



TECH ENVIRONMENTAL

Air Quality, Odor Control, and Noise Solutions

***Outdoor Wood Boilers –
New Emissions Test Data
and Future Trends***

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Outdoor Wood Boilers (OWBs)

***Heat output typ.
50,000 Btu/hr,***

***5 x heat output
of a woodstove***

Objectives

- ***Present new OWB test data***
- ***Compare PM and PAH emissions, OWB vs. Certified Woodstoves***
- ***Analyze OWB Mass Emissions with AERMOD for $PM_{2.5}$***

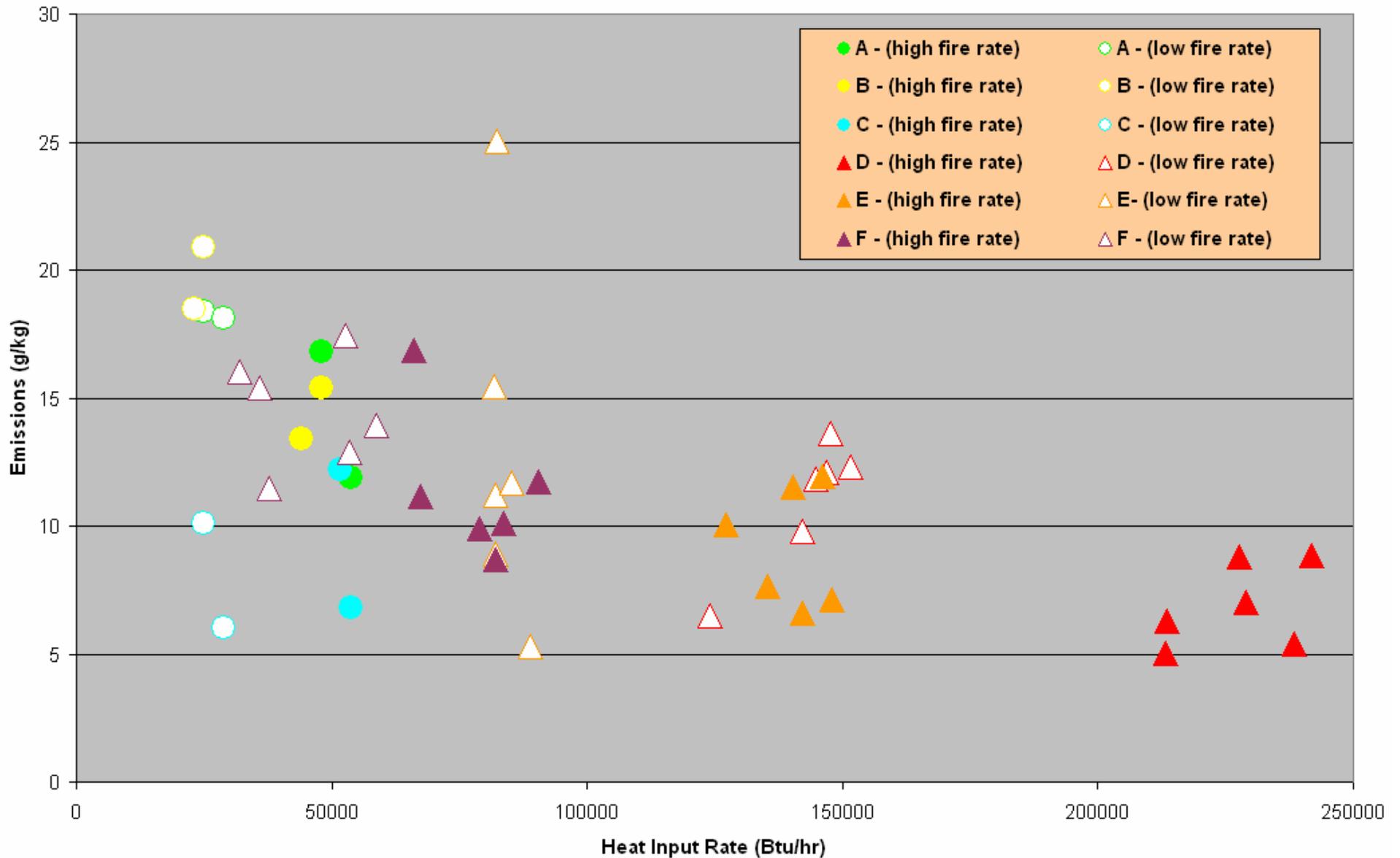
Emission Units

- ***Rate: g/kg-dry or lb/MMBtu input***
- ***Mass: g/hr***

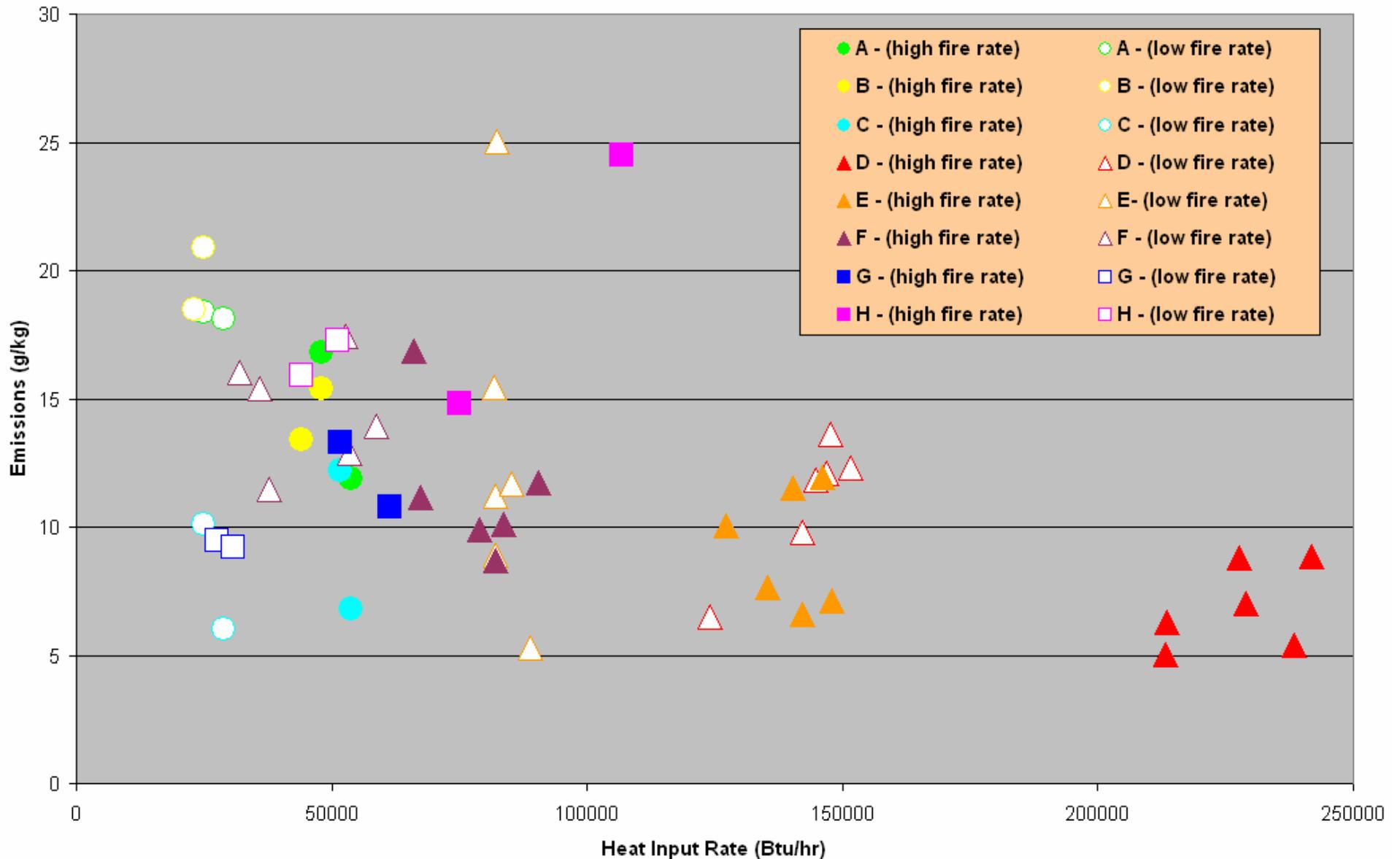
New OWB Test Data (heat output)

