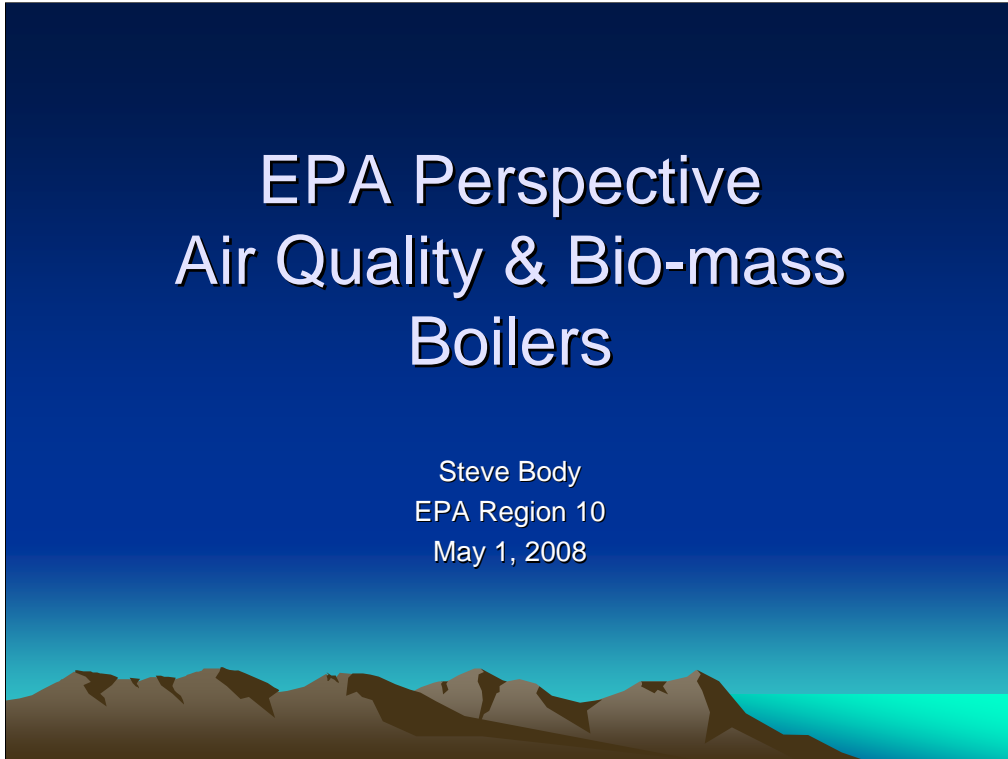


EPA Perspective Air Quality & Bio-mass Boilers

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EPA does NOT have a position or policy regarding bio-mass boilers at this time!

EPA will be meeting July 2008 to discuss air quality concerns with:

EPA
USFS
DoE
WESTAR
NESCAUM

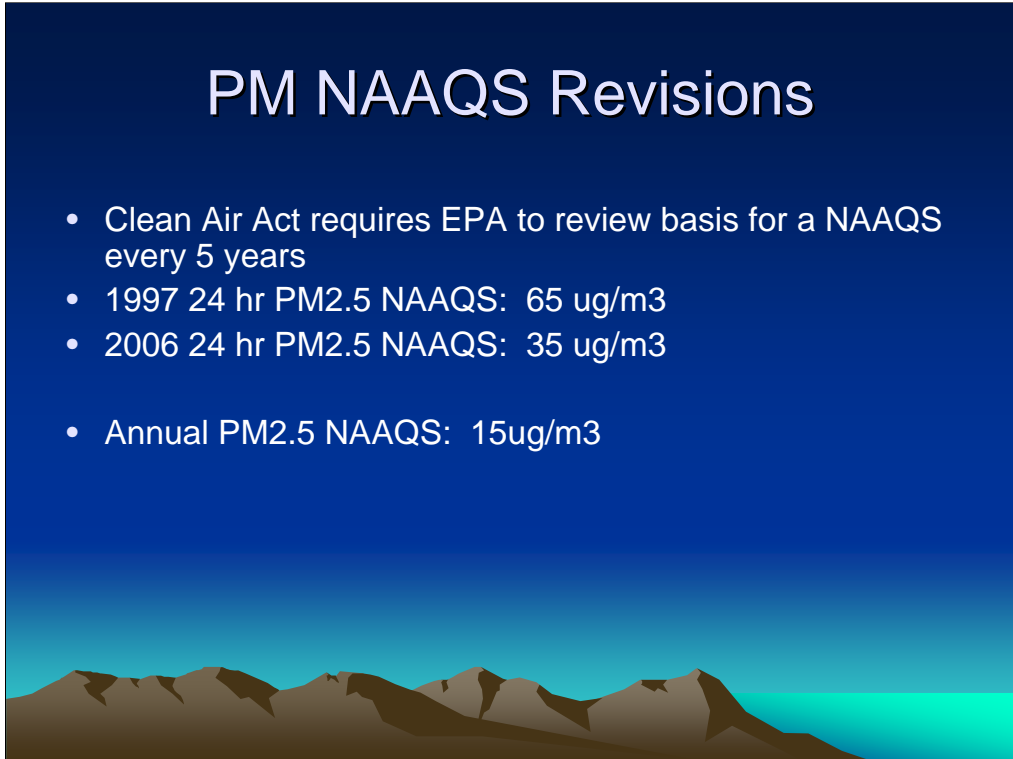
EPA Mission

- To protect public health
 - National Ambient Air Quality Standards
 - Particulate Matter (PM2.5)
 - Carbon Monoxide (CO)
 - Oxides of Nitrogen (NOx)
 - Sulfur Dioxide (SO2)
 - Ozone (O3)
 - Lead (Pb)
- To protect the environment
 - Visibility
- Hazardous Air Pollutants (HAPs)

