

Outdoor Woodburning Furnaces/Boilers



Northeast States for Coordinated Air Use Management (NESCAUM)

Represented by Robert Waterfall of NYS Dept of Env. Conservation

Unique OWB issues

- Good idea but bad implementation
 - Design Parameters
 - four-season utility, “8760” hours/year for hot water
 - 100,000 to 3,200,000 max. btu/hr output (500,000 btu unit most common)
 - Primitive combustion design - oxygen-starved, smoldering fires, low temp burns
 - Short stack height, generally <12 ft, results in poor dispersion
 - Generally no air pollution control devices or low emission design
 - Testing of efficiency shows rates of 28-55%, which does not include pipeline losses
 - Fuel use
 - Large firebox can hold almost anything (average 60 ft³)
 - Enforcement programs identified residents burning tires, garbage, landscape waste, and railroad ties

Scope of the problem

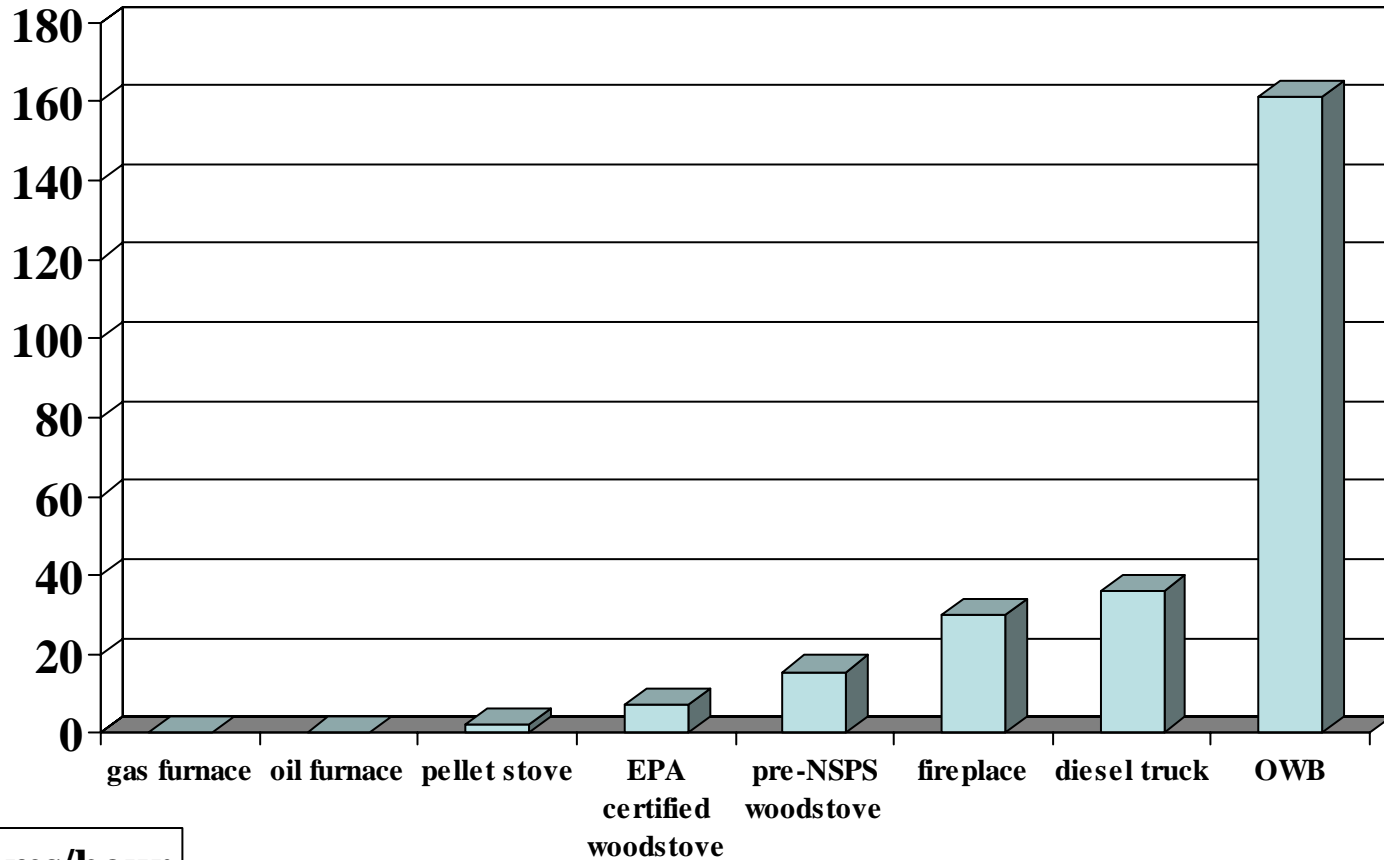
- NSPS not applicable
 - exempt from wood stove regulations (Subpart AAA)
 - EPA does not intend to develop federal regs at this time
- Limited emissions data, no protocol or accepted test method
 - ASTM working on draft test method that may be final by April 2007
 - NESCAUM believes existing PM test methods may be applicable.
- Installation of OWBs is growing significantly.

