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

January 25, 2000

Addendum to Appendix H

On December 27, 1999, ARB was mailed a redacted copy of a 1995 report entitled "Evaluation of Chemical Emissions From White Consolidated Industries Products"[1] (WCI). The WCI report was prepared for Poulan/Weed Eater to determine operator exposure levels for several chemicals that are present in handheld gasoline-powered equipment exhaust emissions, specifically chemicals that are listed under California's "Proposition 65" law as either carcinogens or reproductive or developmental toxins. Batelle, which prepared the WCI report, measured breathing zone concentrations during operation of a leaf blower, three chain saws, and a string trimmer and calculated user exposures. Before sending the report to ARB, however, all data relating to the chain saws and string trimmer were blacked-out.

The WCI report presents the only data on operator exposures from leaf blowers known to ARB at this time. As noted in the December 15, 1999 Report to the California Legislature on Potential Health and Environmental Impacts of Leaf Blowers (leaf blower report), exposure data are crucial for determining health impacts. Although the WCI report was received too late for incorporation into the leaf blower report, the following summary and analysis of the results of the WCI report may be useful for future research.

The WCI study measured breathing zone exposures of operators of certain power equipment to six toxic chemicals: formaldehyde, acetaldehyde, benzene, 1,3-butadiene, toluene, and carbon monoxide. The leaf blower tested was a consumer model with an engine displacement of 32 cc and engine horsepower of 0.9; the blower was run at full throttle for 30 minutes in each of two tests. Concentrations of the six toxic chemicals were measured and user exposures were calculated based on specified assumptions. The WCI report concludes that "[m]easured concentrations and calculated user exposures are below all existing concentration standards and Prop 65 allowable exposures. . . . Consequently, operator exposures to the target chemicals from normal use of WCI power equipment do not convey significant health risks as established under Prop 65."

Study limitations include a small sample size and potential bias towards conditions that could minimize risk calculations. As only one leaf blower was tested, the results cannot be assumed to represent all leaf blowers. As only two samples were collected from the leaf blower, the results are likely not representative of breathing zone concentrations that would be experienced by a variety of operators. Conditions during the test that could minimize measured concentrations, and thus underestimate risk, include 10 mph winds, one start-up per test (emissions are higher during start-up), and the use of a

[1] Batelle. Evaluation of chemical emissions from White Consolidated Industries products, final report. Prepared for Poulan/Weed Eater, Division of WCI Outdoor Products, Inc. Batelle: Columbus Operations. October 1995.

new, properly tuned leaf blower. Typically, older equipment emits more pollutants. In addition, the user exposure is calculated by assuming that 30-minutes is the maximum time of exposure for all users, and Batelle represents this as a "worst case" exposure. It is more likely that this represents a "best case" scenario for exposure, however, and that 8-hours of exposure would more likely represent a "worst case" scenario. Given these limitations, the WCI report supports ARB's conclusion that additional research is needed to better understand operator exposures to hazards.

Table 1. WCI Report Calculated Daily Exposure Levels

Weedeater model GBI-30V, 0.9 hp engine	Measured Conc. ($\mu g/m^3$)	Ambient Air Conc. ($\mu g/m^3$)	WCI Adjusted Conc. ($\mu g/m^3$)	WCI Calculated User Exposure (µg/day)	Standards (µg/day)
Formaldehyde	33.1, 28.1	22.6, 23.4	7.6	0.31	40*
Acetaldehyde	23.0, 22.2	12.3, 17.5	7.7	0.31	90*
Toluene	265, 144	2.0, 1.7	55.3	84	13,000+
Benzene	67.2, 45.2	0.84, 1.02	203	2.25	7*
1,3-Butadiene	0.92, <0.15	<0.15, <0.15	0.39	0.02	0.4*
Carbon Monoxide, ave.	3435, 6870	1145, <1145	4010	2005†	40000#
Carbon Monoxide, peak	29800, 43500	3435, 1145	34400	34400‡	458000**

†Assumes 30 minute exposure averaged over one-hour, in $\mu g/m^3$; an 8-hour exposure is assumed to be 250 $\mu g/m^3$, or 2005 $\mu g/m^3$ divided by 8 hours.
‡Measured peak in units of $\mu g/m^3$
*Prop 65 No Significant Risk Level
+Prop 65 Acceptable Daily Intake Level
#U.S. EPA One Hour Ambient Air Quality Standard (The California one hour standard is 23,000 $\mu g/m^3$)
**ACGIH Workplace Short Term Exposure Limit (15 min)