation and compares those emissions to the amount of still air in which emissions would need to be mixed to avoid a transitory, local exceedance of the ambient air quality standards, which are health-based standards. Details of the model and results are presented in Appendix J.

The exposure scenario suggests that 10 minutes of leaf blower usage could expose the operator to a significant, potentially harmful dose of CO, assuming a worst case exposure, in which there is no dispersion of pollutants out of the immediate area. In this case, the operator could be exposed to potentially harmful amounts of carbon monoxide. The best case would be that all emissions and fugitive dust from the leaf blower would be blown out of the immediate area, resulting in little or no exposure to the operator. Actual exposures would most likely be somewhere in between these two assumptions and would vary greatly with weather conditions, wind, use or nonuse of protective gear, walking speed of the operator, and type of machine used. In addition, for carbon monoxide exposures, whether or not the operator has heart disease would be important in determining potential risk. Exposure studies would need to be conducted to obtain more reliable estimates of operator exposure, and staff recommend further research.

On December 27, 1999, ARB was mailed a redacted copy of a 1995 report on operator exposure levels for several chemicals that are present in handheld gasoline-powere equipment exhaust emissions. The report summarized breathing zone measurements during operation of chain saws, a string trimmer, and a leaf blower, but all data pertaining to equipment other than the leaf blower was blacked-out. The study and its limitations are discussed in some detail in Appendix H, but it is relevant to note here that ARB has received two measurements from one leaf blower of breathing zone concentrations of carbon monoxide, toluene, benzene, 1,3-butadiene, acetaldehyde, and formaldehyde. As reported in the study, concentrations of carbon monoxide, benzene, and 1,3-butadiene were high enough as to reinforce concern over operator exosures for the commercial leaf blower operator.

2. Fugitive Dust

Estimated fugitive dust emissions cannot be compared to light duty vehicle exhaust. The worst case exposure scenario, however, suggests that ten minutes of use of a commercial blower would exposure the operator to significant amounts of PM (Appendix J). While leaf blower operators would not be expected to spend significant amounts of time within such a particulate cloud, the day-in-day-out exposure to this much PM10 could result in serious, chronic health consequences in the long-term. Short-term exposures of one to two days to high levels of PM can lead to coughing and minor throat irritation. Long-term exposures have shown statistically significant associations of ambient PM levels with a variety of negative human health outcomes, as discussed previously. These data strongly suggest that professional leaf blowers operators, and

those regularly working within the envelope described above, should wear a face mask effective at filtering PM from the air, and further research is warranted.

3. Noise

The potential health impacts of leaf blowers on workers from noise center on noise-induced hearing loss. Two factors contribute to an increased risk of hearing loss in typical career gardeners: the high sound pressure levels emitted by leaf blowers at the level of the operator's ear, and the infrequent use of hearing protection. While we cannot estimate the percentage of workers who will experience noise-induced hearing loss without additional data, these two factors are likely to be responsible for hearing loss in an unknown percentage of workers, although individuals may not notice any hearing loss until many years have passed. In order to reduce potential hearing loss, employers should ensure that employees use hearing protection. State and local health and enforcement agencies should promote hearing protection in campaigns targeted at professional landscapers and gardeners. Hearing loss is gradual, and may become obvious only years after the exposure has ceased.

B. The Public-at-Large

Those who are not working in landscaping and gardening fall into two categories: homeowners doing their own gardening and bystanders. Homeowners who chose to use a leaf blower likely experience relatively low-level exposures which they control. Bystanders may experience low or high exposures, depending on the nature of the exposure. Bystanders, however, almost never have chosen to be exposed to the exhaust, dust, and noise emissions of the leaf blower. Thus their attitude toward the leaf blower is likely very negative and they may be highly annoyed by the exposure.

In addition, staff have received letters, and read testimonials on Internet web-sites, concerning acute symptoms, such as asthma and allergies, exhibited by sensitive individuals to relatively limited exposures. These symptoms have not been evaluated in this report as they are anecdotal and unable to be substantiated. The recent study by Miguel et al. (1999), however, lends support to those who claim that exposure to leaf blower-generated dust causes allergic and asthmatic symptoms. It is also important to acknowledge that some individuals may be very sensitive to the emissions from leaf blowers and unable to tolerate exposures that do not seem to bother other individuals.

In addition to homeowner-leaf blower operators and bystanders who are in the vicinity of leaf blower operation, everyone is exposed to a small degree to air pollution that results from exhaust and dust emissions from leaf blowers. This report does not quantify those exposures, but the ARB does regulate exhaust emissions from leaf blowers, as from most other sources of air pollution. All sources of air pollution need to be reduced in order that Californians can breathe clean air.

1. Exhaust Emissions

The typical leaf blower owned and operated by a homeowner for private residential use is assumed to have an average horsepower of 0.8 and a load factor of 50%, based on the ARB off-road emissions model. Emissions from one hour of operation are compared to exhaust emissions from two different age light duty vehicles (Table 10). There are few data available on the length of time a homeowner runs a leaf blower, but it is likely that the homeowner uses a leaf blower for less than one hour, which would reduce the potential exposures and impacts.

Table 10. Homeowner Leaf Blower Emissions Compared to Light Duty Vehicle Emissions 0.8 hp average, 50% load factor, 1999 emissions data

	Exhaust Emissions, g/hr	Exhaust Emissions, new light duty vehicle,* g/hr	Exhaust Emissions, older light duty vehicle,** g/hr
Hydrocarbons	56.73	0.39	201.9
Carbon Monoxide	119.2	15.97	1310
Particulate Matter	1.44	0.13	0.78
Fugitive Dust	48.6-1031	N/A	N/A

*New light duty vehicle represents vehicles one year old, 1999 or 2000 model year, driven for one hour at 30 mph.
**Older light duty vehicle represents vehicles 1975 model year and older, pre-catalytic vehicle, driven for one hour at 30 mph.

As with the heavier-duty commercial leaf blower, CO and particulate matter emissions from the lighter-duty leaf blower are many times higher than emissions of the same pollutants from vehicles (Table 10). CO emissions from a leaf blower that might be used by a typical homeowner are significantly lower than those from a commercial leaf blower (Table 9) and it is likely that homeowners use leaf blowers for much less than one hour at a time. The exposure scenario for homeowner usage (Appendix J) estimates a correspondingly lower potential exposure. The homeowner is, therefore, less likely to be exposed to potentially harmful amounts of carbon monoxide, although sensitive individuals should be cautioned. For all exhaust emissions, exposures are considerably lower in a residential setting than in a commercial setting. In the best case, all emissions and fugitive dust from the leaf blower would be blown out of the operator's immediate area, resulting in little or no exposure. Actual exposures would most likely be somewhere in between these two assumptions and would vary greatly with weather conditions, wind, use or nonuse of protective gear, walking speed of the operator, and type of machine used. Exposure studies would need to be conducted to obtain more reliable estimates of operator exposure, and staff recommend further research.

As discussed in Section IV. A. 1., another way to visualize the data is to compare emissions for a given amount of leaf blower operation to miles traveled by car. The Air Resources Board regularly publishes such emissions benchmarks. Thus, for the average 1999 homeowner-type leaf blower and car data presented in Table 10, we calculate that hydrocarbon emissions from one-half hour of leaf blower operation equal about 2,200 miles of driving, at 30 miles per hour average speed. The carbon monoxide emission benchmark is signficantly different. For carbon monoxide, one-half hour of a homeowner-type leaf blower useage (Table 10) would be equivalent to about 110 miles of automobile travel at 30 miles per hour average speed.

2. Fugitive Dust Emissions

For fugitive dust, because the homeowner is likely using leaf blowers for a very short time each week, the potential risk from exposure is much lower than for commercial gardeners. Still, based on estimates in the exposure scenario (Appendix J), staff recommends that even homeowners wear a dust filtering mask when using a leaf blower.

3. Noise

The homeowner who uses a leaf blower for a brief amount of time each week or two is unlikely to experience noise-induced hearing loss. The cumulative exposure to many recreational sources of noise, such as recreational power tool use, lawn care, shooting, boating, concert-going, and other activities that expose one to loud noises, however, is likely to be great enough to impact hearing (Clark 1991). Those who regularly use noisy power equipment should be in the habit of using hearing protection to reduce their overall exposure to potentially damaging noise.

The likelihood of a bystander exposed to leaf blower noise on an irregular basis experiencing hearing loss is low. The potential health impacts from leaf blowers on bystanders that are likely more important include interference with communication, sleep interruption, and annoyance. Each of these impacts may in turn lead to stress responses, although research has not conclusively tied chronic exposures with any particular adverse health outcome. Although interference with communication, sleep interruption, and annoyance may not seem to be serious impacts, they are important health and quality of life issues for many people. At least 100 municipalities in California have restricted or banned the use of leaf blowers within city limits in response to people who object to the loud noise of leaf blowers interrupting their lives.

C. Summary of Potential Health Impacts

Health effects from hazards identified as being generated by leaf blowers ranging from mild to serious, but the appearance of those effects depends on exposures: the dose, or how much of the hazard is received by a person, and the exposure time. Without reasonable estimates of exposures, ARB cannot conclusively determine the health impacts from leaf blowers; the discussion herein clearly is about potential health impacts. The goal is to direct the discussion and raise questions about the nature of potential health impacts for those exposed to the exhaust emissions, fugitive dust, and noise from leaf blowers in both occupational and non-occupational settings.

For the worker, the analysis suggests concern. Bearing in mind that the worker population is most likely young and healthy, and that these workers may not work in this business for all of their working lives, we nonetheless are cautioned by our research. Leaf blower operators may be exposed to potentially hazardous concentrations of CO and PM intermittently throughout their work day, and noise exposures may be high enough that operators are at increased risk of developing hearing loss. While exposures to CO, PM, and noise may not have immediate, acute effects, the potential health impacts are potentially greater for chronic effects. In addition, evidence of significantly elevated concentrations of benzene and 1,3-butadiene in the breathing zone of workers leads to concern about exposures to these two toxic air contaminants.

Potential noise and PM effects should be reduced by the use of appropriate breathing and hearing protective equipment. Employers should be more vigilant in requiring and ensuring their employees wear breathing and hearing protection. Regulatory agencies should conduct educational and enforcement campaigns, in addition to exploring the extent of the use of protective gear. Exposures to CO and other air toxics are more problematic because there is no effective air filter for these air pollutants. More study of CO and other air toxics exposures to leaf blower operators is warranted to determine whether the potential health effects discussed herein are actual effects or not.

Describing the impacts on the public-at-large is more difficult than for workers because people's exposures, and reactions to those exposures, are much more variable. Bystanders are clearly annoyed and stressed by the noise and dust from leaf blowers. They can be interrupted, awakened, and may feel harassed, to the point of taking the time to contact public officials, complain, write letters and set up web sites, form associations, and attend city council meetings. These are actions taken by highly annoyed individuals who believe their health is being negatively impacted. In addition, some sensitive individuals may experience extreme physical reactions, mostly respiratory symptoms, from exposure to the kicked up dust.

On the other hand, others voluntarily purchase and use leaf blowers in their own homes, seemingly immune to the effects that cause other people such problems. While these owner-operators are likely not concerned about the noise and dust, they are should still wear protective equipment, for example, eye protection, dust masks, and ear plugs, and their exposures to CO are a potential problem and warrant more study.

