Opportunities for Air Quality Improvement in the Fairbanks North Star Borough

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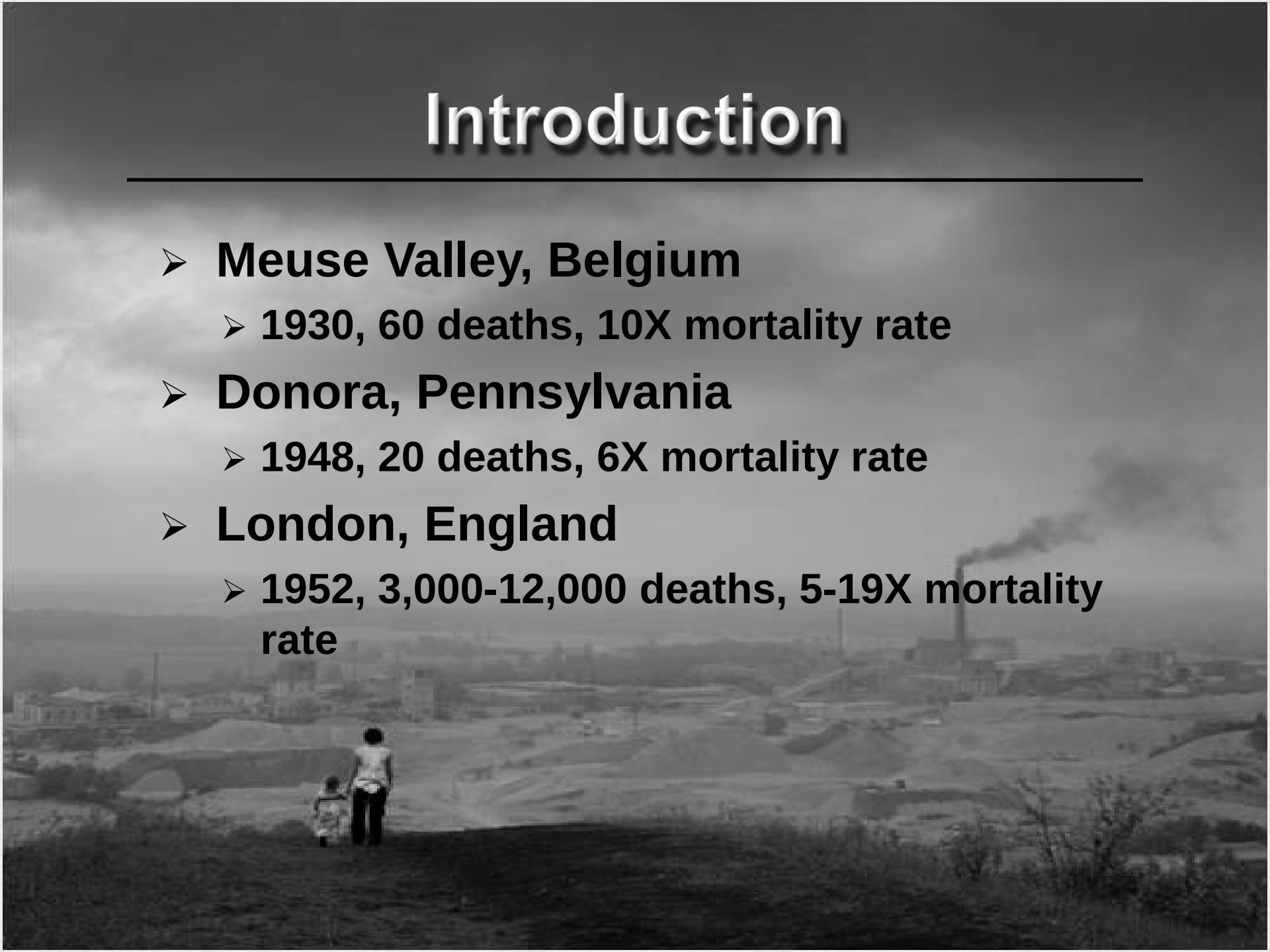
Introduction