- ***A,B,C – 12 tests (11 & 22 kBtu/hr)***
- ***D – 12 tests (50 & 100 kBtu/hr)***
- ***E – 12 tests (25 & 50 kBtu/hr)***
- ***F – 12 tests (12 & 24 kBtu/hr)***

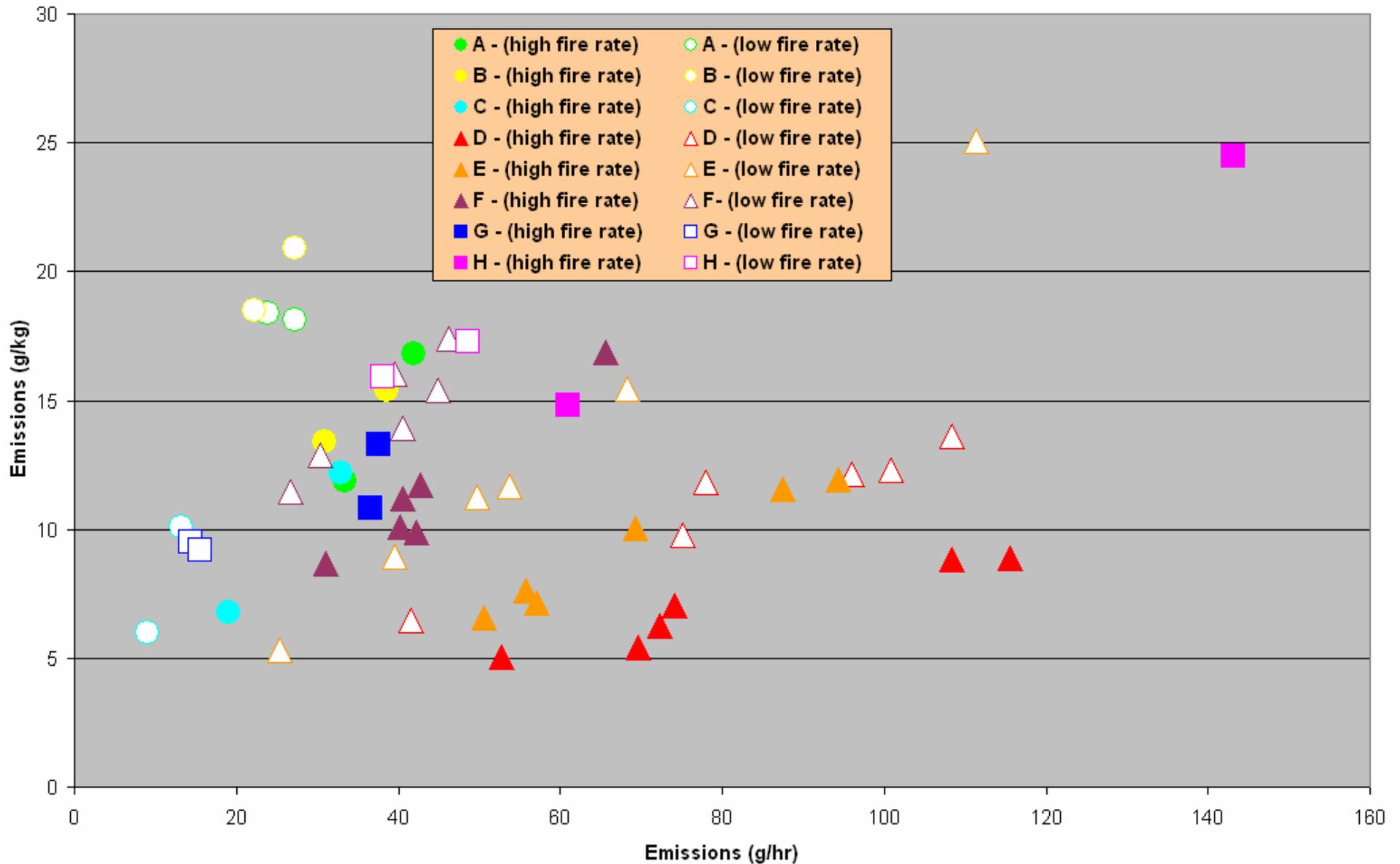
PM Emission Rate (g/kg) vs. Heat Input Rate (lb/MMBtu)