V. RECOMMENDATIONS

The Legislature asked ARB to include recommendations for alternatives in the report, if ARB determines alternatives are necessary. This report makes no recommendations for alternatives. Based on the lack of available data, such conclusions are premature at this time. Exhaust standards already in place have significantly reduced exhaust emissions from the engines used on leaf blowers, and manufacturers have reduced CO emissions further than required by the standards. Ultra-low or zero exhaust emitting leaf blowers could further reduce public and worker exposures. At its January 27, 2000, public hearing, the Air Resources Board directed its staff to explore the potential for technological advancement in this area.

For noise, the ARB has no Legislative mandate to control noise emissions, but the evidence seems clear that quieter leaf blowers would reduce worker exposures and protect hearing, and reduce negative impacts on bystanders. In connection with this report, the Air Resources Board received several letters urging that ARB or another state agency set health-based standards for noise and control noise pollution.

A more complete understanding of the noise and the amount and nature of dust resuspended by leaf blower use and alternative cleaning equipment is suggested to guide decision-making. Costs and benefits of cleaning methods have not been adequately quantified. Staff estimates that a study of fugitive dust generation and exposures to exhaust emissions and dust could cost $1.1 million, require two additional staff, and take two to three years. Adding a study of noise exposures and a comparison of leaf blowers to other cleaning equipment could increase study costs to $1.5 million or more (Appendix H).

Fugitive dust emissions are problematic. The leaf blower is designed to move relatively large materials, which requires enough force to also blow up dust particles. Banning or restricting the use of leaf blowers would reduce fugitive dust emissions, but there are no data on fugitive dust emissions from alternatives, such as vacuums, brooms, and rakes. In addition, without a more complete analysis of potential health impacts, costs and benefits of leaf blower use, and potential health impacts of alternatives, such a recommendation is not warranted.

Some have suggested that part of the problem lies in how leaf blower operators use the tool, that leaf blower operators need to show more courtesy to passersby, shutting off the blower when people are walking by. Often, operators blow dust and debris into the streets, leaving the dust to be resuspended by passing vehicles. Interested stakeholders, including those opposed to leaf blower use, could join together to propose methods for leaf blower use that reduce noise and dust generation, and develop and promote codes of conduct by workers who operate leaf blowers. Those who use leaf blowers professionally would then need to be trained in methods of use that reduce pollution and potential health impacts both for others and for themselves.

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Attachment 5

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PRINT PAGE

Emissions Test: Car vs. Truck vs. Leaf Blower

By Jason Kavanagh, Engineering Editor | Published Dec 5, 2011

Even in the complex, expensive and highly political world of emissions testing and certification, rumors are a bitch. And in California — where various government agencies bring to bear the world's toughest vehicle emissions regulations on the most dense car enthusiast population anywhere — it pays to investigate rumors.

So that's what we're doing.

You've probably heard stories about the emissions of today's cars being cleaner than lawn equipment, about modern cars actually cleaning the air and about the pre-emissions-control era when birds fell from the stinking sky. So have we. We're all about busting myths, so we concocted an investigation to find the truth. Forget about the birds, but those other rumors, well, we've got them covered.

Big, Small and Handheld

Early on, we decided to go big. We'd run this emissions test at a real-deal emissions lab rather than a smog check station or asking Magrath to inhale at the tailpipes and offer commentary on their bouquets.

It would have been easy to load this test in favor of the vehicles by hand-picking the cleanest combustion-powered vehicle we could find. No, only the biggest, baddest truck will do, and they don't come much bigger or badder than the 2011 Ford F-150 SVT Raptor Crew Cab. Acting as a counterweight in perception to this pickup is our long-term 2012 Fiat 500.

The vehicles are absolutely poles apart. The Raptor packs a 411-horsepower 6.2-liter V8, weighs more than 6,200 pounds and has the aerodynamics of Mount Rushmore. The dollop-size Fiat weighs a mere 2,350 pounds and has a 1.4-liter four that generates less than one-fourth the amount of power as the Raptor. They couldn't be more different, and capturing extremes is the idea.

Like you, we made a trip Home Depot to buy a leaf blower. And like all trips to Home Depot, we lost 3 hours and bought more than we intended. In this case we ended up with two leaf blowers — a two-stroke backpack-style job and a handheld four-stroke unit. The two-stroke leaf blower in this test is an Echo PB-500T, a model that sits in the middle of the manufacturer's range of backpack-style offerings. It's powered by a 50.8cc two-stroke air-cooled single-cylinder engine. The Ryobi is a RY09440 model that brings a 30cc four-stroke engine. Yes, we're pitting a 6,210cc truck against a 30cc leaf blower.

Two-stroke engines have high power density, making them the engine of choice among commercial and prosumer-grade leaf blowers, but they emit more pollutants than four-strokes. The four-stroke leaf blower in this test is the Fiat to the two-stroke's Raptor. That was the idea, anyway.

Making the Sausage

It turns out that our local branch of the American Automobile Association (AAA), Auto Club of Southern California,

runs exactly the kind of emissions lab we had in mind. It's called the Automotive Research Center, and it's in

Diamond Bar, California. There, the fine people of AAA ran full FTP 75 emissions cycles on the Raptor and the 500.

The FTP 75 cycle is one of the primary yardsticks in the U.S. certification of light-duty vehicle emissions and fuel economy. It consists of — stay with us here — three major sub-tests called phases, each of which is defined by a specific pattern of speed versus time. Phase 1 is a 505-second cold-start cycle and is followed by Phase 2, which is a "stabilized" test that lasts 864 seconds. Phase 3 is a repeat of the Phase 1 test, the only difference being that it is performed when the engine is fully warmed.

All three phases of the FTP 75 are run with the vehicle strapped to a chassis dynamometer. But before the FTP 75 can be run, an elaborate pretest sequence is carried out for each vehicle. We'll spare you the details, but suffice it to say that it is very thorough, very tedious and very time-consuming. This pretest procedure takes the better part of a 24-hour period to carry out per vehicle.

Once the pretest is complete, the roller-turning, emissions-gathering part of the FTP 75 can be performed. Here, the vehicle is "driven" by a skilled technician on the dyno over a prescribed pattern of speed versus time while the exhaust is sampled and bagged. If the speed of the vehicle (as measured by the dynamometer) falls outside of a narrow band, the test is voided and the whole expensive process must be repeated, including that protracted pretest process. A technician that flubs with any kind of frequency has a very short career in this field.

It's worth noting that the load on the dyno rollers is adjusted to reflect the aerodynamics and drivetrain loss of the vehicle being tested. So the Raptor is indeed being asked to work harder at a given speed than the Fiat, just as they'd do in the real world.

Comparing Apples to Kumquats: Creating the Leaf Blower Test Cycle

The FTP 75 test simulates 11.04 miles driven over 31.2 minutes and includes idle periods, accelerations, decelerations and cruising. This driving cycle works great when testing things that boast driven wheels: less so for leaf blowers which, of course, don't.

Therefore we needed to come up with a test for the leaf blowers that provided a basis of comparison to the vehicles, yet still reflects the way lawn equipment is actually used in practice. Observe leaf blowers in the wild and you'll find they are very often operated at either full whack or idle. Our test would have to mimic this usage pattern.

It didn't have to be leaf blowers. We considered testing lawnmowers or string trimmers, but they introduce an element of complexity — load. To properly load those devices we'd need the resistance provided by grass and shrubs, and there wasn't time to grow a lush enough lawn in Auto Club's dyno cell. That's why we settled on leaf blowers — they have essentially one knob, and that's blower speed.

With these factors in mind, the test we crafted for the leaf blowers followed the FTP 75's duration and speed-up/slow-down pattern with a twist — we substituted vehicle speed with leaf blower speed. We gave the blowers full speed during the cruise periods defined by the FTP 75. The idle periods remained idle periods and boom, there's our leaf blower emissions test.

The Results

During the FTP 75 test, exhaust gas from the vehicle's tailpipe is captured and analyzed by laboratory-grade equipment that's so expensive it makes the Kentucky Derby look like the Pinewood Derby. This lab equipment measures all kinds of compounds coming out of the tailpipe but the three we will focus on are those with which EPA

and CARB are primarily concerned, namely, non-methane hydrocarbons (NMHC), oxides of nitrogen (NOx) and

carbon monoxide (CO).

What's that? Fewer words and more numbers? Here, then, are pollutants measured during our testing expressed in weighted grams per minute:

	NMHC	NOx	CO
2011 Ford Raptor	0.005	0.005	0.276
2012 Fiat 500	0.016	0.010	0.192
Ryobi 4-stroke leaf blower	0.182	0.031	3.714
Echo 2-stroke leaf blower	1.495	0.010	6.445

Distilling the above results, the four-stroke Ryobi leaf blower kicked out 6.8 times more NOx, 13.5 times more CO and more than 36 times more NMHC than the Raptor.

The two-stroke leaf blower was worse still, generating 23 times the CO and *nearly 300 times* more NMHC than the crew cab pickup. Let's put that in perspective. To equal the hydrocarbon emissions of about a half-hour of yard work with this two-stroke leaf blower, you'd have to drive a Raptor for 3,887 miles, or the distance from Northern Texas to Anchorage, Alaska.

Clearly, engine displacement plays little part in the concentrations of these pollutants. Consider that the Fiat 500 produced more than double the NOx and more than three times the hydrocarbons of the truck. A close look at the vehicles' underhood emissions labels sheds further light — the Fiat 500 is classed as LEV-II, whereas the Raptor in California trim is ULEV-II. The Raptor's emissions control equipment is simply more capable. It's only in the production of carbon dioxide (CO2) — not yet directly regulated by EPA or CARB — where the Raptor is the higher emitter.

Here, I'll Tie One Hand Behind My Back

Maybe you think the above test was unduly hard on the leaf blowers. To evaluate that notion, we ran a follow-up test on the leaf blowers. We simply started them up and let them idle for 505 seconds — the duration of the Phase 1 portion of the FTP 75 — while collecting their emissions. Idling, that's all, nothing else. The only way the leaf blowers could produce fewer emissions than this is if they were shut off.

We then compared the leaf blowers' idle test results to those of the vehicles running their Phase 1 driving cycle of the FTP 75 test. Remember, this is the 505-second cold-start portion of the test, which is when the vehicles produce the majority of their total emissions since their catalytic converters are still waking up.

In other words, this is a best-case scenario for the leaf blowers and a worst-case scenario for the vehicles. The data below are expressed in grams per minute:

	NMHC	NOx	CO
Phase 1 - 2011 Ford Raptor	0.021	0.013	0.725
Phase 1 - 2012 Fiat 500	0.075	0.032	0.544
Idling - Ryobi 4-stroke leaf blower	0.077	0.002	1.822
Idling - Echo 2-stroke leaf blower	1.367	0.000	2.043

Here, the overall picture improves only slightly for the leaf blowers. Of note is that NOx is near zero for the lawn equipment. This is logical, as the formation of NOx tracks with combustion temperature, which is lowest at idle.

Carbon monoxide output of the lowest-emitting Ryobi leaf blower outstrips that of both door-slammers combined, and the two-stroke Echo in particular still belches out several times more hydrocarbons than the vehicles.

You'd have to drive a Raptor 235 miles — stopping every 505 seconds and doing cold restarts — to emit the same level of hydrocarbons as simply idling the two-stroke leaf blower for less than 10 minutes.