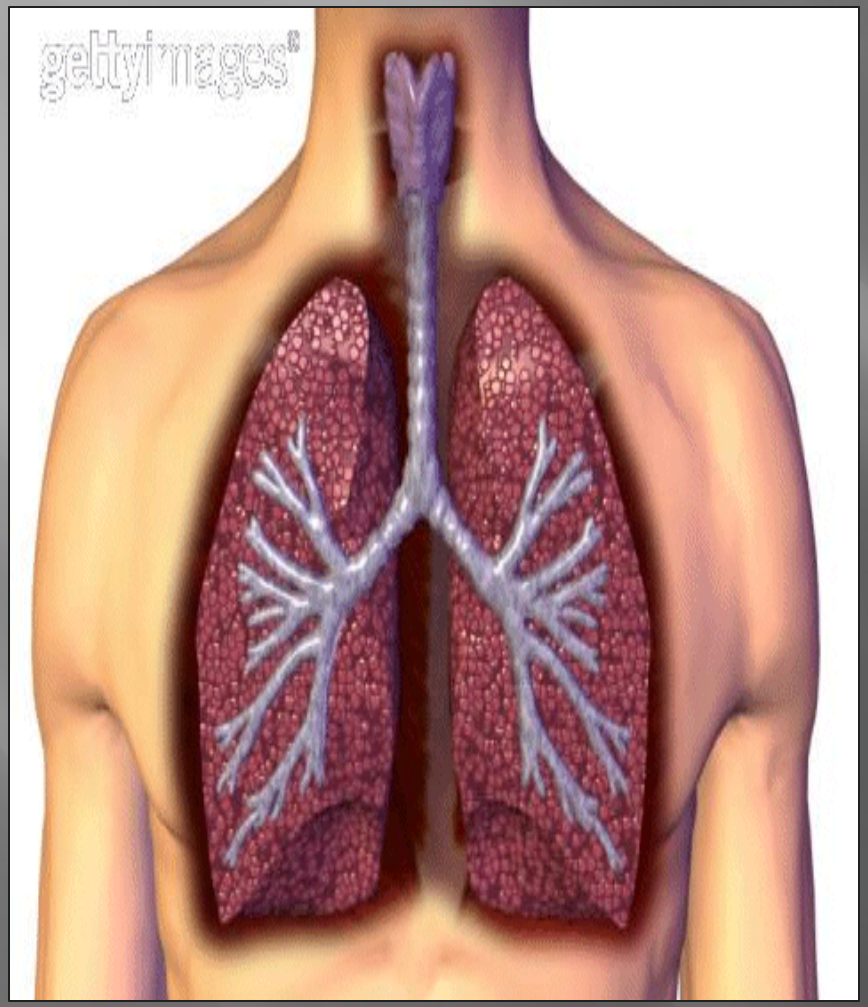
- **Meuse Valley, Belgium**
  - **1930, 60 deaths, 10X mortality rate**
- **Donora, Pennsylvania**
  - **1948, 20 deaths, 6X mortality rate**
- **London, England**
  - **1952, 3,000-12,000 deaths, 5-19X mortality rate**



Introduction

- More recent and scientific
  - 1993 Six Cities Study by Harvard University
  - Followed 8,000 people in six small cities
  - Study conducted for 14-16 years
  - As particle concentrations increased, there was an almost directly proportional increase in death rate
  - Residents in the most polluted city in the study had a 26% increased risk of premature mortality
  - Increased risks were associated with a difference of fine particle concentrations of 18.6 micrograms per cubic meter

Introduction



- Humans take an estimated 17,000 breaths per day
- Every breath draws air and other substances into our lungs
- Smaller particles make it to our lungs

Introduction

- Other substances in the air we breathe is considered air pollution
- Exposure to air pollution can:
  - Make people and animals sick
  - Decrease health and well being
    - Recent studies state that chronic exposure to particulate pollution shortens lives by one to three years
  - Damage the environment
  - Damage buildings, vehicles, infrastructure

Introduction

Causes of air pollution: Natural causes such as volcanic eruptions and wind blown dust…

Introduction

Causes of air pollution: Natural causes such as Forest fires and pollen

Introduction

Causes of air pollution: Who can forget 2004 fire season in Alaska?

Introduction

- **Causes of air pollution can also be man made:**
  - **Vehicles**
  - **Industrial plants**
  - **Exhaust/emissions**
    - **Stoves**
    - **Equipment**
  - **Dust**
    - **Construction**
    - **Road maintenance**

Introduction

Causes of air pollution:

Energy production isa large man made contributor to air pollution

Introduction

Causes of air pollution: Same day pollution from natural and man made causes

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The voice of Interior Alaska since 1903

Pollution could dampen wood boilers

Borough might give boiler owners an incentive to upgrade

By CHRISTOPHER ESHLEMAN
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One type of home heating system has drawn far more attention from neighbors, public officials and health advocates this winter than others.

Sales of hydronic outdoor heaters — commonly referred to as outdoor wood boilers (many also can burn coal) — spiked last summer following a dramatic rise in oil prices. Increased use also led to an increase in complaints from the neighbors of those with systems, which can emit thick plumes of soot, particularly if fuels are used improperly.

Officials at the Fairbanks North Star Borough and the Alaska Legislature are writing and considering rules that would tighten emission standards for home heating systems and issue tax breaks for residents who upgrade their less-efficient systems. A possible borough ordinance also could clamp down on outdoor boilers that emit enough to be a nuisance to neighbors, Borough Mayor Jim Whitaker said.

Compounding the situation is Fairbanks' poor air quality, which has placed it on the Environmental Protection Agency's hit list of communities with chronic problems with "particulate" air pollution — soot and dust from a blend of sources.

A report in February by the Cold Climate Housing Research Center suggested wood stoves, and particularly outdoor wood boilers, are the biggest culprits when it comes to particulate pollution

Please see BOILERS, Page A6

John Wagner/News-Miner
Smoke rises from the top of a wood-fired boiler Friday afternoon.

Background

With all the possible sources of air pollution in mind, how does this relate to the Fairbanks North Star Borough?