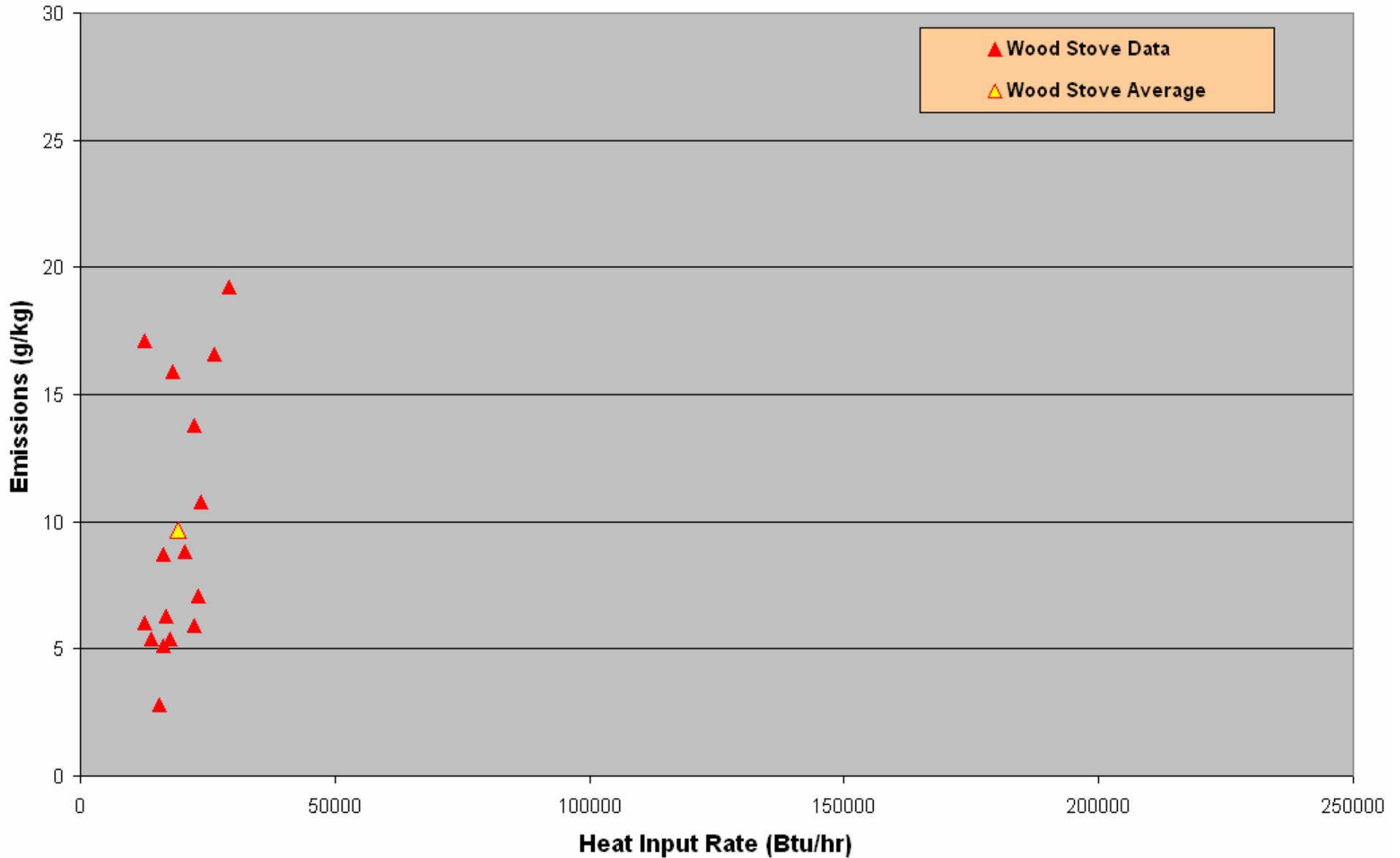
PM Emission Rate (g/kg) vs. Heat Input Rate (lb/MMBtu)



