

Residential Wood Heater NSPS Update

Marc Wolman

MassDEP SIP Steering, November 2012

National Educational Forum on the Residential Wood Heater NSPS

Minneapolis, November 8, 2012

- cosponsored by NESCAUM, WESTAR, CENSARA, LADCO
- included AP & PH agencies, NGOs and vendors
- broad range of topics and perspectives
- closing remarks from EPA staff

- 8:30 am Welcome, Overview and Goals of the Meeting
- David Thornton, MPCA
 - Molly Mayo, Facilitator
- 8:45 am Public Health and Environmental Impacts of Woodsmoke
- Dr. Ryan Allen, Simon Fraser University
 - Dr. Philip Hopke, Clarkson University
 - Judy Abbott, NY DOH
- 9:45 am Questions for Public Health and Environmental Impacts of Woodsmoke Session
- 10:00 am *Break*
- 10:15 am Current and Emerging Technologies
- John Crouch, HPBA
 - Chris Neufeld, Blaze King/Travis Industries,
 - Dr. Harry H. Dresser, Jr., Maine Energy Systems
 - Nathan Russell, NYSERDA
- 11:15 am Questions for Current and Emerging Technologies Session

11:30 am

Case Studies

- Lisa Herschberger, MPCA
- Dr. Jim Conner, Fairbanks Alaska North Star Borough
- Dr. David C. Snyder, University of Wisconsin-Stevens Point - "LADCO Midwest Wood Smoke Study: Grand Rapids Case Study"
- Jim Hodina, Linn County Public Health Dept., Iowa case study
- Eric Merchant, Montana DEQ, Montana Experience

12:30 pm

Questions for Case Studies Session

- 1:45 pm Market Impacts of Emission and Efficiency Standards
- Bob Ferguson, Consultant to HPBA
 - John Ackerly, Alliance for Green Heat
 - Christian Rakos, proPellets Austria
- 2:30 pm Questions for Market Impacts of Emission and Efficiency Standards Session
- 2:45 pm Pellet Fuel Supply and Fuel Quality
- Chris Wiberg, Timber Products Inspection
 - Christian Rakos, proPellets Austria
 - Lisa Rector, NESCAUM
- 3:30 pm Questions for Pellet Fuel Supply and Fuel Quality Session
- 3:45 pm *Break*
- 4:00 pm Overview and Status of Current Draft of USEPA's NSPS for Residential Wood Heating Devices
- Gil Wood, USEPA
- 4:15 pm Questions for Overview and Status of Current Draft of USEPA's NSPS for Residential Wood Heating Devices Session
- 4:45pm Next Steps

Woodsmoke and Human Health

Ryan W. Allen, PhD
Associate Professor
Faculty of Health Sciences
Simon Fraser University
Burnaby, BC, Canada

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Summary

- Biomass smoke contains many pollutants with known adverse effects on health
- Woodsmoke is an important source of air pollution in many communities
 - Emissions in populated areas → high “intake fraction”
- For respiratory outcomes, no evidence that woodsmoke particles are less dangerous than other, similarly-sized particles
 - Short-term (≤ 24 hour) effects on symptoms, lung function, admissions, & ED visits
- Cardiovascular evidence is mixed (controlled exposure & in-home studies vs. population studies)
- Emerging evidence that spatio-temporal variations in woodsmoke relate to important effects in children

Estimating Exposure to Residential Woodsmoke in Rochester, NY

Philip K. Hopke

Institute for a Sustainable Environment
Clarkson University

CONCLUSIONS

- Woodsmoke in winter represent significant source of PM_{2.5} and ultrafine particles
- Local exposures can be significantly higher than those across the community.

A Case Study: Public Health Response to a Wood Smoke Health Complaint

Judy Abbott

Bureau of Toxic Substance Assessment

NYS Department of Health

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Summary

- Wood smoke can cause health effects, not unlike those consistent with PM_{2.5} exposure - DOH recommends avoiding smoke exposure
- Although there are some limitations, simple field instrument techniques can be used to study wood smoke exposures and support enforcement actions
- Other BTSA work at OWHHs (including 5 non-complaint locations; *to be published*)
 - PM_{2.5} levels significantly elevated at 5 of 6 monitoring locations near OWHHs relative to distant location ($p \leq 0.01$)
 - Downwind and calm winds (often at night) were associated with elevated PM_{2.5} levels

More information:



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Current & Emerging Technologies

John Crouch, HPBA

November 8, 2012

Future Innovations?