Drive a Raptor. Clean the Air

Remember that crazy-expensive lab equipment that measures exhaust emissions? It also measures the emissions makeup of the ambient air that the vehicles draw in through their intake tracts. This is important because, well, what if your emissions lab was located next to a natural gas vent? Only by measuring what goes into and out of the vehicle and comparing the differences can the vehicle's contribution to emissions be accurately assessed.

Here's why you should care. When the Raptor (and the Fiat) was running Phase 2 of its tests on the dyno, it was cleaning the air of hydrocarbons. Yes, there were actually fewer hydrocarbons in the Raptor's exhaust than in the air it — and we — breathed. In the Raptor's case, the ambient air contained 2.821 ppm of total hydrocarbons, and the amount of total hydrocarbons coming out the Raptor's tailpipe measured 2.639 ppm.

So if you want to go green, ditch the yard equipment and blow leaves using a Raptor.

The manufacturer provided Edmunds the Raptor for the purposes of evaluation.

Attachment 6

Consumer Reports magazine: September 2010

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Blower noise

Last reviewed: September 2010

This article appeared in September 2010 Consumer Reports Magazine.

Latest on Leaf blowers
Overview
Ratings
Recommendations
Buying Advice
Price & shop

Leaf-blower regulations nationwide

Many U.S. towns and counties now regulate leaf-blower noise. Some locales simply restrict blower use to certain times of the day or year. But others ban gasoline-powered leaf blowers while allowing only electric blowers, which, while far from silent, are still less noisy overall. And more than a dozen communities, mostly in California, have banned all gas and electric leaf blowers, leaving residents reaching for their rakes and brooms.

The list of leaf-blower regulations below is from the Noise Pollution Clearinghouse, a nonprofit organization based in Montpelier, Vt. If your community is listed here, check with your city or county clerk's office just in case, because ordinances can change. Even if you don't find your area on this list, double-check with your municipal or county government for the same reason.

And wherever you live, keep your neighbors happy by not running leaf blowers very early or late in the day, or for long periods of time. If you have a noisy neighbor who's less courteous than you are, Neighbor wars: Keeping the peace offers advice on diffusing the situation courteously and effectively.

Essential information: Read our review leaf blowers, including Ratings (available to subscribers) or electric handheld, gasoline handheld, gasoline backpack, and gasoline wheeled blowers.

City	Ban all leaf blowers	Ban all gasoline-powered leaf blowers	Ban all leaf blowers during certain seasons	Ban all leaf blowers during certain times of day	Ban all leaf blowers above a certain decibel level
California					
Alameda County				•	
Belvedere		•			
Berkeley		•			
Beverly Hills		•			
Calexico				•	
Carmel		•			
Claremont		•			
Costa Mesa				•	
Culver City				•	
Cypress*		•			
Dana Point*		•			

Davis			•
Del Mar	•		
Foster			•
Fountain Valley*		•	
Hermosa Beach	•		
Huntington Beach			•
Indian Wells		•	
Indio			•
Irvine*		•	
La Palma			•
Laguna Beach	•		
Lawndale		•	
Loma Linda			•
Lomita			•
Long Beach			•
Los Altos		•	
Los Angeles		•	
Malibu		•	
Manhattan Beach	•		
Manteca			•
Menlo Park			•
Mill Valley	•		
Ojai		•	
Orange			•
Orinda*		•	
Palo Alto		•	
Pasadena			•
Perris			•
Piedmont		•	
Richmond			•
Rohnert Park			•
Rolling Hills Estates*		•	
Sacramento			•
San Anselmo			•
San Diego			•
Santa Barbara		•	
Santa Monica	•		
Saratoga*		•	
Solana*		•	
Sunnyvale			•
Tiburon		•	
Tustin*		•	
West Hollywood		•	
Westminster*		•	

Colorado

Aspen		•	
Carbondale		•	

Connecticut

Greenwich			•

Florida

Palm Beach	•						
Illinois							
Evanston	•						
Highland Park	•						
Wilmette	•						
Winnetka	•						
Maryland							
Montgomery County							•
Massachusetts							
Cambridge					•		
New York							
Bronxville	•						
Flower Hill							•
Great Neck Estates	•						
Greenburgh	•						
Huntington	•						
Larchmont	•						
Mamaroneck	•						
New Rochelle	•						
Newton	•						
North Hempstead					•		
Oyster Bay					•		
Pelham Heights**		•					
Pelham Manor	•						
Pelham Village**		•					
Rye		•					
Scarsdale	•						
Southampton	•						
Tarrytown					•		
Thomaston	•						
White Plains	•						
Yonkers	•						

* Denotes ban is on Sundays and holidays only
** Denotes ban is in effect summer and winter only

Attachment 7

MEETING DATE: 12/16/13
STUDY SESSION

COUNCIL AGENDA REPORT

DATE: December 9, 2013

TO: MAYOR AND TOWN COUNCIL

FROM: GREG LARSON, TOWN MANAGER

SUBJECT: COUNCIL DIRECTION ON THE REGULATION OF LEAF BLOWERS

RECOMMENDATION:

Staff recommends the Council give the following direction to staff:

1. Join with other local agencies in supporting a Bay Area leaf blower exchange program and Spare the Air Day leaf blower restrictions.
2. In residential zones, prohibit gas powered leaf blowers OR prohibit any leaf blower emitting over 65 decibels.
3. Direct staff to include notice of the pending regulations to gardeners, landscapers or related business license holders or permittees.
4. Direct staff to limit the first 6 months of enforcement to warning notices or letters issued by Police or Community Development as complaints are received.

BACKGROUND:

In July 2012, the Town of Los Gatos adopted a sustainability plan that outlined the Town's existing greenhouse gas emissions inventory, identified GHG reduction targets, and established GHG reduction measures to meet those reduction targets. The possible adoption of a leaf blower ordinance (RE-4) was identified under Renewable Energy and Low Carbon Fuels.

On August 5, 2013, a study session was held to ascertain Council interest in and direction on leaf blower regulation. At the conclusion of the August 5 study session, Council asked staff to return at a later date with additional information on leaf blower ordinances currently in effect in select cities, to provide information on options to limit the current use of leaf blowers in residential and commercial zones, and to provide information on educational options and exchange programs.

PREPARED BY: CHRISTINA GILMORE
Assistant to the Town Manager

Reviewed by: Assistant Town Manager, Town Attorney, ____Finance

Per Council direction, this report provides the Council with the information on the select cities requested, in addition to providing recommendations and alternatives for proposed leaf blower regulations for Council consideration.

DISCUSSION:

The Town of Los Gatos currently allows the use of electric or gasoline leaf blowers and other similar moveable noise sources to be operated during the hours of 8:00 a.m. to 8:00 p.m. on weekdays and 9:00 a.m. to 7:00 p.m. on weekends and holidays in residential or noise sensitive zones. The use of powered equipment in commercial, industrial or public spaces is not time limited.

Based on the survey of other jurisdictions (Attachment 1), staff would initially recommend an equipment use restriction in residential zones, based on either the noise levels or emissions of the equipment. Noise impact could be moderated by requiring equipment to be rated at 65 decibels or less, while emissions could be moderated by requiring the use of electric equipment. Note that either approach approved would also likely benefit the other, as lower decibel equipment is also electric.

A six month education and notification period is recommended following Council adoption of any regulatory changes to encourage voluntary compliance and minimize enforcement workloads. Business outreach, media coverage and warnings would be the primary educational outreach.

Depending on the impact of the residential regulations, staff could return at a later date with recommendations on potential restrictions in commercial zones. Town operations on Town properties would be included as commercial operations for the time being given the generally larger comparable parcels on the properties involved.

In addition, staff would recommend joining with San Mateo and possibly San Jose (see below) and other local jurisdictions in supporting and encouraging a Bay Area leaf blower exchange program through the Bay Area Air Quality Management District, as occurs in Southern California.

Last, staff would recommend the use of gas powered lawn and gardening equipment be prohibited on summer Spare the Air days resulting from anticipated high particulate emissions.

City of San Jose
The City of San Jose is expected to include a proposed Commercial Leaf Blower Ordinance on the City's next priority setting session to consider working with the California Air Resources Board, the Bay Area Air Quality Management District and other potential entities to identify sources of funding for policy research, ordinance implementation and potential rebates/tax credits for the purchase of electric leaf blowers.

Depending on the City San Jose's interest in prioritizing the proposed recommendations, the Town Council may want to consider exploring opportunities for collaboration, as it relates to exploring rebates/tax credits for a commercial leaf blower exchange/purchase program.

ALTERNATIVES:

Besides staff recommendations addressed at the beginning of this report, the following alternatives are available for Council consideration:

1. Make no changes in the current ordinance that prescribes the hours and days of use of electric and gas powered leaf blowers in residential and commercial areas.

2. Reduce the hours and/or days for use of leaf blowers in residential and/or commercial areas.

3. Prohibit the use of gas powered leaf blowers in commercial areas.

4. Prohibit the use of leaf blowers that emit 65 decibels or more in commercial areas.

5. Prohibit the use of all leaf blowers in residential and/or commercial areas.

ENVIRONMENTAL ASSESSMENT:

Is not a project defined under CEQA, and no further action is required.

FISCAL IMPACT:

The fiscal impact will differ depending on the direction given by the Council.

Attachments:
1. Summary of jurisdictions with regulations banning the use of leaf blowers.
2. Public Comments received 12:00 PM Thursday August 8, 2013 through 12:00 PM Thursday, December 12, 2013.

Summary of Jurisdictions with Leaf Blower Regulations in Place

Attached is a summary of the information gathered from the cities specified by the Council, with the exception of the City of Carmel which has not responded to repeated requests for information.

In summary, the other cities surveyed generally provided at least some limits on the types of leaf blowers used in residential areas, provide varying degrees of public and education, and generally provide low priority complaint based enforcement.

City of Los Altos

The City of Los Altos has had a leaf blower ordinance banning the use of gas powered blowers in place since 1991. Portable electric powered blowers are permitted between 9 a.m. and 5 p.m. seven days a week in both residential and commercial areas.

Staff contacted personnel from the City of Los Altos police department to provide additional information on the leaf blower ordinance. Below is a summary of questions and answers:

1. ***What is the process for reporting leaf blower violations to the City?***
   Residents are encouraged to call the Los Altos Police Department business line while the violation is occurring. Depending on availability, patrol or code enforcement will be dispatched to the complaint. Many times, the violation is no longer occurring by the time patrol and/or code enforcement arrives on the scene. If residents are dealing with an ongoing issue, they may be referred directly to code enforcement for a long term resolution.

2. ***Approximately how many complaints does Los Altos receive each month/year?***
   There were 348 leaf blower complaints received from October 1, 2012 through October 7, 2013.

3. ***What is the process for bringing people into compliance with the ordinance?***
   Los Altos police officers and code enforcement are encouraged to work on solving complaints rather than simply enforcing the ordinance. Response to leaf blower calls can require a significant amount of time, so solutions that involve prevention is encouraged. The City of Los Altos provides its officers with "yellow cards," which are translated in both Spanish and English. These cards are given to first time offenders and explain the ordinance in brevity and the violator's information is entered into a system as a one-time warning. Typically only one warning is granted, but that is always left to the officer's discretion.

4. ***What types of noticing/outreach do you conduct to inform residents, businesses, and landscape gardeners of the ordinance?***

Other than face-to-face communication and the issuance of "yellow cards", there are no specific outreach efforts. The ordinance has been in effect for such a long period of time that most people are already aware of the ordinance.