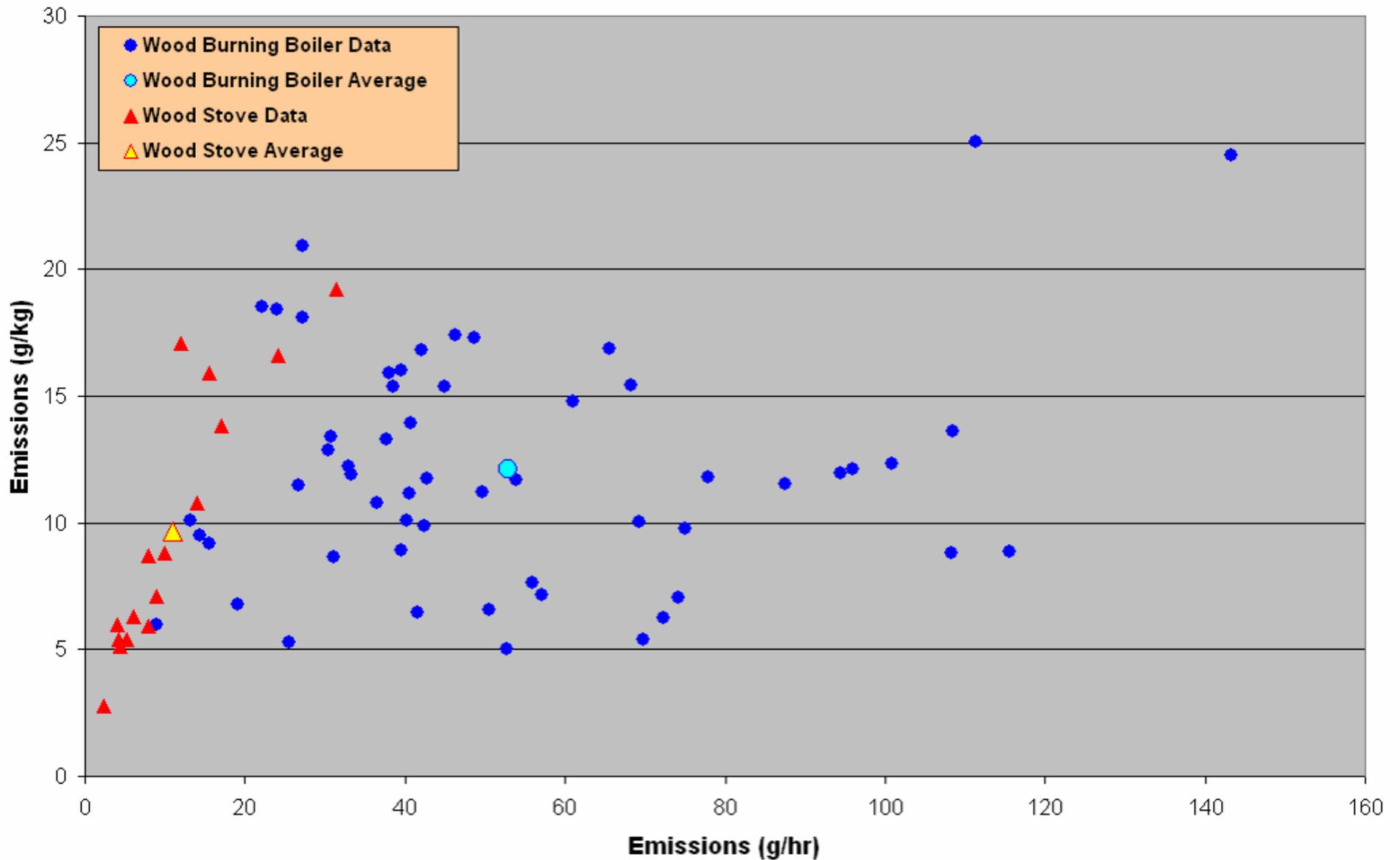
PM Emission Rate (g/kg) vs. Emissions (g/hr)