- By Definition – True Innovations are:
 - Unanticipated
 - Unique
 - Fool Proof & Fail Safe
 - Perform in a wide variety of homes
 - Have long lead times
 - Satisfy Consumers
 - Do not have excessive warranty claims





Presenter Profile:

- Vice President of Blaze King Industries, Inc. of Walla Walla WA.,
 - In business since 1977
 - Stove Manufacturer
 - Non catalytic since 1977
 - Invested In Manufacturing & Perfecting Catalytic wood stoves since 1983
 - Executive Committee Member of the Catalytic Hearth Coalition (CHC)



Final Notes

- Long burn times are the hallmark of our industry, the proof in the marketing. Manufacturers do not brag or talk of high burn times, but rather low burn times. Because folks, low, long burn times are what consumers want.
- Typically, non catalytic wood stoves burn cleanest when operated at the highest possible burn rates and conversely, burn less clean on the lower burn rates.
- Catalytic wood stoves typically have the inverse relationship. That is, the lower they burn, catalytic wood stoves burn clean. The higher burn rates are less clean but as mentioned earlier in the real world folks just don't burn their wood stoves on high all that often.



MAINE ENERGY SYSTEMS



MIESYS

MAINE ENERGY SYSTEMS



AutoPellet
Wood Pellet Central Heating Systems





MAINE ENERGY SYSTEMS

State of the art

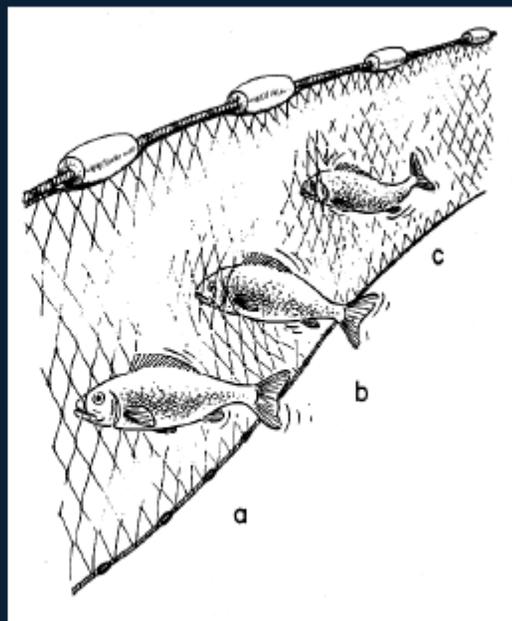




REGULATORY IMPACT

Regulatory support for acquisition of existing technologies

- EN 303-5 test conversions
- Standards not practices
- Standard pellet boilers on Burn Wise website
- Equipment differentiation, particularly in testing



Sizing Impacts on Wood Combustion Performance

November 8, 2012

Nathan Russell, Buildings R&D

New York State Energy Research and Development Authority

Take home

- Sizing a problem for all boilers- especially challenging for solid fuels
- More challenging with larger fuel charge
- Auxiliary thermal storage serves as a major efficiency measure for staged combustion units resulting in lower emissions
- Pellet boilers also benefit from smaller buffer tanks