Answer: Lawyers, Legislatures, Laws, and Regulatory Agencies

Background

- **Air Pollution Act of 1955**
  - **First federal legislation**
  - **Mostly funding for research**
- **Clean Air Act of 1963**
  - **First set of air pollution controls based on research and data**
  - **Established a program with the US Public Health Service**

Background

- **Air Quality Act of 1967**
  - **Further development of federal controls**
  - **Started interstate air pollution regulations**
  - **Ambient monitoring and testing**

Background

- **Clean Air Act of 1970 (CAA)**
  - **Major shift in federal government's role**
  - **Regulatory programs implements**
    - **National Ambient Air Quality Standards (NAAQS); Pronounced "knacks"**
    - **State Implementation Plans (SIPs)**
    - **New Source Performance Standards (NSPS)**
    - **National Emission Standards for Hazardous Air Pollutants (NESHAPS); Pronounced "knee-shaps"**

Background

- **1972 National Environmental Policy Act**
  - **Established the US Environmental Protection Agency (EPA) to implement 1970 CAA requirements (among other things)**
  - **CAA requires EPA to revisit NAAQS standards every five years in light of most recent scientific evidence**
- **1970 CAA amended two times:**
  - **1977: Permit requirements, Prevention of Significant Deterioration criteria**
  - **1990: Acid rain, ozone protection, stationary source permits**

Background

- EPA mission
  - “to protect human health and the environment”
- EPA has implemented programs focused on:
  - Reducing air pollutants that contribute to smog, haze, acid rain, and other air quality problems
  - Reducing toxic air pollutant emission sources that are known to cause cancer
  - Phasing out production of chemicals that destroy stratospheric ozone

Background

- **Six common pollutants regulated by the EPA (Known as criteria pollutants):**
  - **Ground-level ozone**
  - **Carbon monoxide**
  - **Sulfur oxides**
  - **Nitrogen oxides**
  - **Lead**
  - **Particle pollution**

Background

- **Attainment/Non-Attainment definitions**
  - **Attainment: Area has "attained" NAAQS**
  - **Non-attainment: Area has "not attained" NAAQS**
- **Fairbanks North Star Borough (FNSB) was a non-attainment area for carbon monoxide**
- **The Borough is a non-attainment area for particle pollution (more later)**

Background

- **Particle pollution**
  - **EPA definition: “Mixture of extremely small particles and liquid droplets…”**
- **EPA utilizes two particle sizes in their regulation of particle pollution**
  - **PM_{10}**
    - **The Borough is attainment for PM_{10}**
  - **$PM_{2.5}$**
    - **FNSB is not in attainment for $PM_{2.5}$**

Background

- **PM10**
  - **Coarse particulate matter**
    - **Road dust**
    - **Agricultural dust**
    - **River beds**
    - **Construction sites**
    - **Mining operations**
- **Since the Borough is in attainment for PM10 there is no need for air pollution controls to be implemented.**