Findings of NESCAUM Report

- Estimates in 2005, approximately 155,000 – 226,000 units nationwide
- 68% of units put in place in the last 3 years
- Mfgs anticipated 200-350% growth in sales in 2005 and 128% in 2004
- Estimate that 500,000 units could be in place by 2010.
- Estimate that OWBs emitted over 233,000 tons of fine PM in 2005
- Left unchecked believe PM emissions could reach over 850,000 tons annually by 2010.
- Mfgs estimate that 50% of units replacing indoor units
- Sales concentrated in nineteen states (CT, IN, IL, IA, KY, ME, MA, MI, MN, MO, NH, NY, NC, OH, PA, VT, VA, WV and WI)
- Full report can be found at www.nescaum.org

So how bad are they...

Comparing Particulate Emissions based on g/hr



grams/hour

Emissions from OWB's Near Field Ambient Monitoring

- Few if any assessments of OWB in-field ambient emissions have been conducted
- March 2005, NESCAUM conducted exploratory field monitoring of ambient PM_{2.5}
 - to assess the potential for elevated exposures within 50-150 ft of an OWB emissions source
 - Continuous sampling (15-second average intervals)
 - DataRAM (portable nephelometer)

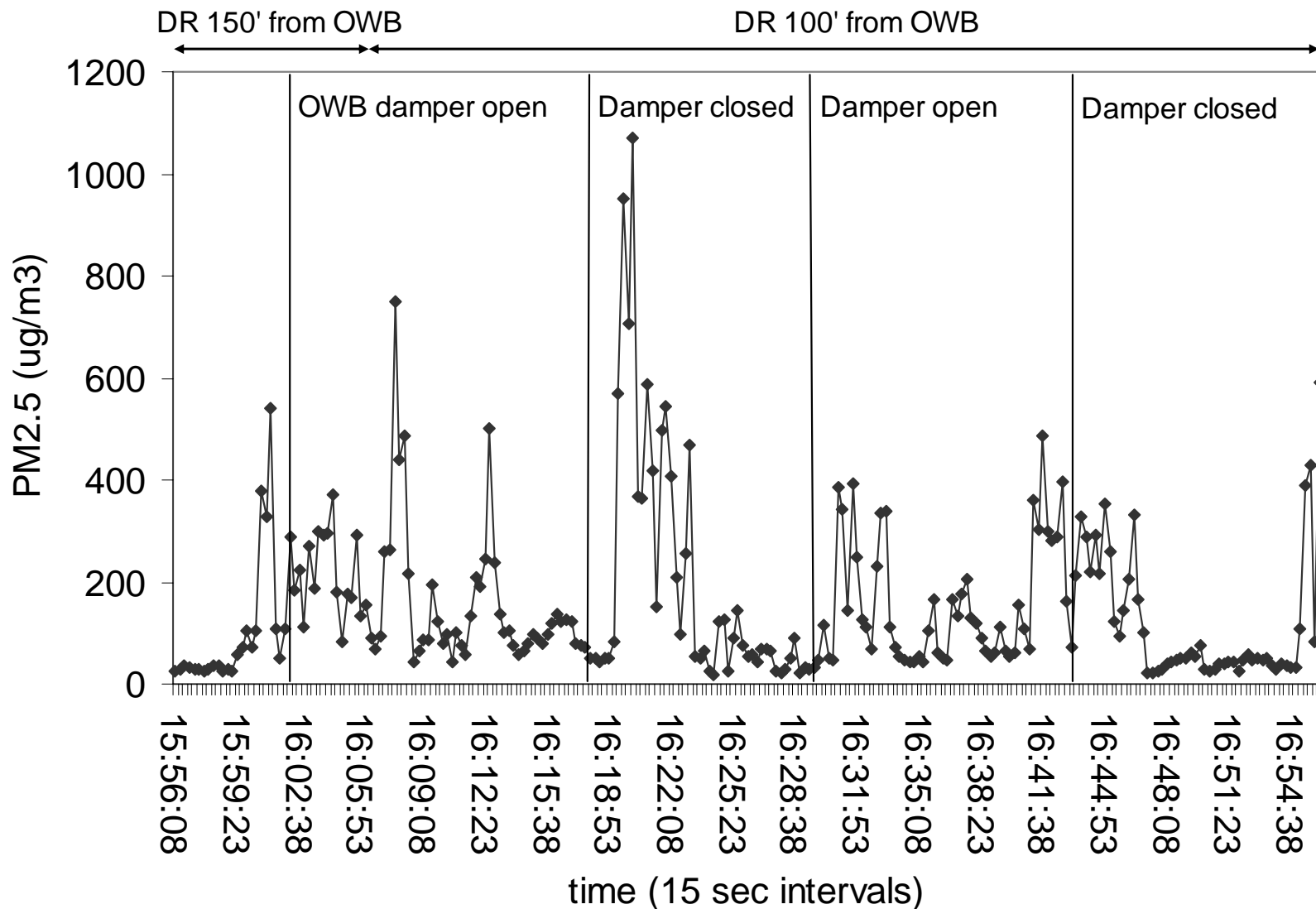


P Johnson 2005 Upstate NY

Ambient Monitoring Findings

- Recorded periodic PM_{2.5} values >1,000 µg/m³
- Frequent values >400 µg/m³
- Elevated levels were found at all sampled distances
 - Values > 4,000 µg/m³ recorded over distances of 50, 100, and 150 ft.
- Max. value of 8,880 µg/m³ observed at 50 ft.
- Results indicate residences located near OWBs can experience elevated ground-level concentrations of PM_{2.5} dominated by submicron aerosols.