Minnesota's Residential Fuelwood Use Surveys

Lisa Herschberger

November 8, 2012

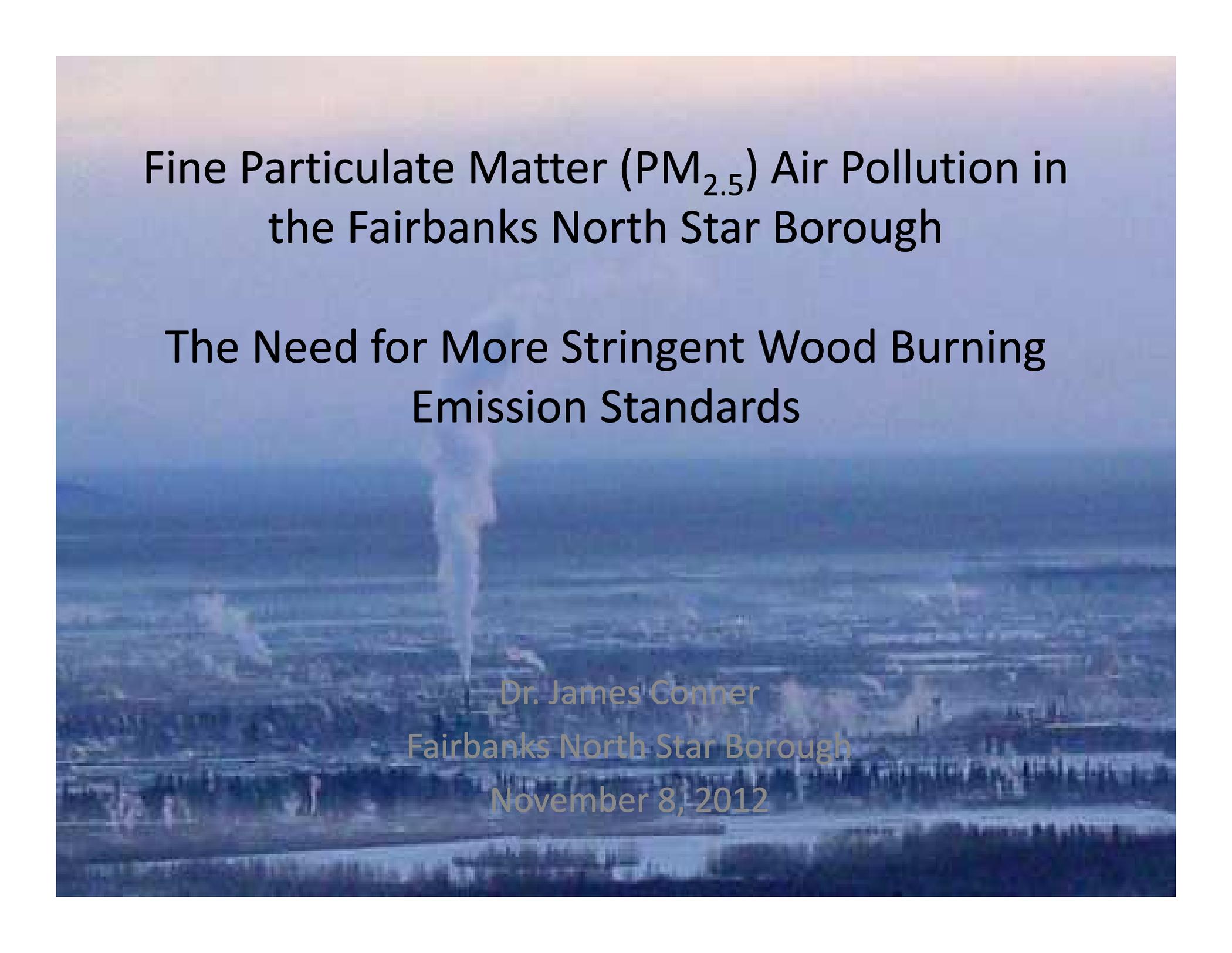
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**Minnesota Pollution
Control Agency**

Conclusions

- Survey is valuable for air quality management
 - Improved emissions inventory
 - Develop reduction strategies – geographic basis
- Minnesota survey found:
 - Regional differences in purpose
 - Larger average emissions per area in Metro
- Collaboration has been positive and could be replicated in other regions



Fine Particulate Matter (PM_{2.5}) Air Pollution in the Fairbanks North Star Borough

The Need for More Stringent Wood Burning Emission Standards

Dr. James Conner
Fairbanks North Star Borough
November 8, 2012

Fairbanks Recommendations

Tighter Wood Burning Emission Standards

- EPA should implement stringent emission standards for wood burning devices
 - Consider standards that force the development of new technology in coordination with States and Industry
- Given range of certified stove emission rates, significant additional reductions are available if EPA adopts a BACM type approach when setting standards
- Alternatively, a phase-in schedule for new standards using a transition from existing to Washington State levels to BACM levels could be established

LADCO Midwest Wood Smoke Study: Grand Rapids Case Study

Dr. David Snyder

Department of Chemistry

University of Wisconsin – Stevens Point

Study Findings

- PM_{2.5} air quality in Grand Rapids meets 24-hr regulatory standards
 - Significant spikes in shorter-term (1-hr and 5 min)
 - High concentrations observed during mobile monitoring in residential areas
 - On average, wood smoke accounted for 17% of PM_{2.5} (range 0 – 63%)
 - Final project report can be found at: www.ladco.org
-

An OWB Program Experience in Linn County, Iowa

November 8, 2012

Local SIP-Approved Rules

10.5 Permit Required

Exemptions

Fuel-burning equipment for indirect heating and re-heating furnaces or cooling units using natural or liquefied petroleum gas exclusively, with a capacity of less than 10 million BTU per hour input per combustion unit.