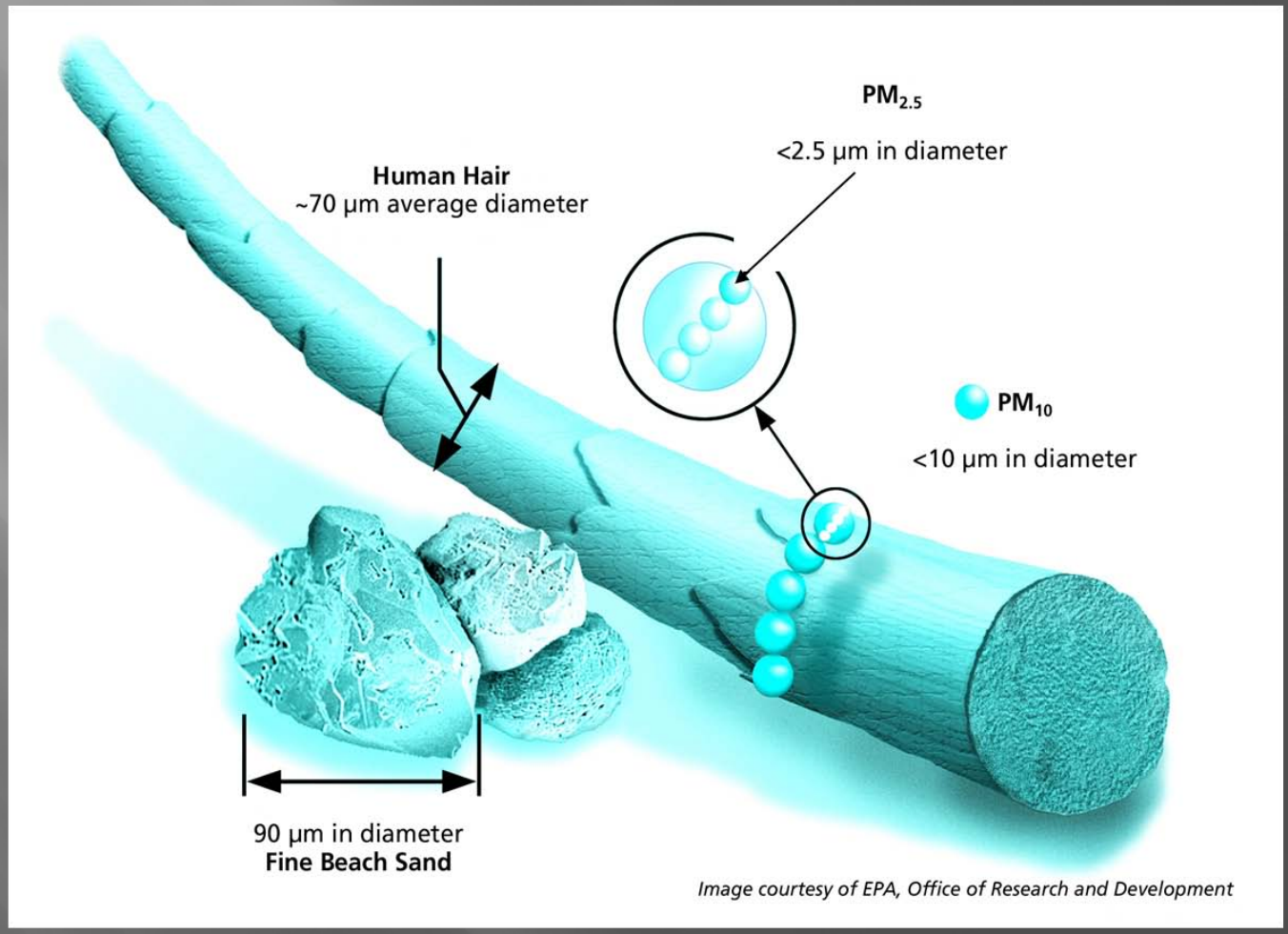
Background

- **PM2.5**
  - **Fine particulate matter**
    - **Byproducts of combustion**
    - **Power plants**
    - **Vehicle exhaust & emissions**
    - **Stoves & fireplaces**
    - **Wild fires**

Background

Particulate Matter: What is It?