5. ***How many hours per week/month does Code Enforcement spend on leaf blower complaints and bringing people into compliance?***
   The Code Enforcement officer currently spends between 10-15 hours a month of proactive enforcement for this type of violation. The Code Enforcement officer can conduct enforcement while doing other code enforcement duties on the streets.

6. ***What is the priority of response for leaf blower calls/complaints?***
   As a patrol call, the priority is low; however an officer will respond when available. At times, the call may be in pending status for too long, due to other activity, and therefore may be canceled. However, if the Code Enforcement officer is on duty, the call assigned will have a higher level of priority.

7. ***What are the biggest barriers to enforcing this ordinance?***
   There really are no big barriers from a community support perspective. The community does not appreciate the noise produced by these devices and is very supportive and, at times, demanding with regards to enforcement. Occasionally, staff experiences language barriers with people who violate the ordinance (Spanish and Vietnamese in particular) but staff has been able to communicate effectively in most cases.

City of Palo Alto

The City of Palo Alto has had a leaf blower ordinance banning the use of gas powered blowers in residential zones in place since 2005. While the ordinance bans gas powered leaf blowers in residential zones, it does permit the use of electric leaf blowers. Electric leaf blowers can be used in residential zones, Monday-Friday from 9 a.m.-5 p.m. and Saturdays from 10 a.m.-4 p.m. Electric leaf blower use is prohibited on Sundays and holidays.

Additionally, gas-powered leaf blowers and electric leaf blowers can be used in non-residential zones. Electric and gas powered leaf blowers can be used Monday-Friday from 8 a.m. - 6 p.m. and Saturdays from 10 a.m. -4 p.m. Any leaf blower use is prohibited on Sundays and holidays.

Staff contacted personnel from the City of Palo Alto police department to provide additional information on the leaf blower ordinance. Below is a summary of questions and answers:

1. ***What is the process for reporting leaf blower violations to the City?***
   The complainant can contact the police department to report an incident. The call for service is logged and a police officer is dispatched.

2. ***Approximately how many complaints does Palo Alto receive each month/year?***
   Approximately 15-30 complaints are received each year.

3. ***What is the process for bringing violators into compliance with the ordinance?***
   A police officer will issue a warning to the violator and a log note is created in the call along with the violator's name. A second call could end in a secondary warning or a $100 administrative citation.

4. ***What types of noticing/outreach does the City conduct to inform residents, businesses and landscape gardeners of the ordinance?***
   Currently, there is no additional community outreach being conducted since the ordinance has been in place for several years.

5. ***How many hours per week/month does PD spend on leaf blower complaints and bringing violators into compliance?***
   Due to a decrease in police staffing levels, minimal time is spent on leaf blower complaints.

6. ***What is the priority of response for leaf blower calls and/or complaints?***
   Calls for service for leaf blower violations have the lowest priority. Often times, when the police officer arrives, the violator is gone.

7. ***What are the biggest barriers to enforcing this ordinance?***
   Since electric leaf blower use is allowed under the current ordinance, gardeners will use a gas-powered generator to plug in an electrical cord to power their electric leaf blowers. While this is in compliance with the ordinance, it does not reduce the amount of noise or emissions released into the environment.

City of Beverly Hills

The City of Beverly Hills has had a leaf blower ordinance banning the use or operation of any portable machine powered with a gasoline engine to blow leaves, dirt, and other debris off sidewalks, driveways, lawns or other surfaces in place since the 1970's. The use of electric leaf blowers is allowed. The primary reason for banning gas powered leaf blowers was initially related to the level of gas emissions from blowers, but over the intervening years, the main opposition to their use now is primarily noise related. The ordinance is enforced by both the Police Department and Code Enforcement.

Staff contacted personnel from the City of Beverly Hills Code Enforcement to provide additional information on the leaf blower ordinance. Below is a summary of questions and answers:

1. ***What is the process for reporting leaf blower violations to the City?***

Summary of Jurisdictions with Leaf Blower Regulations in Place

There are several ways to report a violation. To make a new complaint, residents can submit a complaint through a web based application, or they can call a phone number to report a violation. If complaints are received by phone, staff will initiate a standard letter sent to the property owner informing them of the violation and providing them information on the ordinance.

2. ***Approximately how many complaints does Beverly Hills receive each month/year?***
   There were 256 complaints recorded in 2012, and there were 291 complaints recorded in 2013.

3. ***What is the process for bringing people into compliance with the ordinance?***
   To bring violators into compliance, Code Enforcement will send a letter to the property owner or issue a "notice to appear" citation.

4. ***What types of noticing/outreach do you conduct to inform residents, businesses, landscape gardeners of the ordinance?***
   Beverly Hills has developed a general letter and informational flyer that can be sent to property owners that informs them that gasoline-powered leaf blowers are prohibited from use. Property owners are instructed to ask their gardeners to discontinue use of gas powered leaf blowers and are assigned a Code Enforcement officer to follow up with the property owner's gardener.

5. ***How many hours per week/month does CE spend on leaf blower complaints and bringing people into compliance?***
   N/A

6. ***What is the priority of response for leaf blower calls/complaints?***
   N/A

7. ***What are the biggest barriers to enforcing this ordinance?***
   In the last several years Code Enforcement has taken proactive measures to enforce the ordinance, primarily tracking violations when they occur, using a warning log to issue warning notices to property owners and gardeners, and proactive enforcement by officers out in the field. The combination of these proactive enforcement measures has been found to be especially effective.

City of Santa Monica

The City of Santa Monica banned the use of all motorized leaf blowers in 1991. Since July 1, 2013, all leaf blower enforcement is now handled by Code Compliance. Prior to that date, leaf blower enforcement was handled by the Office of Sustainability. The decision to have Code Compliance take over the enforcement is due to the fact that there are more Code Compliance inspectors out in the field seven days a week who are more readily available to respond to leaf blower complaints.

Summary of Jurisdictions with Leaf Blower Regulations in Place

Staff contacted personnel from the City of Santa Monica Code Compliance to provide additional information on the leaf blower ordinance. Below is a summary of questions and answers:

1. ***What is the process for reporting leaf blower violations to the City?***
   Residents may report violations with their iPhone or Android phone, online using GO Santa Monica, by email, or by telephone.

2. ***Approximately how many complaints do you receive each month/year?***
   The average number of complaints received range from five to ten complaints on a daily basis. Complaints may be submitted via email or through a city hotline.

3. ***What is the process for bringing people into compliance with the ordinance?***
   One warning letter is issued as a courtesy before a citation/fine is issued. A citation can be issued immediately if a Code Enforcement Officer observes a violation while it is occurring. The compliance deadline is two weeks from the date a warning letter is issued.

4. ***What types of noticing/outreach do you conduct to inform residents, businesses, landscape gardeners of the ordinance?***
   No additional noticing or outreach besides the warning letters issued is conducted by Code Compliance.

5. ***How many hours per week/month does CE spend on leaf blower complaints and bringing people into compliance?***
   For each complaint received, Code Compliance Officers spend approximately 20 minutes within a two week time period to investigate complaints. Code Compliance Officers make a total of two visits to the address filed in the complaint. If the Code Enforcement Officer does not observe a violation occurring at the address on file, then the complaint is closed out of the system.

6. ***What is the priority of response for leaf blower calls/complaints?***
   Leaf blower complaints receive a priority three response, out of a five-tier priority system, because leaf blower compliance and enforcement is a high priority with the City Council.

7. ***What are the biggest barriers to enforcing this ordinance?***
   The biggest barrier to enforcing the ordinance is a lack of staffing resources.

Attachment 8

City of Santa Monica®

Information Item

Date: May 24, 2011

To: Mayor and City Council

From: Dean Kubani, Director – Office of Sustainability and the Environment

Subject: Six-month Report on Implementation of the Amended Leaf Blower Ordinance

Introduction

This information item provides a report on the implementation and enforcement of an amended ordinance banning the use of motorized leaf blowers (Santa Monica Municipal Code Chapter 4.08.270), which became effective October 28, 2010.

Background

The City of Santa Monica first adopted restrictions on users of motorized leaf blowers in 1991, and adopted amendments to the ordinance in 1995. The original ordinance banned the use of all motorized leaf blowers and held the operator of the leaf blower as the sole responsible party. Enforcement of the ordinance required that leaf blowing activity be witnessed by a police officer before a citation could be issued. Violation of the ordinance resulted in an infraction or misdemeanor, punishable by fine and/or imprisonment.

On January 19, 2010, Council directed staff to prepare options for amendments to the existing leaf blower ordinance in order to improve its effectiveness. On September 14, 2010, Council adopted amendments to the ordinance which:

1. Hold property owners, water customers, owners and operators of gardening or landscape maintenance services, property management companies, and leaf blower operators responsible for adhering to the prohibition against the use of motorized leaf blowers;
2. Authorize the City's Office of Sustainability and the Environment (OSE) to issue administrative citations for any violation of the ordinance.

Discussion

OSE staff have overseen enforcement of the amended ordinance since it took effect on October 28, 2010 and began a public education and outreach campaign regarding the leaf blower ban at that time. This report provides details on these efforts and on the effectiveness of the amended ordinance at reducing the illegal use of motorized leaf blowers for the first six months following its adoption through the end of April, 2011.

Public Outreach and Education

Following adoption of the amended ordinance OSE published educational information on its website (www.sustainablesm.org/leafblower) that includes:

- a summary of the ordinance with a link to the municipal code
- information on alternatives to motorized leaf blowers
- information for reporting leaf blower violations
- downloadable flyers in English and Spanish that property owners can provide to their gardeners to help educate them about the ordinance
- information about the environmental, noise and health impacts of leaf blowers

During the fourth quarter of 2010 OSE staff mailed:

- leaf blower educational materials to all Santa Monica water customers as an insert to the bi-monthly water bills
- 222 informational letters regarding the amended ordinance to landscape companies with Santa Monica business licenses
- 182 informational letters to property management companies with Santa Monica business licenses

In addition to the mailings and the educational information posted on the City's website, OSE published an article about the amended ordinance in Seascape, and issued a press release on October 26, 2010 which was used as the basis for articles in the local press. Bi-lingual flyers about the ordinance have been distributed at the City's weekly Farmers' Markets since November 2010. OSE prepared a public service announcement and a screen slide about the ordinance, which are regularly shown on CityTV and CityTV filmed two news segments on the ordinance which were shown on

its Santa Monica Update news program in October and November 2010. Signage regarding the leaf blower ordinance will be displayed on City solid waste and recycling vehicles beginning in June 2011 as part of the ongoing public information campaign.

Beginning in January 2011 information regarding the leaf blower ordinance was incorporated into OSE's Sustainable Landscape Professionals Educational Series. These classes are offered several times per month all year long for landscape contractors, designers, and maintenance workers. A special course offered on April 19, 2011 focused entirely on the ordinance and on alternatives to leaf blowers. Information regarding the leaf blower ordinance has also been included in OSE's Green Garden Academy workshops which are offered monthly to Santa Monica residents.

Enforcement Process

To enforce the ordinance OSE staff conduct dedicated leaf blower patrols at least two days per week. These patrols typically last four to five hours and are conducted by one staff member using a City vehicle. The patrols are undertaken at various times of day, with the time and location based on previously reported leaf blower use, locations of past violations that have not demonstrated compliance, and known weekly schedules of landscape maintenance companies. In addition to regular patrols, OSE staff monitor leaf blower use throughout the city during regular enforcement and inspection visits for the urban runoff and water conservation ordinances. Staff also conduct individual site visits in response to reports of leaf blower use from community members that are received via telephone, email or the City GO reporting system.

