

May 2, 2006

Contact – Laura Scatena

**Workgroup Recommendations and Other Potential Control Measures**  
**Homes and Restaurants Workgroup**

**HR006 – A Multi-Stage Approach to Outdoor Wood Burning Equipment**

**DESCRIPTION**

As the price of oil and gas in the Northeast continues to rise, more people are turning to wood burning as a way to heat their homes in the northeastern states (1). This trend was also demonstrated in the 1980's (2). Outdoor wood boilers (OWBs) are becoming an increasingly popular alternative in areas where wood supply is plentiful (1, 2, 3). An OWB is "...is a freestanding combustion unit located outside the home or structure to be heated that consists of a firebox surrounded by a water reservoir" (p. 2, 3) and is pictured below. The number of these units has increased in the United States from 4,828 in 1999 to 24,560 in 2004 (3). The number of units in New Jersey has been estimated to have increased from 75 to 200 in the last two years.<sup>1</sup> The NJDEP Compliance and Enforcement program has noted this growth and has handled several complaints of smoke and odors from neighbors with OWBs.<sup>2</sup> There are at least 23 manufacturers that sell these units in the country. While there are a small number of these units currently present in New Jersey, it is thought that they may become more prevalent in the future (1). Emissions from wood boilers are currently not regulated at the national level but several northeastern states, including New Jersey, have petitioned the Administrator of the United States Environmental Protection Agency (USEPA) in 2005 to establish emission limits or standards for OWBs.



Photograph adapted from *Smoke Gets in Your Lungs: Outdoor Wood Boilers in New York State* (August 2005).

Pollutants that are emitted from burning wood, especially when incomplete combustion occurs in OWBs, include particulate matter (PM), sulfur dioxide (SO<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), volatile organic compounds (VOCs), nitrogen oxides (NO<sub>x</sub>), formaldehyde, benzene, naphthalene, and polycyclic aromatic hydrocarbons (PAHs) (3, 4). More toxic emissions are released if garbage is burned in these units, as indicated by studies done on backyard burning (3). Fine-particulate matter (PM<sub>2.5</sub>) emissions from OWBs is estimated to be nine times higher than PM<sub>2.5</sub> emissions from indoor wood stoves.

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<sup>1</sup> Personal communication between Lisa Rector and NJDEP.

<sup>2</sup> Internal communication with Compliance and Enforcement employees.

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**IMPLEMENTATION**

The multi-stage approach for OWBs includes four phases:

1. Require the USEPA to establish rules or standards for OWBs.
2. Establish a moratorium, through a Governor's Executive Order or through legislation, on the sale and distribution of new OWBs until the implementation of USEPA rules or standards.
3. Establish provisions on minimum chimney height and distance to houses/property lines. (see HR-007)
4. A commitment that New Jersey will consider State rules or standards, if after 5 years, the USEPA has not acted to implement rules or standards for OWBs.

The USEPA has indicated that there are no plans to regulate OWBs on a federal level but communication with the industry has been initiated in response to several concerned parties' inquiries about these units (5). The industry is currently involved in researching air emissions from OWBs through a task force of the American Society for Testing and Materials (ASTM). Additional potential federal plans for OWBs include a green label program that would consist of a two-phase emission limit process and "a standardized sampling methodology" with the ASTM task force (6). The complicated process of establishing testing methods, emission limits, and control devices and the potential of having several different sets of state standards for OWBs makes national regulation the ideal way to regulate OWBs (3).

The moratorium, through a Governor's Executive Order or through legislation, on the sale and distribution of new OWBs in the State of New Jersey would go into effect until the national standards for these units are established. In the interim, the State would establish criteria on the chimney height and distance to houses and property lines for OWBs. Such provisions have been adopted into Vermont and Washington rules and Connecticut law (2, 3, 7). The actions taken by Vermont and Connecticut are discussed in more detail in HR-007: Multi-Stage Approach for Wood Burning Issues at the Local Level. If after 5 years from the time of the moratorium the USEPA has not acted to implement rules or standards for OWBs, then New Jersey would consider establishing State rules or standards. Washington has adopted standards for these units and Vermont has proposed a regulation that included standards for OWBs on August 12, 2005 (2, 8, 9). Similar standards could be adapted and adopted into New Jersey rules. The options for standards for these units are as follows:

- Vermont: A particulate emission limit of 0.20 grains per dry standard cubic foot (gr/dscf) corrected to 12% carbon dioxide (CO<sub>2</sub>) or an equivalent standard of 0.30 pounds per million British thermal units (lb/mmBTU) of heat input with standard test methods and procedures for certifying the unit and reporting requirements for purchases (2, 9).
- Washington: A particulate emission limit of 4.5 grams per hour (g/hr) with "...an opacity standard not to exceed an average of 20 percent opacity for six consecutive minutes in any one-hour period" (p. 18, 3), restrictions on the material that can be burned in a unit and reporting requirements for manufacturers (3).