A complex mixture of extremely small particles and liquid droplets



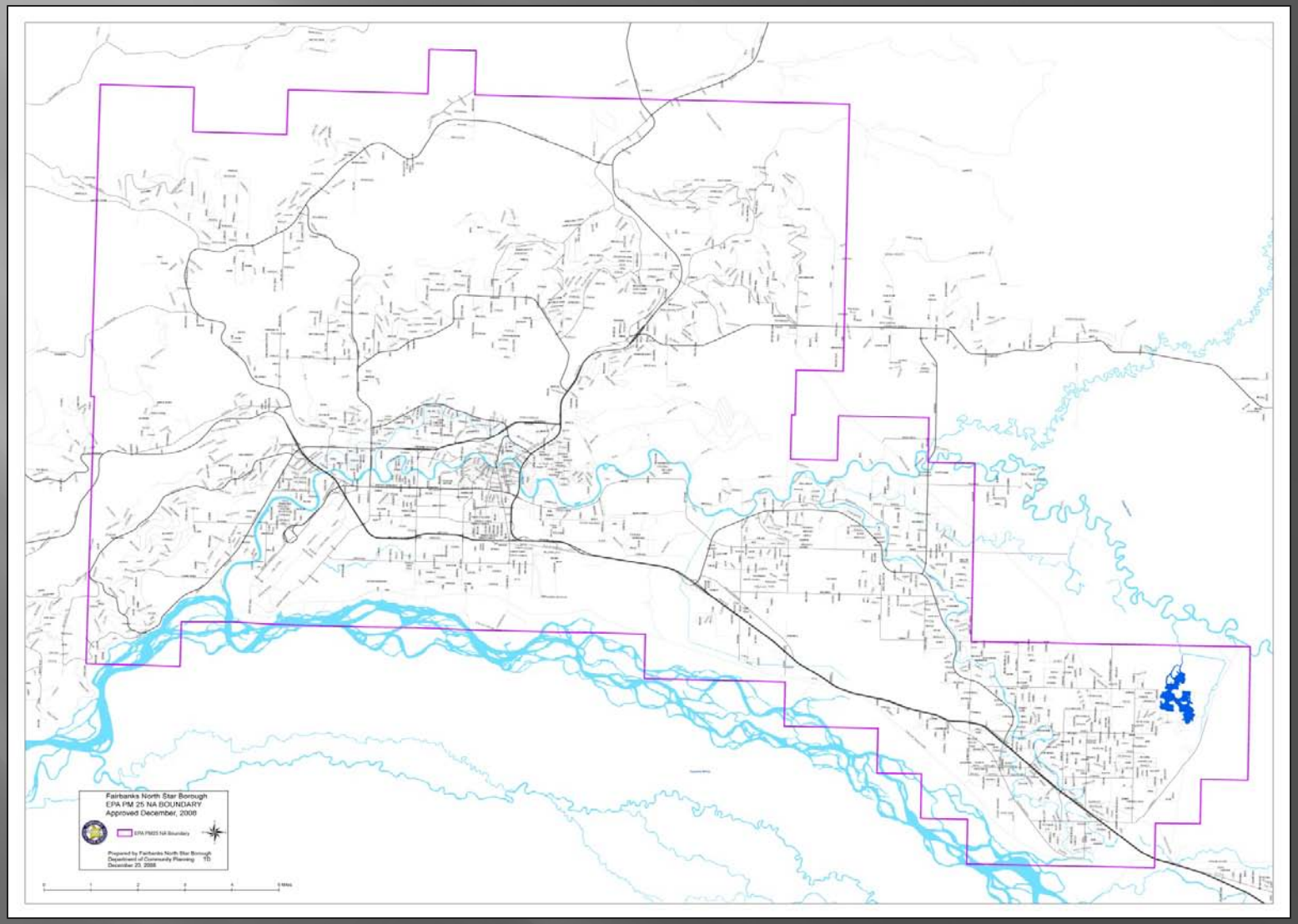
Background

- In September 2006 the EPA revised the $PM_{2.5}$ standards
  - Annual measurement remained the same
  - 24-hour exposure lowered
    - 65 µg/m^3
    - 35 µg/m^3
- Prior to 2006, the FNSB was in attainment with the $PM_{2.5}$ NAAQS
- FNSB now violates $PM_{2.5}$ approximately 20-30 days a year, winter time only
- EPA revisits every 5 years based on most recent scientific evidence

Background

- EPA required states to designate attainment and non-attainment areas based on 2004-2006 data
- Alaska Department of Environmental Conservation (ADEC) is state lead
- Negotiation between EPA and ADEC on boundaries that has been concluded and boundaries have been set

Background


Fairbanks North Star Borough
EPA PM 25 NA BOUNDARY
Approved December, 2008

Background

- EPA published status simultaneously for all states in the Federal Register 22 December, 2008
- 90-day review period has ended
- Official designation has taken place that Fairbanks is a non-attainment area with regards to $PM_{2.5}$
- Timeline for attempting to come into compliance has now begun

Background

- **NAAQS ($PM_{2.5}$) Compliance Timeline**
  - **Designation** — **December 08**
  - **Effective Date** — **April 2009**
  - **SIPs Due** — **April 2012**
  - **Attainment Required** — **April 2014**
  - **Extension Period** — **April 2019**

Background

- **Current status:**
  - **The Borough continues to gather more exact data to determine sources of $PM_{2.5}$**
  - **CCHRC report on $PM_{2.5}$ emissions**
  - **Emissions inventories from industrial plants**
  - **SIPs are in the beginning stages of development**

Background

- Current data points toward a few major sources
  - Area Sources: wild land fires, wood stoves
  - On Road Mobile Sources: heavy duty diesel vehicles
- Climatology has an affect on the Fairbanks area
  - Inversions
  - Air flow (lack of) from surrounding hills

Background

- **Facts are:**
  - **New NAAQS standards are part of CAA**
  - **Fairbanks violates NAAQS $PM_{2.5}$ standard enough to be considered a non-attainment area**
  - **State is required to submit a SIP**
  - **Bring us into compliance with EPA standards**

Background

- **If the Borough does not or can not:**
  - **Chronic $PM_{2.5}$ exposure is linked to premature mortality (1-3 years)**
  - **EPA could enforce a Federal Implementation Plan (FIP) and mandate state/Borough actions**
  - **Non-compliance could result in:**
    - **Conformity requirements on large projects such as pipelines, major highway improvements, development. Could discourage development and add costs.**
    - **Reduced federal funding with subsequent impact on local economy**

Opportunity A

Given that information, where can the Borough make the most improvement on reduction of $PM_{2.5}$ counts?