If OSE staff observe a leaf blower in use they will inform the operator of the law, give the operator a bi-lingual (English/Spanish) flyer that explains the ordinance and potential penalties for violating it, take a photo if possible, and then send a warning letter and photo to the involved parties (which may include but is not limited to the property owner, water customer, leaf blower operator, employer of the leaf blower operator, and property management company). The letter provides information about

the ordinance, states the violation and corrective action, and directs the recipient to respond within two weeks confirming that leaf blowers are no longer being used at the property. If and when a response letter from the recipient is received within two weeks, compliance for that violation is achieved and the case is closed.

In cases where a potential violation is reported by a member of the public that includes specific information regarding the date, time and location of the violation, a warning letter is issued, typically to the property owner, along with a printed bi-lingual flyer about the ordinance for the property owner to provide to their gardener, and the compliance course described above is followed. In cases where a potential violation is reported that does not include specific information regarding the violation, an educational letter (rather than a warning letter) is sent to the involved parties along with a bi-lingual flyer. These locations are then included in future patrol schedules in order to identify in the field potential future violations.

If a repeat violation occurs at a property, OSE will issue a second warning letter. If compliance is not achieved within two weeks of the second warning letter being sent a citation will be issued. In all cases, the responsible parties are provided two warnings before a citation is issued. This is consistent with the procedure for enforcement of the City's urban runoff and water conservation ordinances, which has proven effective at achieving compliance through education. Because many of the violations are reported to OSE by members of the public, the provision of two warnings prior to issuing a citation also allows OSE staff to verify a violation in the field prior to the issuance of a citation.

Public Reporting of Leaf Blower Activity

For the six-month period through April 30, 2011, OSE received a total of 1,133 reports of leaf blowing activity from the public. These include 774 phone calls, 269 e-mails, and 90 GO reports. These totals include repeat violation locations. Violation reports from the

public have decreased over time as leaf blowing activity has decreased (see Table 1 below).

Violations Identified Directly by OSE Staff

Over the same time period OSE staff observed 167 violations during regular patrols. The frequency of these violations has also decreased over time.

Warning Letter and Citation Summary

Based upon the violation reports from the public and direct observation of violations by OSE staff, a total of 1300 violation reports were entered into the leaf blower database through April 30, 2011. In some cases more than one report was received from the public for the same violation. A total of 1,173 individual violations of the ordinance (including first and second violations at the same address) were identified and warning letters were mailed to appropriate parties in all instances. Table 1 shows the violations identified during each of the first six months of enforcement. The number of monthly violations reached a high point of 278 during December 2010 and decreased by 60% to 112 by April 2011. The peak in December coincided with full implementation of OSE's outreach efforts.

Table 1 – Leaf Blower Violations By Month

Nov 2010	215
Dec 2010	278
Jan 2011	240
Feb 2011	154
Mar 2011	174
Apr 2011	112
Total	**1173**

Of the 1,173 total cases, 526 cases have been closed, meaning that the responsible party of a violation location contacted the City to acknowledge the problem and verify in writing that leaf blowing has ceased and will not occur in the future at the property. As of April 30, 2011 the remaining 647 cases were still open because the recipients of the warning letters have not yet responded to OSE. The majority of the open cases are past due for response and have been included in the patrol schedule in order to verify potential future violations in the field. As noted above, future violations at these locations will result in either a second warning or issuance of a citation. Attachment A plots the geographic locations of all open and closed cases. OSE staff also tracks all violations by time of day and day of the week in order to coordinate patrol schedules.

To date, no citations have been issued by the OSE office. In three cases where a third violation was observed that triggered a citation (meaning that the property had already received two warning letters), OSE staff proactively contacted responsible parties to alert them that a fine would result if they did not immediately address the present leaf blower violation. Compliance was achieved in each of these cases and citations were not issued.

Summary

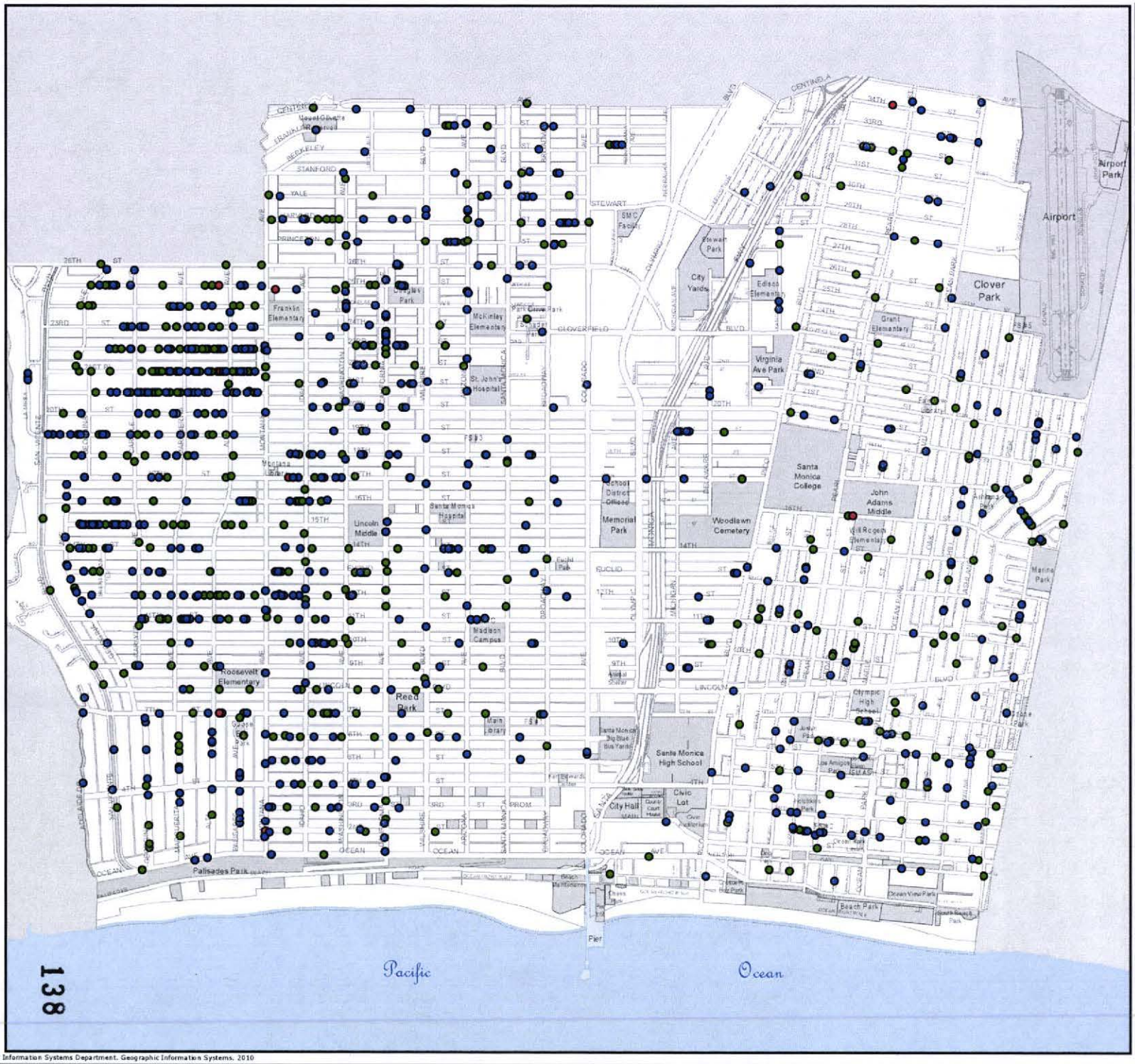
Since adoption of the amended leaf blower ordinance OSE has implemented a public education and outreach strategy, and is maintaining an ongoing outreach and enforcement effort. While it is not possible to determine the precise amount of leaf blowing activity prior to October 2010 or current leaf blower usage, the combination of educational outreach, increased enforcement presence and issuance of warning letters is having an impact on leaf blowing activity in Santa Monica. Since November 2010 leaf blowing activity has ceased at more than 500 properties in the City, more than 600 other locations have been identified and are in the process of coming into compliance. Initial call volumes from the public and observed incidences of leaf blowing activity by OSE

staff have dropped over time since OSE began its enforcement in October 2010, and monthly violations of the ordinance have dropped by 60% since December 2010 .

Prepared by: Neal Shapiro, Watershed Program Coordinator

Attachments:

A: City map showing all violation locations



CITY OF SANTA MONICA

Leaf Blower
Reported Violations
November 2010 – April 2011
Total Violations: 1173

LEGEND

- Letter Sent (Total: 598)
- 2nd Letter Sent (Total: 49)
- Closed - No Fine (Total: 526)
- City Blocks
- Public Facilities

N W E S

Miles
0 0.15 0.3

Scale: 1 in = 0.42 mi

Disclaimer:
This map of the City of Santa Monica has been provided for illustration purposes only. Every reasonable effort has been made to ensure the accuracy of the maps provided, however, some information may not be available. The City of Santa Monica ("City") provides this map on an "AS IS" basis. The City assumes no liability for damages arising from errors or omissions. THE MAPS ARE PROVIDED WITHOUT WARRANTY OF ANY KIND, either expressed or implied, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose. Do not make any business decisions based on this map before validating your decision with the appropriate City office.

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Information Systems Department. Geographic Information Systems. 2010

Attachment 9

BOARD MEETING DATE: April 7, 2017 AGENDA NO. 5

PROPOSAL: Execute Contracts to Conduct 2017 Leaf Blower Exchange Program

SYNOPSIS: At its December 2, 2016 meeting, the Board approved release of a Program Announcement to solicit competitive bids from manufacturers of zero or low emission/low noise commercial leaf blowers. This action is to award contracts to conduct the 2017 Leaf Blower Exchange Program in an amount not to exceed $563,400 from the Rule 2202 AQIP Special Revenue Fund (27).

COMMITTEE: Mobile Source, March 17, 2017; Recommended for Approval

RECOMMENDED ACTIONS:
Authorize the Chairman to execute the contracts listed below, totaling $563,400 from the Rule 2202 AQIP Special Revenue Fund (27):

a. A contract with Black & Decker to exchange any combination of handheld and backpack battery-electric leaf blowers in an amount not to exceed $147,200; and
b. A contract with Pacific STIHL to exchange up to 1,000 gasoline and any combination of handheld and backpack battery-electric leaf blowers in an amount not to exceed $416,200, comprised of up to $188,000 for gasoline leaf blowers and up to $228,200 for battery-electric leaf blowers.

Wayne Nastri
Executive Officer

MMM:FM:LCM:VY

Background
The Rule 2202 Air Quality Investment Program (AQIP) allows employers to participate by electing to invest in an SCAQMD administered restricted fund. Effective July 1, 2016, investment can be either $46.73 annually per employee reporting to the worksite during the 6:00 a.m. to 10:00 a.m. peak window or $129.79 triennially per employee. The restricted monies are to be used by the SCAQMD to fund proposals that achieve mobile source emission reductions that would otherwise have been achieved by implementing a rideshare program.