Certified Woodstoves – g/kg vs. lb/MMBtu



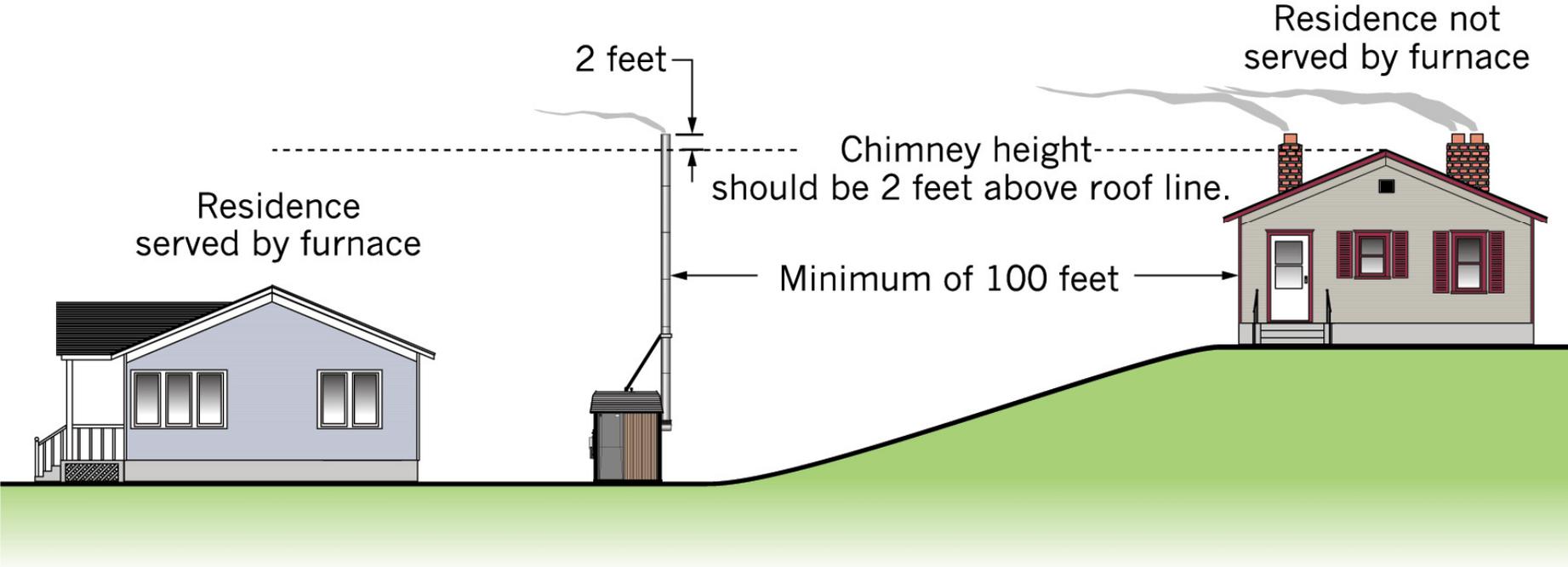
Certified Woodstoves and OWBs – g/kg vs. g/hr.