Opportunity A: Wood Stove Emissions

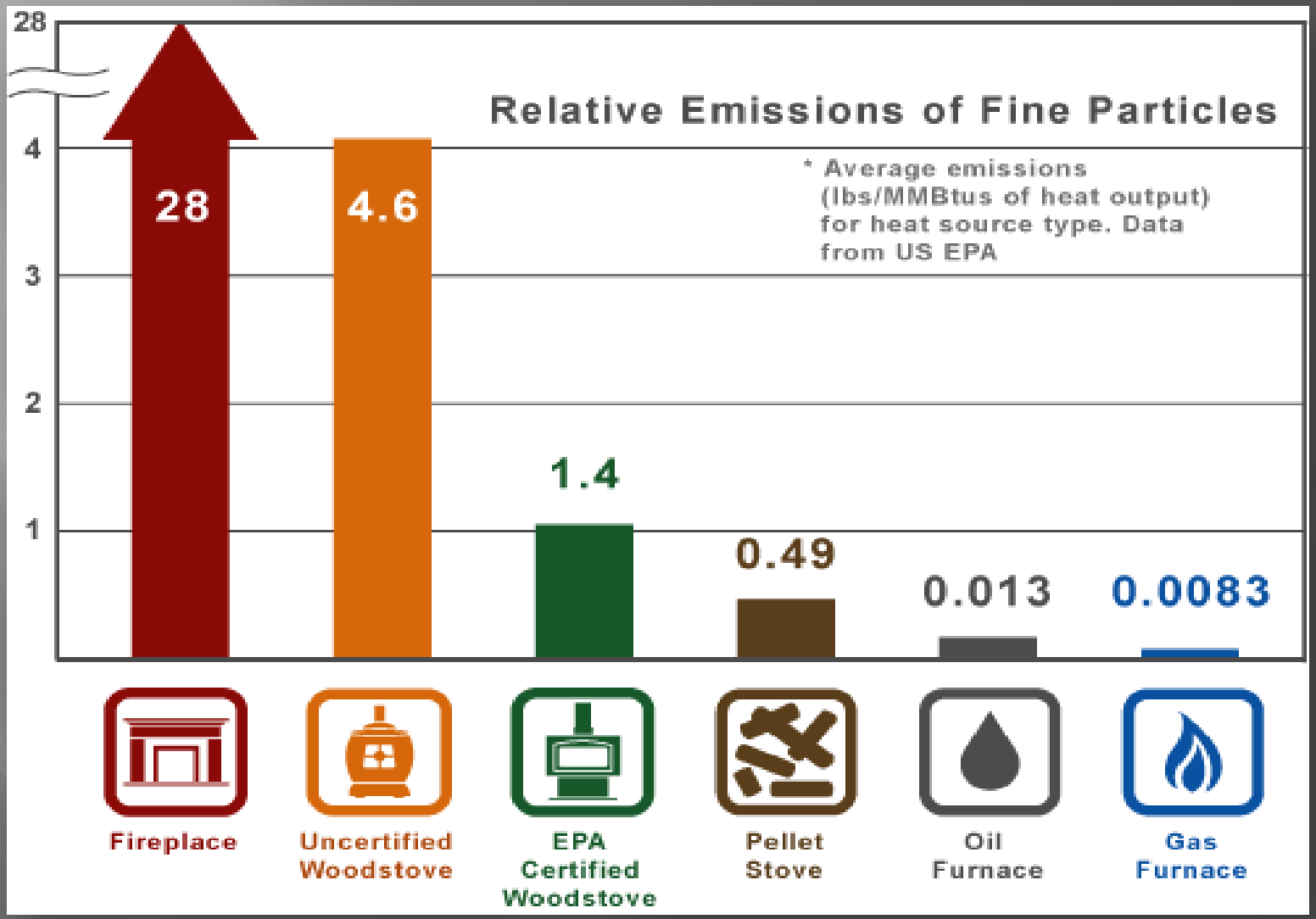
Emissions From Stoves

- **Stove combustion process produces smoke containing harmful chemicals:**
  - **Carbon Monoxide, Volatile Organic Compounds, Nitrogen Oxides, Dioxin, and Particulate Matter**
  - **Common myth that wood is a safer fuel but even wood smoke PM is comprised of wood tar, gases, soot, and ashes**
  - **There is exposure to wood smoke both indoors and outside**

Typical Types of Stoves

- Fireplace, Non-EPA certified wood stove, EPA certified wood stove, wood-fired hydronic heater, pellet stove, coal stove, oil fired furnace, natural gas fired furnace
- Different stoves have different efficiencies and contribute different types of by products and rates of emission