At its December 2, 2016 meeting, the Board approved the release of Program Announcement #PA2017-02 to solicit bids from potential manufacturers/suppliers of zero or low emission/low noise commercial leaf blowers to provide units at a discounted price to be used for the SCAQMD's 2017 Leaf Blower Exchange Program. The primary goal of the Leaf Blower Exchange Program is to replace existing two-stroke backpack blowers currently used by commercial landscapers/gardeners within the South Coast Air Basin with new zero emission or four-stroke blowers, which have significantly reduced emission and noise levels.

Outreach

In accordance with SCAQMD's Procurement Policy and Procedure, a public notice advertising the PA and inviting bids was published in the Los Angeles Times, the Orange County Register, the San Bernardino Sun, and Riverside County's Press Enterprise newspapers to leverage the most cost-effective method of outreach to the South Coast Basin.

Additionally, potential bidders may have been notified utilizing SCAQMD's own electronic listing of certified minority vendors. Notice of the PA was emailed to the Black and Latino Legislative Caucuses and various minority chambers of commerce and business associations, and placed on the Internet at SCAQMD's website (http://www.aqmd.gov).

Bid Evaluation

Pacific STIHL and Black & Decker submitted proposals by the Program Announcement due date. Pacific STIHL offered three types of leaf blowers: two zero emission battery-operated BGA85 and BGA100 model blowers, in addition to the gasoline BR500 model blower that meets the low exhaust emission standards ("Blue Sky Series") required by the Program Announcement. The BGA85 is a handheld battery-electric model, and the BGA100 is a backpack battery-electric model. Black & Decker offered two zero emission battery-operated DCBL790X1 and DCBL590X2 models utilizing their DeWalt blowers. The DCBL790X1 is a handheld battery-electric model, and the DCBL590X2 is a backpack battery-electric model.

Proposal

This Program will exchange up to 2,300 old two-stroke leaf blowers with new four-stroke gasoline and zero emission blowers. Staff proposes to offer the STIHL's BR500 gasoline model in addition to the two zero emission models as well as Black & Decker's two zero emission DeWalt models in the 2017 Leaf Blower Exchange Program. Tables 1 and 2 provide the specifications and pricing information for the proposed models from Pacific STIHL and Black & Decker.

SCAQMD's past leaf blower exchanges for commercial gardeners/landscapers have been conducted at STIHL dealerships. Both Pacific STIHL and Black & Decker will

conduct general outreach by direct mail, email and promotion in their local dealerships and factory service centers. Typically, 13 exchange events are set up across the Basin, and for the convenience of the participants, the exchange events take place during consecutive weekdays. Due to the great demand, and to prevent long lines, pre-registration will be required.

At the event site, the old gasoline-powered leaf blowers will be tested for operation and then drained of all fluids in a responsible manner and collected for scrapping. The vendors will haul the traded-in blowers to a scrapping yard where they are crushed and recycled. The vendors will also provide training for the proper use of the equipment at each of the exchange sites. This format has been used for all prior exchange programs.

This is the first year that multiple technologies and models of battery-electric leaf blowers are offered by two vendors. Therefore, staff recommends allocating a total funding amount of $416,200 to Pacific STIHL, comprising 1,000 units of BR500 (gasoline) blowers in an amount not to exceed $188,000 as well as 150 units of BGA85 and 500 units of BGA100 blowers in an amount not to exceed $228,200. Staff also recommends allocating a total funding amount of $147,200 for Black & Decker's two zero emission DeWalt models, comprising 150 units of the DCBL790X1 model and 500 units of the DCBL590X2 model. The total number of all the units shall not exceed 2,300. However, based on customer demand, any combination (other than the 150 and 500 units split between the handheld and backpack electric models) can be funded, as long as the funding is within the total allocated amount for those two models.

Benefits to SCAQMD

The current CARB emissions standard for commercial leaf blowers is 72 grams of HC + NO_x per kilowatt hour. The STIHL BR500 model has been certified by CARB at 16 grams of HC + NOx per kilowatt hour. The 16 gram per kilowatt hour exceeds CARB's Blue Sky criteria of 36 grams for products in its displacement category. Because of its low emission levels and low noise level rating, Model BR500 was used in all prior Leaf Blower Exchange Programs. The cost-effectiveness of this model is $0.53 per pound. The cost-effectiveness of the zero emission BGA85 and BGA100 models are $0.32 and $0.67 per pound, respectively. Black & Decker's DeWalt models are both zero emission battery-operated models and the cost-effectiveness of the handheld DCBL790X1 and the backpack DCBL590X2 models are $0.25 and $0.42 per pound, respectively.

Resource Impact

Total expenditures for the proposed program shall not exceed $563,400 from the Rule 2202 AQIP Special Revenue Fund (27).

Attachments

Table 1 – Leaf Blower Specifications and Pricing for Pacific STIHL
Table 2 – Leaf Blower Specifications and Pricing for Black & Decker

Table 1: Leaf Blower Specifications and Pricing

Pacific STIHL

Leaf Blower Specifications			
Blower Model	**BR 500 (Gasoline)**	**BGA 85 (handheld)**	**BGA 100 (backpack)**
HC+NOx Certification Level (g/kW-hr)	16	N/A	N/A
CO Certification Level (gm/kW-hr)	307	N/A	N/A
Noise Rating in dB(A)	65	66	56
Air Velocity (mph)	181	104	141
Air Volume (cfm)	477	391	494
Weight With Batteries (lbs)	22.3	10.8	N/A
# of Batteries Included	N/A	1	1
# of Chargers Included	N/A	1	1
Battery Amp Hour (Ah)	N/A	6.0	23.7
Voltage (V)	N/A	36	36
Battery Run Time (Min.)	N/A	24	130
Warranty Period for Commercial Users (Tool)	2 Yrs.	2 Yrs.	2 yrs.
Warranty Period for Commercial Users (Battery)	N/A	2 Yrs.	2 Yrs.
Factory Service Centers	120	120	120
Leaf Blower Price Information			
MSRP	**$ 479.95**	**$ 479.93**	**$ 1,419.92**
SCAQMD Discounted Price	**$ 437.97**	**$ 387.97**	**$ 900**
SCAQMD pays	**$ 187.97**	**$ 187.97**	**$ 400**
Customer's Price (+Tax)	**$ 250**	**$ 200**	**$ 500**

Table 2: Leaf Blower Specifications and Pricing

Black & Decker **DEWALT**

Leaf Blower Specifications		
Blower Model	**DCBL790X1 (Handheld)**	**DCBL590X2 (backpack)**
Noise Rating in dB(A)	67	63
Air Velocity (mph)	120	142
Air Volume (cfm)	400	450
Weight With Batteries (lbs)	11.4	With 1 battery: 22 With 2 batteries: 27
# of Batteries Included	1	2
# of Chargers Included	1	1
Battery Amp Hour (Ah)	7.5	7.5
Voltage (V)	40	40
Battery Run Time (Min.)	27	39
Warranty Period for Commercial Users (Tool)	3 Yr. Limited 1 Yr. Free Service	3 Yr. Limited 1 Yr. Free Service
Warranty Period for Commercial Users (Battery)	2 Yr. Free Service	2 Yr. Free Service
Factory Service Centers	2	2
Leaf Blower Price Information		
MSRP	**$ 349.00**	**$ 699.00**
SCAQMD Discounted Price	**$ 297.49**	**$ 499.99**
SCAQMD Pays	**$ 147.49**	**$ 249.99**
Customer's Price (+Tax)	**$ 150**	**$ 250**

Attachment 10

South Coast AQMD

2017 Commercial Leaf Blower EXCHANGE PROGRAM

Registration Opens July 11 — Call To Register 1-888-425-6247

The South Coast Air Quality Management District will open registration for this year's Leaf Blower Exchange Program on July 11. Exchange events will be held August 14-31 at multiple locations. Pre-registration is REQUIRED and the reservation is only valid for the date and location pre-selected. A maximum of five (5) leaf blowers can be exchanged per company/organization. Commercial landscapers and gardeners operating within the South Coast Air Basin can exchange gasoline-powered backpack leaf blowers for new low-emission/low-noise backpack leaf blowers from DeWALT and STIHL at a discounted price. Participation is also open to city and county agencies, special districts, school districts and colleges.

This year we are offering four (4) battery-electric models and one (1) gasoline-powered model. Discount prices are available with the trade-in of a working, gasoline-powered backpack leaf blower. Compliant with state law, sales tax will be charged on the full retail value of the leaf blower.

Model	Discounted Price
DeWALT DCBL790X1 Battery-electric handheld leaf blower (includes battery and charger)	**$150** with trade-in (Retail value $349)
DeWALT DCBL590X2 Battery-electric back pack leaf blower (includes battery and charger)	**$250** with trade-in (Retail value $699)

DeWALT

Model : DCBL590X2

Model	Discounted Price
STIHL BGA 85 Battery-electric back pack leaf blower (includes battery and charger)	**$200** with trade-in (Retail value $479.93)
STIHL BGA 100 Battery-electric back pack leaf blower (includes battery and charger)	**$500** with trade-in (Retail value $1,419.92)
STIHL BR 500 Gasoline-powered back pack leaf blower	**$250** with trade-in (Retail value $479.95)

STIHL

Model : BGA 100

Please note it is the user's responsibility to comply with all local ordinances pertaining to the use of this equipment.

To register you must speak with an attendant by calling 1-888-425-6247 (Tuesday-Friday from 8 a.m. to 5 p.m.). Please do not leave a message or email your request. For more information on the leaf blowers, please visit our Web page at www.aqmd.gov/home/programs/community and select Lawn Equipment. If you have a question you can email *leafblower@aqmd.gov.*

Exchange Dates and Locations

Only morning reservations from 8 a.m. to 12 p.m. are available.

Mon. Aug.14	Tues. Aug. 15	Wed. Aug. 16	Thur. Aug. 17	Fri. Aug. 18
Palm Springs Lynwood Anaheim (D)* Ontario (D)	Rancho Cucamonga Van Nuys Anaheim (D) Ontario (D)	Riverside Inglewood Anaheim (D) Ontario (D)	Chino Irvine Anaheim (D) Ontario (D)	San Bernardino Westminster
Mon. Aug. 21	**Tues. Aug. 22**	**Wed. Aug. 23**	**Thur. Aug. 24**	
North Hollywood Anaheim Anaheim (D) Ontario (D)	La Verne Santa Ana Anaheim (D) Ontario (D)	Rialto Pasadena Anaheim (D) Ontario (D	Fontana La Habra Anaheim (D) Ontario (D)	
Mon. Aug. 28	**Tues. Aug. 29**	**Wed. Aug. 30**	**Thur. Aug. 31**	
Anaheim (D) Ontario (D)	Anaheim (D) Ontario (D)	Anaheim (D) Ontario (D)	Anaheim (D) Ontario (D)	

* *D- designates DeWALT. All other locations are STIHL exchange events.*

www.aqmd.gov

Program sponsored by SCAQMD

Attachment 11

ORDINANCE No. _____

AN ORDINANCE OF THE CITY OF PALM SPRINGS, CALIFORNIA, ADDING SUBSECTION (k) TO SECTION 11.74.043 AND SECTION 5.78.050, AND AMENDING SECTION 5.78.010 OF THE PALM SPRINGS MUNICIPAL CODE, REGARDING LOUD, UNUSUAL NOISES AND LANDSCAPE RELATED BUSINESSES, PROHIBITING GASOLINE POWERED LEAF BLOWERS IN THE CITY AS A PER SE NUISANCE COMMENCING ON JANUARY 1, 2019, AND PROVIDING FOR REGULATION OF ELECTRICAL OR BATTERY POWERED LEAF BLOWERS.