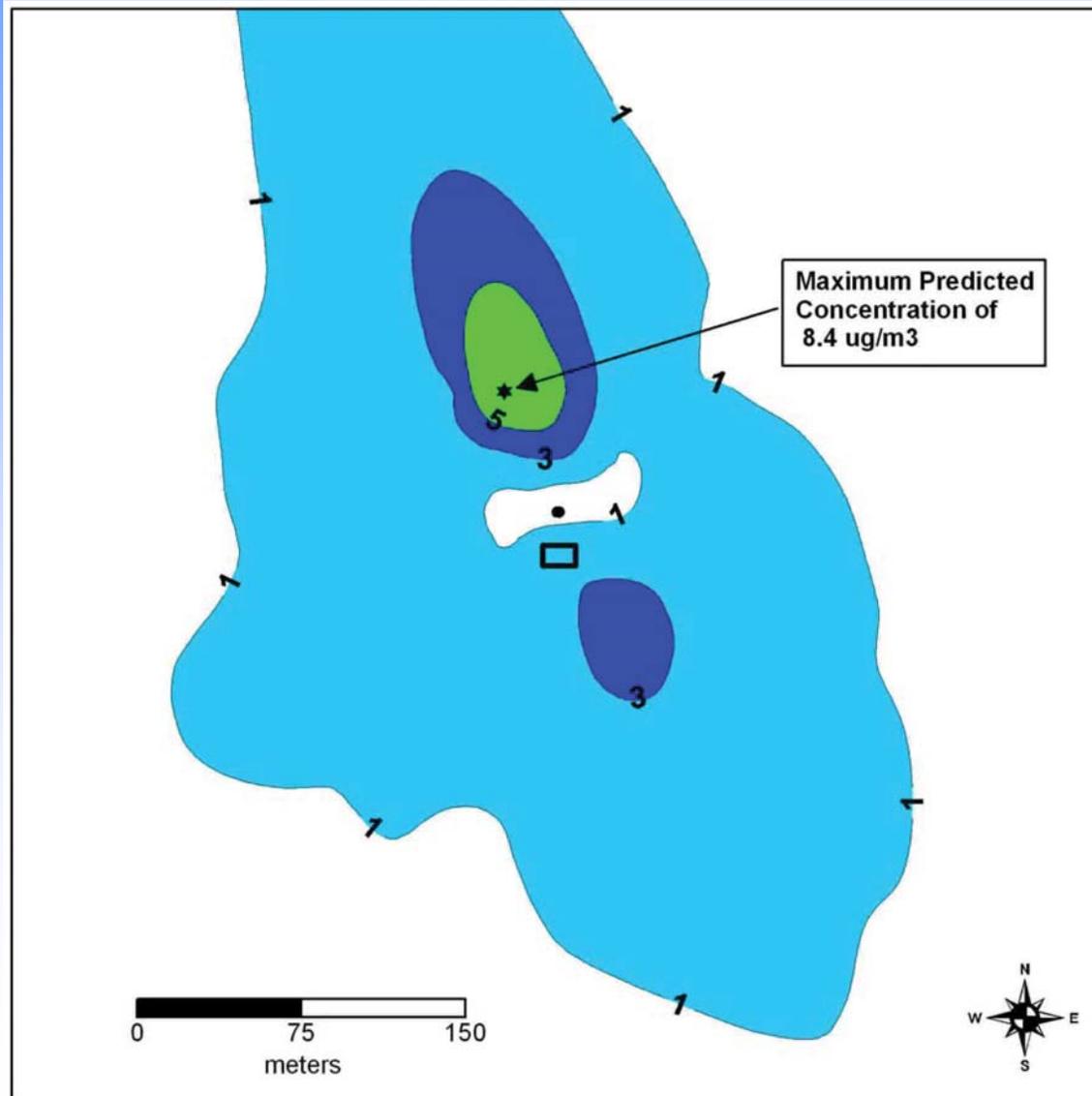
AERMOD Dispersion Study

- ***Emissions of 60 and 27 g/hr.***
- ***5 Years Burlington, VT
Meteorological Data***
- ***Downwash From Residence***