10.7 Visible Emissions

No person shall allow, cause, or permit the emission of visible air contaminants of a density or shade equal to or darker than that designated 20 percent opacity

10.8 Emissions From Fuel-Burning Equipment

Applies to installations in which fuel is burned for the primary purpose of producing steam, hot water, hot air or other liquids, gases or solids and in the course of doing so, the products of combustion do not come into direct contact with process materials.

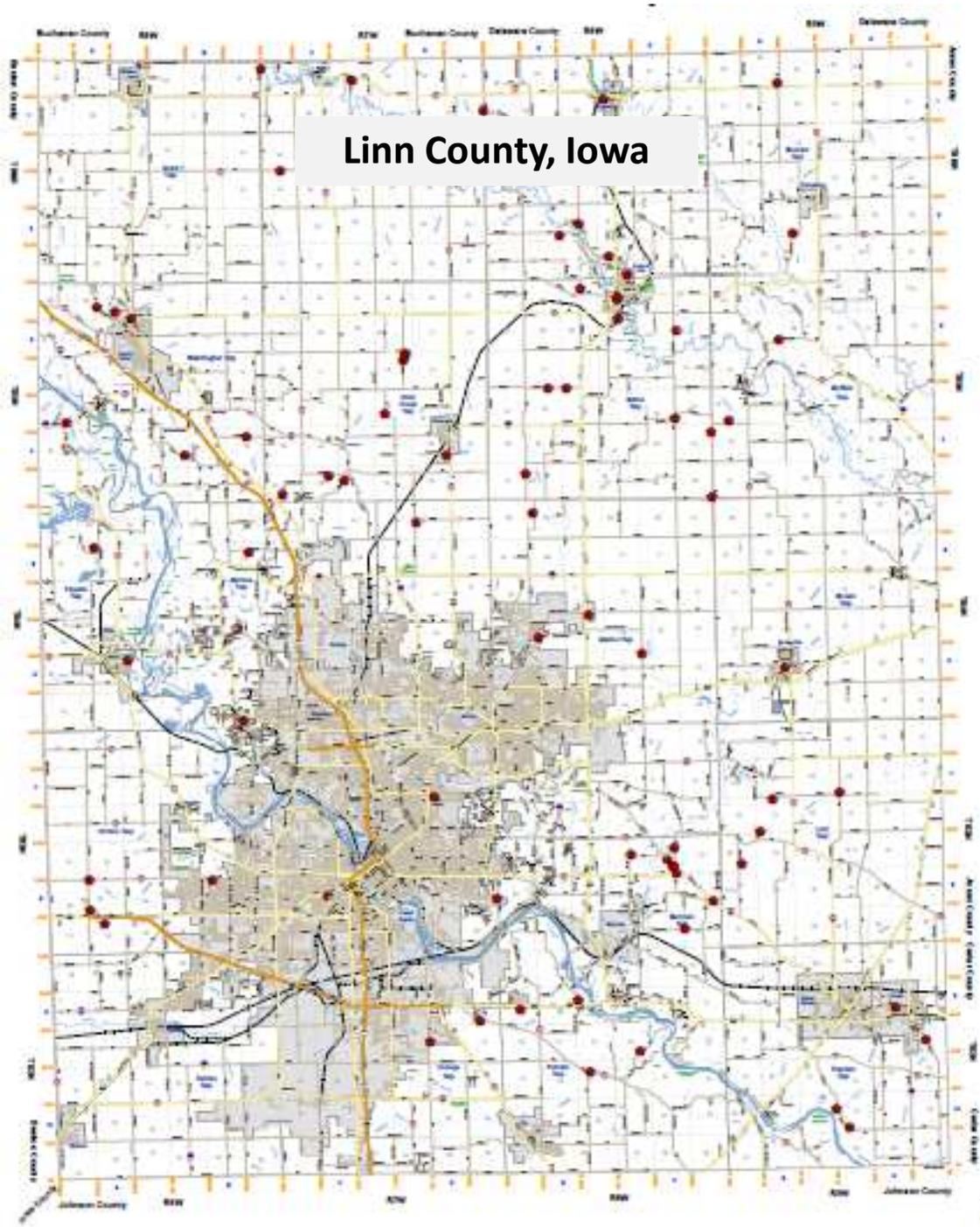
For heat inputs less than 10 million BTU, 0.6 lb/million BTU shall apply.