Stove Emissions



Stove Emissions

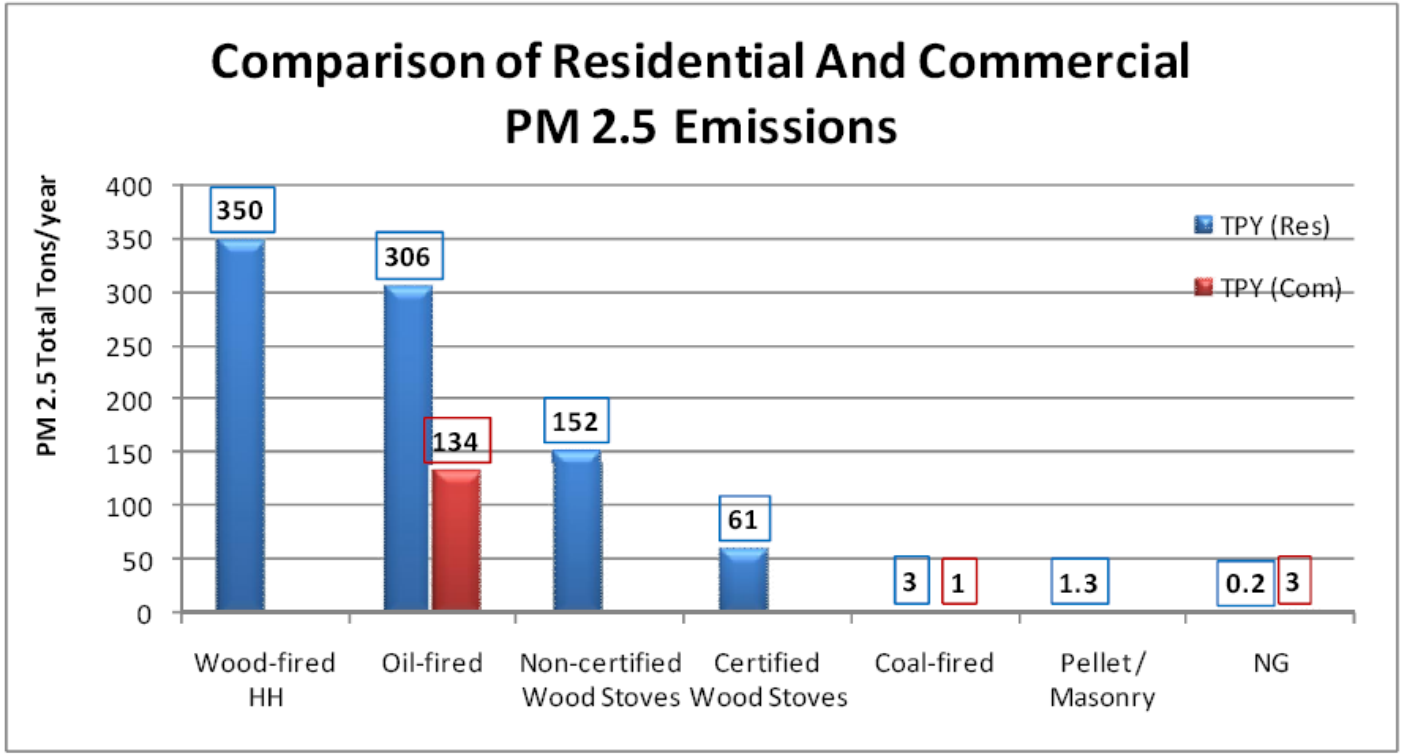
- In 1988, the EPA created performance criteria for wood stoves
- Initiated a certification process for stoves to be accomplished by EPA accredited labs
  - Wood stoves manufactured since 1988 use 1/3 less wood than older stoves to produce same heat (more efficient!)
  - EPA approved stoves emit 50-60% less air pollution (less by products!)
  - Identified by special label and tag

Focusing on the Problem

- **CCHRC recently accomplished modeling studies of the effect of residential heating on FNSB $PM_{2.5}$ problem**
  - **Concluded that residential sources are 2nd largest contributor of $PM_{2.5}$ emissions in the Borough @ 874 tons per year**
  - **Different style of wood stoves account for 3 of the top 4 contributors in the residential category**
    - **Wood fired hydronic heaters, non-certified wood stoves, certified wood stoves**

Residential & Commercial Emissions

Graph 1.



The baseline estimates were used to reach conclusions about the fuels, devices, and factors that were most correlative to PM2.5 emissions. The observations are discussed in the following section.

Focus on Wood Stoves

- **CCHRC study allowed the following conclusions:**
  - **Residential heating is a significant source of $PM_{2.5}$ emissions**
  - **Wood stoves are the most significant source of $PM_{2.5}$ in the residential heating category**
  - **Wood fired hydronic heaters emit more annual tons of $PM_{2.5}$ than any other residential heating category and are on the scale of point sources**

Fun fact: Interesting to note that there are only an estimated 1,500 wood fired hydronic heaters in the Borough (~1 for every 65 people in the FNSB)

Focus on Wood Stoves

- **Oil fired furnaces are a significant source of $PM_{2.5}$ however;**
  - **CCHRC concluded it is premature to consider policies to reduce sulfur in home heating oil at this time due to uncertainty of conversion rate and probable costs of enacting policies**
- **CCHRC modeling shows that coal fired stoves are well below 1% of the estimated tons/year of $PM_{2.5}$ pollution**
- **Pellet stoves/natural gas furnaces also not considered further in this analysis because of negligent contribution to the problem (too few and too little $PM_{2.5}$)**

Focus on Wood Stoves

- **Break wood stoves into two major categories for discussion:**
  - **Non-EPA Certified Wood Stoves: Those that do not meet the defined 1988 performance standards**
  - **EPA Certified Wood Stoves: Those that meet or exceed 1988 performance standards**
- **There are fireplaces, wood stoves, wood fired hydronic heaters in both categories**

Opportunity B

Given that information, where else can the Borough make improvements on reduction of $PM_{2.5}$ counts?

Opportunity B: Diesel Engine Emissions

Diesel Emissions

Diesel emissions are the primary mobile based $PM_{2.5}$ contributor in the Borough. Can be generated by:

- **Trucks**
- **Buses**
- **Heavy equipment**

$PM_{2.5}$ from diesel exhaust is worse for a human's health than that produced by wood stoves and wild fires.

Diesel Engines

Two types of diesel engines (depending on use):

- **Heavy duty**
- **Light duty**

This opportunity for the Borough is focused on heavy duty, road utilized diesel engines. Identified by the Gross Vehicle Weight Rating (GVWR) of the vehicle being classified.