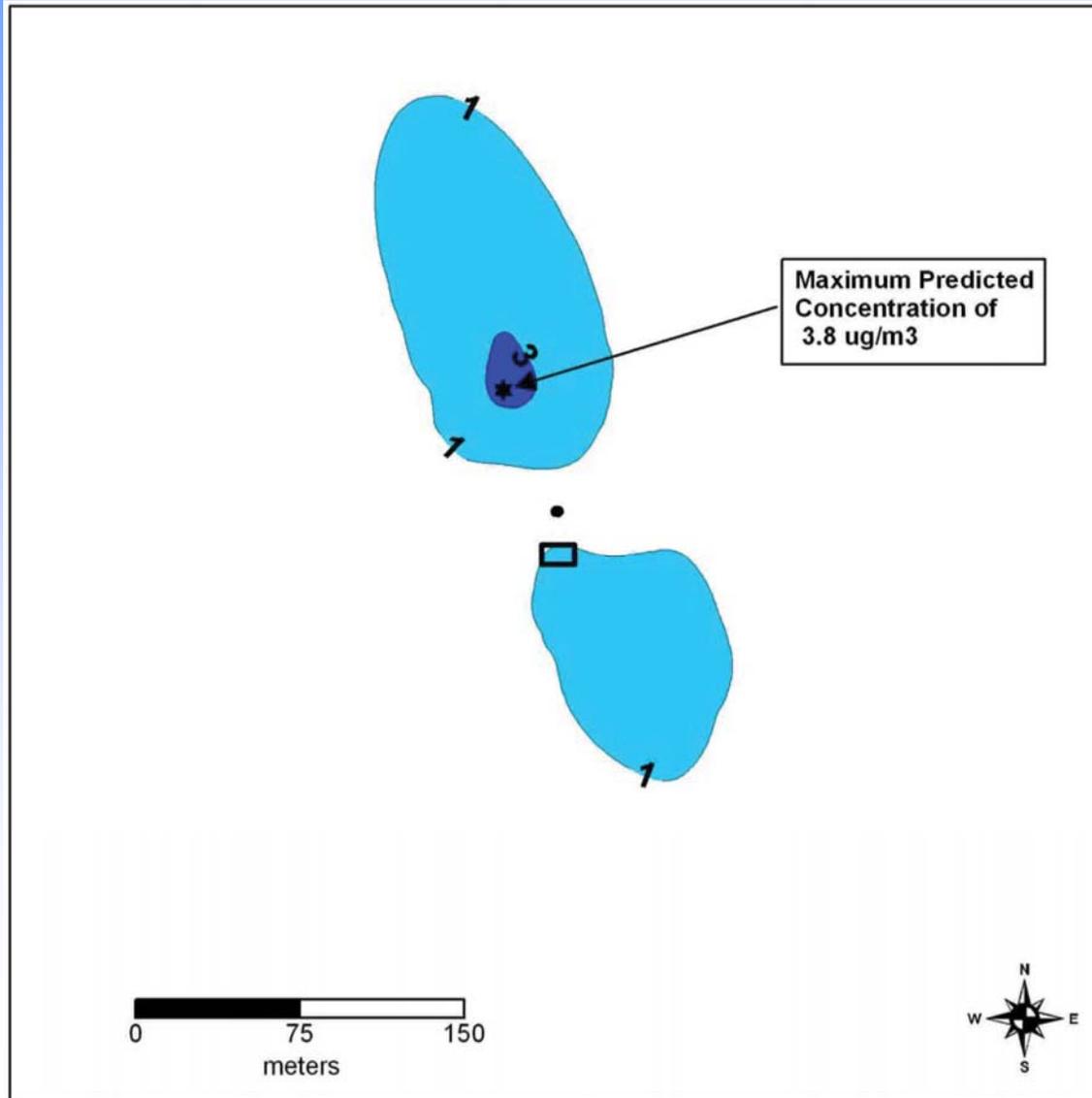
Chimney Height Installation Scenario



PM_{2.5} H8H for Emissions 60 g/hr



PM_{2.5} H8H for Emissions 27 g/hr



PM Emission Rates (lb/MMBtu)

<i>Current OWB</i>	<i>1.44 Actual</i>
<i>Certified Stoves</i>	<i>1.18 Actual</i>
<i>Non-Catalytic Stoves</i>	<i>0.74 Compliance Test</i>
<i>EPA Phase 1 OWB Limit</i>	<i>0.60 Compliance Test</i>

Conclusions

- ***OWB PM Emission Rates Are Steady Over A Wide Range of Burn Rates***
- ***OWB PM Rates Are Similar to Certified Woodstoves; 20-25% Higher***

Conclusions

- ***OWB PAH Rates Are Similar to Woodstoves***
- ***A Properly Installed OWB Fully Complies with $PM_{2.5}$ NAAQS***

Conclusions

- ***EPA Phase 1 Goal Represents 60% Reduction in PM***
- ***New Phase 1 Goal is More Stringent Than Current NSPS for Non-Catalytic Woodstoves***