**COST**

Cost information as it relates to each phase of the potential control measure is detailed below.

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1. No quantitative information is known at this time but national standards would save costs for state agencies since they would not have to develop separate standards on their own and for the manufacturers since they would only have to follow one set of requirements rather than several.
2. Implementing a moratorium in the State might include an adverse economic impact on the manufacturers and dealers of OWBs even more so than establishing State standards (10). However, no quantitative data is known at this time and there are no known OWB manufacturers in New Jersey but there are 3 in Pennsylvania (3).
3. See HR-007: Multi-Stage Approach for Wood Burning Issues at the Local Level
4. The average cost of an OWB is \$5,500 with a maximum of 43% heating efficiency, which is significantly more costly and less efficient than other heating systems (3). Thus, homeowners would spend more money on wood using an OWB compared to wood stoves. In Vermont's economic analysis for the proposed standards, costs for out-of-state OWB manufacturers may decrease and income for in-state OWB dealers would increase if no standards were established (10). In addition, requiring individual purchasers to demonstrate compliance rather than manufacturers was not considered to be a viable option because it places "an unacceptable economic burden" (p. 1, 10) on consumers who would otherwise pay for the testing by an increase in the price of the unit. Dealers would be able to continue to sell other types of wood burning equipment. In Vermont, most of the impacted sources are small businesses so having separate requirements was not a feasible alternative to statewide standards. Not adopting standards could lead to an increase in medical costs from exposure to the air pollution and smoke from the OWBs. Additional costs to the State would include enforcement, testing, monitoring, reviewing data, and policy development. The economic information outlined demonstrated no economic impact for the homeowner and increased, but not significantly burdensome, costs for the manufacturer because they could continue to sell the existing units outside of the state.

**EMISSION REDUCTIONS**

There is no standard testing method for OWB emissions and, until one exists, emissions cannot be accurately quantified (3). Qualitative emission reduction information as it relates to each phase of the potential control measure is detailed below.

1. The emissions from one boiler are equivalent to the emissions from 22 EPA certified wood stoves, 205 oil fired furnaces or as many as 8,000 natural gas furnaces (11).
2. National standards on OWBs would decrease not only the air pollution from the units, as currently only about 200 units exist in the State, but the amount of smoke that causes odor and nuisance complaints on a local scale (2, 3).
3. A moratorium on the sale and distribution of new OWBs would theoretically decrease the potential for new air emissions from these units, as currently there are about 200 units in the State, because growth in wood burning would be reduced, assuming that the moratorium was followed and enforced to its full extent.
4. See HR-007: A Multi-Stage Approach for Wood Burning Issues at the Local Level
5. Vermont concluded that having siting criteria under their rule, Air Pollution Control Regulations (APCR) §5-204, was not enough to reduce the amount of smoke and pollutants being emitted from OWBs to decrease the number of nuisance complaints and health effects as a result of these units (2).

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6. The recent NESCAUM report called for getting rid of all existing units through a replacement program (11). This would reduce the emissions from the uncontrolled units.

**COST-EFFECTIVENESS**

Cost-effectiveness information as it relates to each phase of the potential control measure is detailed below.

1. National regulatory action on OWBs would be more cost-effective compared to separate state and local regulatory efforts. However, no quantitative information is known at this time.
2. The cost-effectiveness of a moratorium on the sale and distribution of new OWBs will have minimal potential adverse economic impacts in New Jersey, as there are no known manufacturers of OWBs in New Jersey. However, no quantitative information on the per ton of emission reduction is known at this time because no standard testing method for OWBs exists.
3. Consumers having OWBs on their property would still be allowed to operate their units assuming they are not adversely affecting their neighbors. New purchasers could be encouraged to install a clean burning pellet stove or wood burning stove. Also see HR-007: A Multi-Stage Approach for Wood Burning Issues at the Local Level
4. No quantitative information is known at this time because no standard testing method for OWBs exists.

Additional research on the potential impacts to OWB dealers in New Jersey should be performed.

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