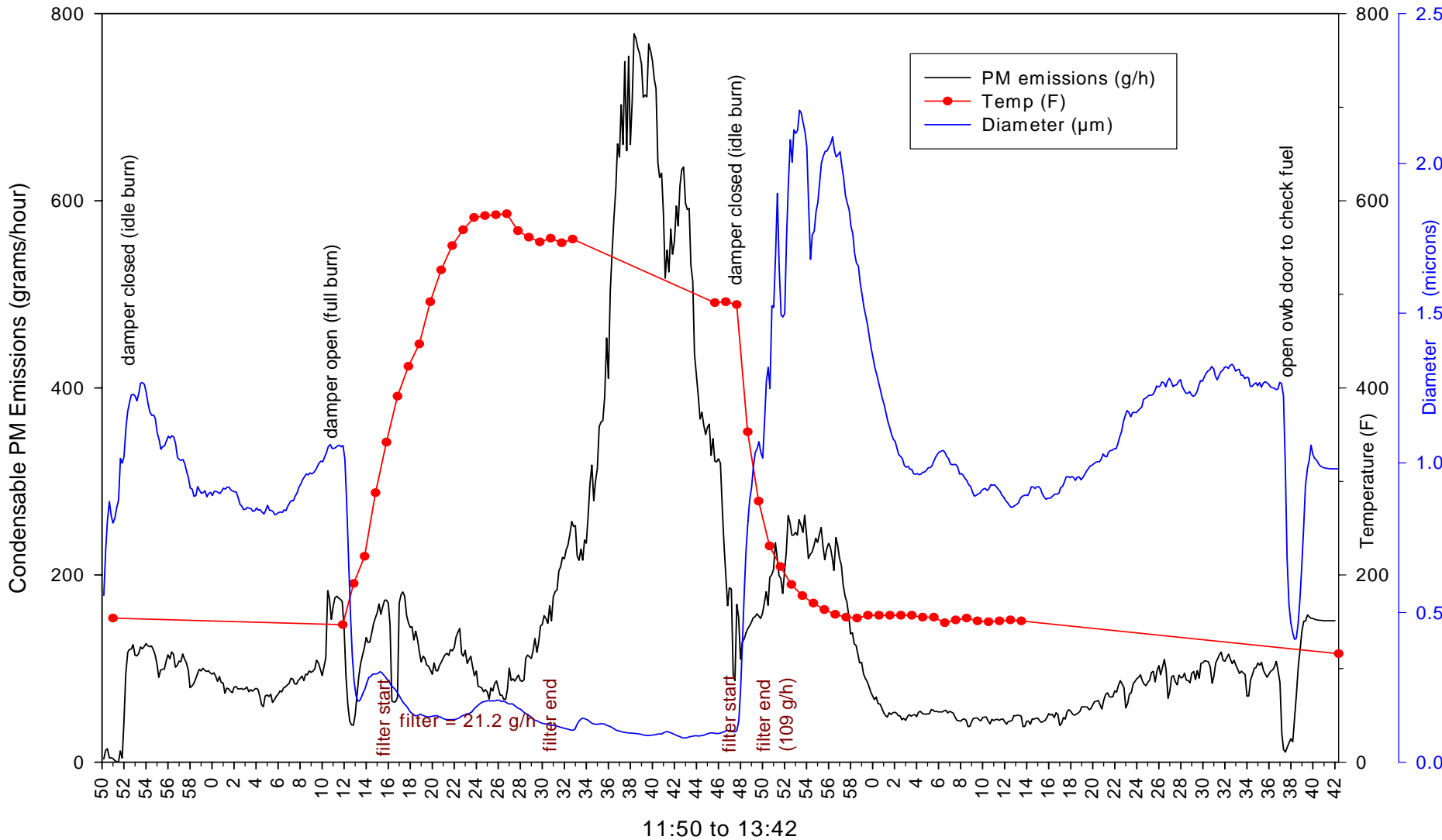
Continuous field measurements of PM_{2.5} in proximity to an OWB during air intake and starved operating modes about 25 hr after fuel loading.¹¹



NESCAUM Emission Characterization Field Stack Test

- First known field stack test of an OWB
- Conducted in June 2005
 - two test methods
 - in-stack filter and continuous monitor (DataRAM)
- 250,000 Btu/hr Unit
 - space heat, domestic hot water and swimming pool

Comparison of Filter and Continuous Monitoring Data



NESCAUM Emission Characterization

Field Test

- Findings
 - DataRam
 - mean DataRAM PM emission rate during middle range burn was 161 g/h. Obtained over a 3.5 hour period and include both high and low fire modes. This average does not include worst emission rates from initial charge and cycles.
 - Filter
 - Caution On Comparisons - Filter data from full fire samples likely to be biased low by a large factor due to loss of condensable PM from the hot filter.
 - Mean full fire PM emission rate was 93 g/h with a range of 13 to 237 g/h.
 - Mean idle fire PM emission rate was 64 g/h with a range of 13 to 148 g/h.

Enforcement Issues

- Existing Opacity Regulations do not usually result in resolution
- States with zoning regulations (e.g., setback requirements) still have significant issues and enforcement has been resource intensive.
- Usually resolution has only been through private party nuisance suits.

The Future

- Vermont proposed emission standard and is likely to finalize this year
- NYS legislature introduced bill in March 2006 to set emission standards
- Environment Canada investigating regulations
- Other States investigating regulatory development
- NESCAUM workgroup participating in the development of an ASTM test method
- NESCAUM developing model regulation

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