City Attorney Summary

This Ordinance prohibits the use of gasoline powered leaf blowers in the City commencing on January 1, 2019, and provides for the regulation of electrical or battery powered leaf blowers.

The City Council of the City of Palm Springs Ordains:

SECTION 1. The City Council hereby makes the following factual findings: ***(i)*** as of the date of this Ordinance's adoption, there is no technology or practice that will prevent gasoline powered leaf blowers from constituting a "noise disturbance" as that term is defined under the Palm Springs Municipal Code, and ***(ii)*** to mitigate potentially undesirable logistic impacts of this Ordinance, and accomplish the gradual acceptance of the requirements of this Ordinance by all parties as desired by the Council, the City should issue warnings as to violations after this Ordinance's effective date, but should issue no citation for any violation hereof until 12:01 am on April 1, 2019.

SECTION 2. Add Subdivision (k) to Section 11.74.043 to Chapter 11.74 of the Palm Springs Municipal Code, re "Loud, Unusual Noises," to read:

(k) Gasoline Powered Leaf Blowers.

The use of gasoline powered leaf blowers, to produce a current of air and thereby push, propel or blow cuttings, refuse or debris, or otherwise shall be prohibited within the corporate limits of the City.

SECTION 3. Add Section 5.78.050 to Chapter 5.78 of the Palm Springs Municipal Code, re "Landscape Related Businesses," to read:

The City Manager, or his/her designee is hereby authorized and directed to adopt guidelines for the proper use of electrical or battery powered leaf blowers, which guidelines shall promote the safe and efficient use of leaf blowers while also mitigating,

to the extent possible, the noise and nuisance effects of Leaf blowers. The Finance Department is hereby directed to provide a copy of this Ordinance and the leaf blower guidelines to each person obtaining a City business license for the operating of a gardening or landscape maintenance service or business within the City.

SECTION 4. Amend Section 5.78.010 in Chapter 5.78 of the Palm Springs Municipal Code, re "Landscape Related Businesses," to read:

The purpose and intent of this chapter is to promote the public health, safety, and general welfare by insuring that landscape related businesses operating within the city understand and appreciate ***(i)*** the grass over-seeding alternative promoted by CVAG, AQMD, and local stakeholders, which alternative eliminates the need for turf scalping, serves as an important air quality control measure, and thereby enhances the local air quality, and ***(ii)*** the City's determination that electrical or battery powered leaf blowers authorized for use in the City of Palm Springs is an activity that must be regulated.

SECTION 5. Neither introduction nor adoption of this Ordinance represents a "project" for purposes of the California Environmental Quality Act (CEQA), as that term is defined by CEQA guidelines (Guidelines) section 15378, because this Ordinance is an organizational or administrative activity that will not result in a direct or indirect physical change in the environment, per section 15378(b)(5) of the Guidelines.

SECTION 6. The Mayor shall sign, and the City Clerk shall certify to the passage and adoption of this Ordinance and shall cause the same, or the summary thereof, to be published and posted pursuant to the provisions of applicable law; this Ordinance shall take effect at 12:01 am on January 1, 2019.

PASSED, APPROVED AND ADOPTED BY THE PALM SPRINGS CITY COUNCIL THIS ___ DAY OF _____, 2017.

ROBERT MOON, MAYOR

ATTEST:

KATHIE HART, INTERIM CITY CLERK

ORDINANCE No. ____

AN ORDINANCE OF THE CITY OF PALM SPRINGS, CALIFORNIA, ADDING SUBSECTION (k) TO SECTION 11.74.043 AND SECTION 5.78.050, AND AMENDING SECTION 5.78.010 OF THE PALM SPRINGS MUNICIPAL CODE, REGARDING LOUD, UNUSUAL NOISES AND LANDSCAPE RELATED BUSINESSES, PROHIBITING GASOLINE POWERED AND ELECTRICAL/BATTERY-POWERED LEAF BLOWERS IN THE CITY AS A PER SE NUISANCE COMMENCING ON JANUARY 1, 2019, AND PROVIDING FOR REGULATION OF ELECTRICAL OR BATTERY POWERED LEAF BLOWERS.

City Attorney Summary
This Ordinance prohibits the use of gasoline powered and electrical/battery powered leaf blowers in the City commencing on January 1, 2019.

The City Council of the City of Palm Springs Ordains:

SECTION 1. The City Council hereby makes the following factual findings: ***(i)*** as of the date of this Ordinance's adoption, there is no technology or practice that will prevent gasoline powered or electrical/battery powered leaf blowers from constituting a "noise disturbance" as that term is defined under the Palm Springs Municipal Code, and ***(ii)*** to mitigate potentially undesirable logistic impacts of this Ordinance, and accomplish the gradual acceptance of the requirements of this Ordinance by all parties as desired by the Council, the City should issue warnings as to violations after this Ordinance's effective date, but should issue no citation for any violation hereof until 12:01 am on April 1, 2019.

SECTION 2. Add Subdivision (k) to Section 11.74.043 to Chapter 11.74 of the Palm Springs Municipal Code, re "Loud, Unusual Noises," to read:

(k) Leaf Blowers.

The use of gasoline powered or electrical/battery powered leaf blowers, to produce a current of air and thereby push, propel or blow cuttings, refuse or debris, or otherwise shall be prohibited within the corporate limits of the City.

SECTION 3. Add Section 5.78.050 to Chapter 5.78 of the Palm Springs Municipal Code, re "Landscape Related Businesses," to read:

The City Manager, or his/her designee is hereby authorized and directed to adopt guidelines for the proper provisions of landscape maintenance, which guidelines shall promote alternative methods of yard cleanup without the use of leaf blowers. The

Finance Department is hereby directed to provide a copy of this Ordinance and the landscape maintenance guidelines to each person obtaining a City business license for the operating of a gardening or landscape maintenance service or business within the City. The Finance Department shall also require each such gardening or landscape maintenance service or business within the City to execute an acknowledgement of the City's prohibition on the use of leaf blowers and the violations resulting from the continued use of leaf blowers, on a form approved by the City Manager.

SECTION 4. Amend Section 5.78.010 in Chapter 5.78 of the Palm Springs Municipal Code, re "Landscape Related Businesses," to read:

The purpose and intent of this chapter is to promote the public health, safety, and general welfare by insuring that landscape related businesses operating within the city understand and appreciate ***(i)*** the grass over-seeding alternative promoted by CVAG, AQMD, and local stakeholders, which alternative eliminates the need for turf scalping, serves as an important air quality control measure, and thereby enhances the local air quality, and ***(ii)*** the City's determination that the use of gasoline, electrical or battery powered leaf blowers in the City of Palm Springs is an activity that must be prohibited.

SECTION 5. Neither introduction nor adoption of this Ordinance represents a "project" for purposes of the California Environmental Quality Act (CEQA), as that term is defined by CEQA guidelines (Guidelines) section 15378, because this Ordinance is an organizational or administrative activity that will not result in a direct or indirect physical change in the environment, per section 15378(b)(5) of the Guidelines.

SECTION 6. The Mayor shall sign, and the City Clerk shall certify to the passage and adoption of this Ordinance and shall cause the same, or the summary thereof, to be published and posted pursuant to the provisions of applicable law; this Ordinance shall take effect at 12:01 am on January 1, 2019.

PASSED, APPROVED AND ADOPTED BY THE PALM SPRINGS CITY COUNCIL THIS ___ DAY OF _____, 2017.

ROBERT MOON, MAYOR

ATTEST:

KATHIE HART, INTERIM CITY CLERK

K. HOVNANIAN'S®
FOUR SEASONS
AT PALM SPRINGS COMMUNITY ASSOCIATION, INC.

June 13, 2017

WHEREAS, K. Hovnanian's Four Seasons at Palm Springs Community Association, Inc., is a community located in the City of Palm Springs;

And WHEREAS, the Palm Springs City Council requested of Staff to create a second ordinance for a complete ban of gas, electric and battery-operated leaf blowers;

And WHEREAS, the City of Palm Springs has not performed any community outreach on the impact to businesses, landscapers, homeowners, and HOAs of a complete ban on leaf blowers;

And WHEREAS, the fiscal impact to K. Hovnanian's Four Seasons at Palm Springs Community Association, Inc., on a complete ban will be a 25% increase to our monthly landscape budget;

THEREFORE, BE IT RESOLVED that K. Hovnanian's Four Seasons at Palm Springs Community Association, Inc., opposes any ordinance that would include a ban on electric and battery-operated leaf blowers;

And BE IT FURTHER RESOLVED that the City of Palm Springs should solicit community outreach on both ordinances to fully understand the impact on businesses, landscapers, homeowners, and HOAs.

This resolution is adopted and made part of the minutes of the Special Open Board meeting on June 13, 2017.

By: _____
Vice-President

Attested: _____
Secretary

3800 FOUR SEASONS BLVD. • PALM SPRINGS, CA 92262 • PHONE: 760-323-3008 • FAX: 760-323-1520

June 13, 2017

Mayor Rob Moon
Mayor Pro Tem Ginny Foat
Councilmember Chris Mills
Councilmember Geoff Kors
Councilmember J.R. Roberts
3200 E. Tahquitz Way
Palm Springs, CA 92262

Via email and US Mail

Dear Mayor Moon, Mayor Pro Tem Foat, and Councilmembers Mills, Kors, and Roberts,

At our most recent meeting of Advisors for the Old Las Palmas Neighborhood Organization on June 8th we discussed the proposed City ordinance to ban leaf blowers that was discussed by Council on June 7th. Apparently the ordinance as now requested by Council will ban all leaf blowers, both gas and electric. We are opposed to this action as we see it as a hardship on our gardeners and on the residents whose gardening and landscaping bills will certainly increase.

We suggest the following issues that need to be addressed:

-For some years residents have been encouraged by the City of Palm and the Desert Water Agency to convert their existing water intolerant landscaping to desert water saving landscaping. It is a fact that this new desert landscaping is much better maintained by blowers than by raking or sweeping. Blowers are more efficient labor wise and do a much better job. Some residents have chosen rocks or cobble as landscaping. It is completely impossible to rake or sweep rock or cobble landscaping. Blowers are the only way to maintain this attractive choice.

-In particular, those residents with artificial grass will face even more challenges. Artificial grass is very difficult to rake or vacuum, and blowers are by far the best way to clean artificial grass. Again, residents were encouraged to install artificial grass and now they will have to work harder and pay more to maintain their landscapes.

-The banning of blowers will undoubtedly necessitate more labor hours for landscapers. This means landscape laborers will have to work even more hours in the hot desert sun to get the same amount of work done. It also means that owners and managers of landscaping firms will be faced with increasing labor costs which will undoubtedly be passed on to residents of Palm Springs.

Again, we as a neighborhood are asking you to reconsider this ban and continue to allow blowers to be used in Palm Springs. Perhaps there is a compromise that might work:

-Only allow blowers to be used from Monday Morning until Friday at Noon. That way the weekends will be free of blower noise.

While maintaining the use of electric blowers might seem like a compromise as well, the fact is that electric blowers simply do not work as well and have short battery life, and noted by City Manager David

Ready in the last meeting. We do not see this as a good solution. We prefer the "days of the week" solution.

Most of the residents in neighborhood were not aware until early last week about the proposed blower ordinance that was considered on Wednesday the 7th. We would ask that in the future the time frame be longer so that neighborhoods can be better informed.