•EPA's role is to be an overview agency. The standards are set out of basic guidelines and structures for state. We don't have any specific requirement for biomass boilers. Biomass boilers are falling between the cracks because they aren't large systems nor are they very small like automobiles. I'm not sure whether to encourage or discourage the use of them. We will meet this summer with other agencies and policy makers to spend a couple of days talking about issues and resolution.

PM NAAQS Revisions

- Clean Air Act requires EPA to review basis for a NAAQS every 5 years
- 1997 24 hr PM_{2.5} NAAQS: 65 ug/m³
- 2006 24 hr PM_{2.5} NAAQS: 35 ug/m³
- Annual PM_{2.5} NAAQS: 15ug/m³



Health Effects: PM

- Children and Elderly
- People with pre-existing conditions
- Respiratory illness
- Aggravated asthma
- Cardio-vascular disease
- Premature death
- Increased hospital visits
- Lost work & school days



Health Effects: PM

- NAAQS set to protect health
- HOWEVER, research shows there is no 'safe' level.
- Any increase in PM levels shows some adverse health response in the population
- Lowering of PM_{2.5} NAAQS from 65 to 35 ug/m³ estimated reduction in 2500 to 5700 premature deaths among other benefits



HAPs

At least 26 hazardous air pollutants are known to be present in woodsmoke

Compound	Examples	Mode of toxicity
Hydrocarbons	Unsaturated: <i>1,3-butadiene</i>	Irritant, carcinogenic, mutagenic
	Saturated: <i>n-hexane</i>	Irritant, neurotoxicity
	Polycyclic aromatic (PAHs): <i>benzo(a)pyrene</i>	Mutagenic, carcinogenic
	Monoaromatics: <i>benzene, styrene</i>	Mutagenic, carcinogenic
Oxygenated Organics	Aldehydes: <i>acrolein, formaldehyde</i>	Irritant, carcinogenic, mutagenic
	Organic alcohols and acids: <i>methanol</i>	Irritant, teratogenic
	Phenols: <i>catechol, cresol (methylphenols)</i>	Irritant, carcinogenic, mutagenic, teratogenic
	Quinones: <i>hydroquinone</i>	Irritant, allergenic, redox active, oxidative stress and inflammation, possibly carcinogenic
Chlorinated Organics	<i>Methylene chloride, methyl chloride, dioxin</i>	Central nervous system depressant (methylene chloride), possible carcinogens

Source: Woodsmoke health effects: a review - Naeher LP, Brauer M, Lipsett M, et al. *Inhal Toxicol.* 2007 Jan;19(1):67-106



Visibility-Regional Haze

- Regional Haze rule applies to National Parks and wilderness areas
- Congress established goal to reach 'natural conditions' in 60 years
- 10 year planning cycles: i.e. State Implementation Plans

• Standards for national parks and wilderness—visibility issues and hazardous air pollutants. For particulate matter, EPA is required to review certain standards. New non-attainment areas in Pacific Northwest were established. These were established because of hazardous effects on health such as irritation of mucous membranes on the body which has a physiological response. I'm not sure how to deal with the standards, there are many trade-offs and no simple solutions. Darby, MT is on the border of creating a non-attainment condition and could have adverse impacts.

Darby, Montana Wood Boiler PM2.5 Emissions

NAAQS 24 Hour Standard is 35 ug/m³

NAAQS Annual Standard is 15 ug/m³

- Stack Test: 1.9 lbs/ton of wood burned - total particulate
- Total Particulate is 6.7 lbs/day or 0.5 tons/year (School Year)
- January 2004 average 3.53 tons of wood burned per day
- Dispersion Modeling with building downwash
- Results based on modeling
 - Concentration of 35 ug/m³ of PM2.5 for 24 hours with background included.
 - Annual concentrations were not provided... depends on consistency of meteorological conditions



EPA Concerns

- Engineering evaluations of bio-mass boilers should include air quality impacts; 24 and annual PM concentrations & HAPs
 - Primary particulate emissions
 - Condensable organics
 - Secondary formation of PM (sulfate & nitrate)
- Moving emissions from forest to urbanized areas (schools and hospitals)
- Air quality impact of bio-mass boilers compared to existing and alternative fuels

•Engineering and economic analyses should look at air quality standards. If you are looking at the viability of the project, determine if the fuel you are using is clean or not. Look at the alternative. The community should be aware of the benefits and non-benefits of alternative fuels.