Slide 28

DS1

I would consider adding LCCO 10.7 [Visible Emissions]. The 20% opacity limit can be very effective in regulating dirty units if the owners fail to properly operate and maintain the OWB.

Dodge, Shane, 11/2/2012



Today

- LCPH has had significant reduction in complaints.
- Some municipalities adopting more stringent requirements than county, with bans in residential neighborhoods
- Also very few new units being registered.
- 83 Registered Outdoor Wood Boilers:
 - Built and installed 2006 and later
 - Rated heat input of 125,000 – 500,000 Btu/hr
 - Over 20 different manufactures each with different models

Residential Wood Burning A Montana Case Study

Eric Merchant

Air Quality Policy and Planning Supervisor

Air Resources Management Bureau

Montana DEQ



Montana

- Western mountain valleys are often subject to elevated concentrations of PM_{2.5}.
- Elevated PM_{2.5} concentrations often exceed and violate the primary health-based NAAQS for PM_{2.5}.
- State/Local programs and various regulatory strategies have been employed to address these issues.
- This case study will evaluate four local program strategies to demonstrate the need for clean residential wood heating devices.

Wood Stove Market Impacts

Including Efficiency and Emissions Standards

Hearth, Patio & Barbecue Association

Prepared and Presented by:
Robert Ferguson
Ferguson, Andors & Company

Conclusions

- Wood stove demand is volatile, can have regional differences and is influenced by many factors.
- Economic Factors are Primary Drivers for Consumers
 - Conventional Heating Costs
 - Availability and Cost of Firewood
 - Capital Investment and Payback (ROI)
- Tightening standards is a meaningless numbers game -- nothing more. It will however, drive up stove prices and reduce demand.
 - This reduces change-outs as consumers opt to keep their old stoves. Pre-certification era stove models produce the vast majority of PM from residential wood combustion.

Issues with Wood & Pellet Stove Efficiency

A minimum efficiency standard will help consumers
and industry



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Every Gram of PM Matters

- ✓ If neighborhoods like this are to have 10 – 20 pellet stoves, the difference between 3 grams and 1 gram is huge. If industry and the renewable energy community want more widespread deployment of pellet stoves, we need them to be consistently and significantly cleaner than wood stoves.

- ✓ EPA should propose 2.5 gr/hr in the NSPS and propose as an alternative going to 1.5 several years later.



pro»pellets

Austria

**Market impacts of emission and
efficiency standards – the Austrian
experience**

Conclusions

- » Emission and efficiency standards did not have a negative impact on long term market development in Austria
- » They need to be reasonable however and set requirements, that can be met by primary measures (enhanced combustion)
- » Harmonisation of requirements with EU regulations would benefit technology transfer and speed up improvement air quality in the US

Presentation Objectives

- Overview of the New PFI Standards
- Difference from European Standards

PFI Standards/EN plus

Similarities

- Both include an accredited auditing structure and third party oversight
- QA/QC practices at the facility
- Three grades with similar grade criteria



PFI Standards/EN plus

Differences

- EN plus covers the complete supply chain
- Sustainability criteria
- Carbon calculations
- Inspection and testing frequency





Wood pellets: supply and quality in Europe

Christian Rakos

Pellet quality certification

- » Introduced by the industry first in Austria 15 years ago to manage quality problems
- » Instead of testing every delivered batch of pellets the pellet plant and the quality management of the plant is evaluated by an independent auditor annually
- » Certification has almost eliminated quality issues

Residential Wood Pellets: Elemental Composition, Market Analysis and Policy Implications



Lisa Rector, NESCAUM

George Allen, NESCAUM

Dr. Phillip Hopke, Clarkson University

Sriraam Ramanathan Chandrasekaran,
Clarkson University

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Initial Conclusions

- PFI standards are not likely to identify contamination in pellets since primary focus is on physical properties
- Appropriate methods for analysis are critical in identifying elemental constituents
- Need to gain a better understanding what contributes to variability in pellets and minimize sources of contamination
- Impact of elevated elements for local exposures
- Significant policy issues remain