We would welcome a meeting with a sub-committee of the City Council if one exists on this issue, or with concerned Councilmembers if there is no sub-committee. We would also welcome a meeting with the Sustainability Commission if more appropriate.

We as an Advisory Board all agreed to the direction suggested in this letter. Our members names are listed below. Thank you in advance for your consideration of these issues and we hope for a satisfactory solution.

Best Regards,

John Williams

John Williams, Chair
Rick Moran, Vice-Chair
Doug Donenfeld, Secretary
Gary Grace, Treasurer
Louise Hampton, Advisor
Dan Kiser, Advisor
Peter Mahler, Advisor
Mike King, Advisor
Tracy Donnell, Advisor
James Williamson, Advisor
Jessica Grace, Advisor
Karen Moran, Advisor
Steven Moses, Advisor

Kathie Hart

From: Staci Schafer
Sent: Monday, June 19, 2017 9:08 AM
To: Kathie Hart; Cindy Berardi
Subject: FW: The people are the city?

Ladies,

I will be sending a copy of this email to the Sustainability Commissioners, but I am not sure how you disseminate it to the City Council, as it is an agenda item for them as well.

Thanks,
Staci A. Schafer
Director of Maintenance & Facilities
City of Palm Springs
425 N Civic Drive
O. 760-323-8170
F. 760-322-5581

Palm Springs is an inclusive world-class city dedicated to providing excellent and responsive public services to enhance the quality of life for current and future generations.

From: Abraham Vega [mailto:abrahamv16@gmail.com]
Sent: Sunday, June 11, 2017 5:20 PM
To: Staci Schafer
Subject: The people are the city?

Dear Staci,

I'm not entirely sure on who I should be sending this email to. However, I am wondering why the landscape, construction, or roofer business owners weren't invited to the meeting concerning leaf blowers? A few years ago we were all mailed a notice. That makes it easier for us to be directly informed as opposed to hearing from it on the news. Some of us don't use social media.

My concern is that we are being pushed aside as if we aren't members of the community or the collective of "people" the "city" belongs to.

The city is beautiful and well maintained by our part of the community. I know I missed out on the meeting but I would still like to express my views from our side of the spectrum. This directly affects us. Most of our clientele won't be willing to pay new price of the labor we will be forced to charge. I know "forced" seems strong but we won't have another choice if this passes. We obviously have many people in our community that don't have legal residency. They are a major reason why our prices are currently lower than they should be. There are also people willing to pay for the low quality of work they receive just to keep more money in their pockets. This leaves us, business owners licensed by the city, to end up losing work for an irrational decision based on what others think is best for everybody without taking our part of the community into consideration.

I know there are plenty of other cities that have banned leaf blowers. Banning something doesn't make it disappear. I heard at the last meeting "Indian Wells banned blowers." I'm not sure if you have visited Indian Wells lately, but the blowers are continuing to be used.

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The blowers help us get through these brutal summers by cutting our work days by hours compared to raking and sweeping. The roofers don't have to get too close to the edge of a roof risking injury and/or death.

All the motors on string trimmers, chainsaws, hedge trimmers, pole saws, power sweepers, tillers, edgers, leaf vacuums/shredders, and leaf blowers are completely the exact same! They just adjust the mounting and the purpose of the engine to add it to any above application.

We wish there was a way for us to all get our way. Obviously it is impossible. The battery operated blowers are not adequate for the professional landscaper. The obvious and apparent high winds still bring dust and sandstorms. If we can't wash or do blower on the hardscapes, when will we every clean the city? The current desert landscape craze has brought beautiful blooming plants that will never be able to be cleaned in between all the rock scape bases that have been installed.

Please consider the visual appearance of the city and realize how beautiful it is. Let's keep the people coming, let's let our city flourish. I ask that you please let the decision be based on the homeowner's own opinion rather than you making it for them. We are all a part of this great community and city, please treat us this way. Thank you for reading this and please consider our take on this subject the directly affects us.

Sincerely,

Vega's Gardening Service

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Terri Milton

From: Paul Zak <paulinps@icloud.com>
Sent: Wednesday, June 14, 2017 1:52 PM
To: Geoff Kors; JR Roberts; Robert Moon; Ginny Foat; Chris Mills; CityClerk
Subject: Leaf Blowers

Dear Mr. Mayor and Members of the Palm Springs City Council:

I recently read that you are considering banning all leaf blowers (gas and electric powered) from being used in the City of Palm Springs. I am concerned about the extent of a possible ban.

I am in favor of banning gas powered leaf blowers but have reservations about banning all leaf blowers. I understand the pollution caused by the use of gas (hydrocarbon and nitrogen oxide emissions). I understand the noise issue and the fact that all leaf blowers create dust which is full of pollen and particulates. However, I think all of this needs to be weighed against the necessity to clean one's property.

Under our water conservation policy, we cannot wash hardscape, so we do not have the option of using water to clean our sidewalks and driveways. In the case of my yard, raking is not an option. I have small gravel and it is impossible to rake up debris without taking a significant amount of gravel with it. Believe me, I have tried. With our winds, clean-up is required from time to time, and the only thing I have found to be effective is the use of a leaf blower by our gardener every couple of weeks.

It seems to me that, rather than an outright total ban, there could be some restrictions on the use of leaf blowers: for example, ban gas powered ones because of the noxious smell and contribution to pollution but allow battery powered or electric leaf blowers between 8AM-1PM (or some timeframe). Noise can be an issue but I do not think that is sufficient to ban these machines which do provide a waterless way to clean debris from our yards. Occasional noise in the interest of keeping our City clean is worth it. The wind itself blows dust and pollen in amounts far surpassing that produced by leaf blowers, so I do not believe that occasionally using leaf blowers significantly adds to the dust and pollen situation.

In sum, I believe that there is a place for electric or battery-powered leaf blowers in keeping our yards and City clean.

I hope you will take a more nuanced approach to this issue than an outright ban of all leaf blowers.

Thank you.

Sincerely,

Paul Zak
2177 Paseo Roseta
Palm Springs, CA 92262
paulinps@icloud.com

Terri Milton

From: Tim Erkins <timothybe@hotmail.com>
Sent: Friday, June 16, 2017 2:21 PM
To: Robert Moon; Chris Mills; Ginny Foat; Geoff Kors; JR Roberts
Cc: David Ready; CityClerk; Tim Erkins
Subject: Leaf Blowers (Ban on Gas NOT electric) and change hours to M-F 9-5pm use.

I am unable to attend the June 21st City Council meeting, so for the record please note my ideas and feelings on the potential ban of all leaf blowers. A good example of why we need them if you have not gone to look, go to the new corner park behind West Elm store and next to the O'Donnell Golf Course. You will see the debris from all the trees that have built up that is from the golf course tall trees that shed their leaves yearly and also note the spiders, rats, muddy composition of the breakdown there. It is not pleasant for many reasons and one being health hazard of debris.

1. I am in favor of banning all ***GAS*** powered leaf blowers for environmental reasons. With a January 2019 start date, so the city and the landscapers can get more research on better leaf blowers out there during this time. Perhaps we approve 5 brands of leaf blowers that can be used in the city limits that meet our noise and electric power use ability.
2. I **STRONGLY OPPOSE** a ban on *electric or battery* powered leaf blowers. It is impossible to adequately removed the excess leaves without a leaf blower given the desert ¾ rock landscaping we did due to drought after removing lawns. It also gets very dusty here in Palm Springs, it is the desert. If you can't use a blower to remove the sand/dust then many people will end up using a hose/water to clean things up. Our goal is to *save water not use more water*. Personally the drought restrictions should not have been lifted for the state, for we need to prepare for the future, just as we are doing with *solar on new construction*. *Perhaps we be a leader in the state* and reestablish the drought protection guidelines to conserve water as a city. Be a leader on that for we need to do right for the future.
3. I am in favor of implementing a program where one can ONLY USE a leaf blower between certain hours (for example 9:00 to 5:00 Monday thru Friday only). This too would limit the noise use and leave weekend and holidays free of noise.

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Gmail Charles Dunn RL B <rlbslc@gmail.com>

Bowers

2 messages

RL B <rlbslc@gmail.com> Wed, Jun 21, 2017 at 8:38 AM
To: Christina.chartier@palmspringca.gov

Christina, could you get this email to the members of the Palm Springs City Council.
First of all I want to express my concern of items that hit the agenda for your important time.
I do not feel that legislating the use of yard blowers is appropriate. What about Chainsaws to trim our beautiful palm trees. and what about those lawnmowers?
What about mother nature that blows dust and sand. Want about families that have children that make loud noises.
WHAT ABOUT THE COST OF KEEPING OUR BEAUTIFUL CITY "BEAUTIFUL".

A wrong vote here will cost you my vote

Bob Bowcut

Mail Delivery Subsystem <mailer-daemon@googlemail.com> Wed, Jun 21, 2017 at 8:38 AM
To: rlbslc@gmail.com

Address not found

Your message wasn't delivered to **Christina.chartier@palmspringca.gov** because the domain palmspringca.gov couldn't be found. Check for typos or unnecessary spaces and try again.

The response was:

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DNS Error: 139993928 DNS type 'mx' lookup of palmspringca.gov responded with code NXDOMAIN
Domain name not found: palmspringca.gov
```

Final-Recipient: rfc822; Christina.chartier@palmspringca.gov
Action: failed
Status: 4.0.0
Diagnostic-Code: smtp; DNS Error: 139993928 DNS type 'mx' lookup of palmspringca.gov responded with code NXDOMAIN
Domain name not found: palmspringca.gov
Last-Attempt-Date: Wed, 21 Jun 2017 08:38:27 -0700 (PDT)

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——— Forwarded message ———

p.1 Jun 21 17 08:36a

Terri Milton

From:	Daniel <Dbarber872@aol.com>
Sent:	Thursday, July 06, 2017 10:40 AM
To:	CityClerk
Cc:	Philip Strout; Lisa Middleton; geoff@geoffkors.com; JR Roberts; Ginny Foat; Chris Mills; Robert Moon; board@lcno.org
Subject:	Comments Regarding Leaf Blowers

CIty Clerk,
Please forward the comments below to the city council.

Mr Mayor and City Council,

These comments, concerns and suggestions listed below are from those collected from the Nextdoor.com social media and discussion from members of the Los Compadres Neighborhood Organization. They do not reflect the opinion of any one individual or the consensus of the neighborhood.

In light of the fact that the council meeting on July 19th will have a section regarding leaf blowers, I wanted to share these with the council for consideration. It would be difficult at best to get these comments heard at the council meeting since there will be so many people wanting to discuss this topic.

General Comments

- No one likes leaf blowers but most consider them a necessary evil
- "Doesn't the council have more important things to consider like homelessness"
- "What's next after leaf blowers, lawn mowers? They make just as much noise and if you require gardeners to use rakes, they can use push mowers as well."
- "What about weed whackers? They make those whiny high pitched noises and spread the dust just as much."

Possible Solutions

- Rotate days/hours in sections of the city for gardening and leaf blowing. (Like we do for garbage pickup). This will allow some quiet time for each neighborhood.

- Partner with other cities and counties across the country to pressure the manufacturers to make less noisy and polluting products. (This was down in the electric utility business to bring us cfl and led lights.)

Dan Barber, Vice President and ONE-PS Representative
Los Compadres Neighborhood Organization
Sent from my iPad

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