Light Duty Diesel Engines

Small, light duty diesel engines are used primarily in passenger cars and light trucks:

- **Tend to get better fuel efficiency than comparable unleaded gasoline engines in the same vehicle model**
- **The light duty engines are not a substantive factor in $PM_{2.5}$ emissions**
- **These vehicles and engines are less than or equal to 7 tons GVWR.**

Heavy Duty Diesel Engines

Heavy duty diesel engines utilized in:

- **Semi trucks**
- **Buses**
- **Marine boat engines**
- **Heavy equipment:**
  - **Bulldozers**
  - **Road construction equipment**
  - **Earth movement equipment for ore, waste or fill**
- **Locomotive trains**
- **Stand-alone power generators***

EPA defines a heavy duty engine in a vehicle as one consisting of greater than 14,000 pounds GVWR (7 tons).

*** = In some cases, usually very large commercial generators (non-personal use)**

Diesel Exhaust

Diesel exhaust contains many dangerous substances, including:

- **No_x**
- **So_x**
- **Aldehydes (Formaldehyde, acetaldehyde and acrolein)**
- **Various hydrocarbons particles**
- **Carbon**

45 tons per year of $PM_{2.5}$ comes from diesel engines! (80.3%) This is the leading On-Road Mobile source.

School buses are of particular concern due to children breathing 50% more air per pound than adults.

$PM_{2.5}$ Reduction Methods

There are four possibilities to address existing $PM_{2.5}$ from heavy duty diesel engines:

- **Retrofit engines with diesel oxidation catalysts (DOC)**
- **Retrofit engines with diesel particulate filters (DPF)**
- **Ultra low sulfur diesel fuel (ULSD)**
- **Idling regulations**

Diesel Oxidation Catalysts

DOCs use a substance that speeds up a chemical reaction, in this case oxidization

Depending on fuel and engine type, a DOC can remove 20% to 40 percent % of total PM and while they do not remove PM from elemental carbon it does from organic carbon. Additionally, DOCs reduce hydrocarbon and CO pollution from exhaust. Potential side effects from DOCs can be the production of ultrafine particulates when paired with non-ultra low sulfur diesel (ULSD) fuel. There are also DOCs made with catalysts that assist in reducing the ultrafine particulates when used with non-ULSD fuel. Depending on the catalyst used, some DOCs may increase the NO2 created. DOCs verified by the California Air Resources Board (CARB) and EPA comply with NO2 and NOx limits

Diesel Oxidation Catalysts

Depending on engine type and age, DOCs can cost anywhere from $600 to $2,000 for parts and installation._The main maintenance costs associated with them is high temperature burn offs of sulfur. ULSD reduces the amount of sulfur in the fuel, also reducing the sulfur build up and maintenance cost to burn it off. This sulfur will need to be removed every other year to four times a year via thermal cleaning at about $178 a year._Anchorage School District has retrofitted 74 buses with DOCs successfully.

Per ton of PM removed from school buses and Class 8b trucks has an average cost of $11,000 to $50,000 using DOCs

Diesel Particulate Filters

DPFs are filters that can replace the muffler of a vehicle. When used in conjunction with ULSD DPFs can result in as much as 90% reduction in total PM._Build up is cleaned from the filter by using high heat to oxidize the particulate build up. Catalyzed diesel particulate filters (CDPF) have a coating of a catalyst to reduce the temperature needed to clean the filter. Using a biodiesel mix may also assist in lowering the necessary temperature. Passive DPFs, those without assistive electric heaters may not be as efficient at removing particulates or require more frequent replacement and cleaning during the winter here in Alaska. DPFs also remove hydrocarbon and CO from exhaust.

Diesel Particulate Filters

DPFs are priced from $5,000 to $10,000, not including electric heaters. Maintenance needed is periodic cleaning of the filter and replacement. Filter cleaning is usually every one to two years or 60,000 to 100,000 miles. Most filters are cleaned on the vehicle using heat, but some need to be removed and cleaned by a company, while others are cleaned using pressurized air or water. The filtered material is considered hazardous waste by the state of California.

Per ton of PM removed from school buses and Class 8b trucks costs in the range of $12,100 to $69,900 using CDPFs.

Ultra Low Sulfur Diesel Fuel

ULSD will be mandatory in Alaska starting summer 2010. According the EPA, under normal circumstances there should be no difference seen between low sulfur diesel and ULSD. However, they also note that there may be a small change in miles per gallon as some energy is removed at the same time the sulfur is removed. ULSD must be used with diesel vehicles 2007 and later, because other fuels will cause damage to the engine. ULSD paired with either a DOC or either type of DPF reduces much more particulate than without and also lowers maintenance costs of both. In vehicles older than 2006, ULSD may cause the fuel filter to plug up due to loosened deposits from the fuel system at the start of use. The EPA suggests using oil formulated to be used in engines using ULSD fuel. Addition lubricants and corrosion inhibitors may also need to be added to the fuel when used with older vehicles, though as one Alaskan town found out, not all lubricants can be used for all systems. Lubricant added to ultra low sulfur heating oil plugged up fuel filters and ruined fuel pumps in heating systems. ULSD does have problems with very cold temperatures, like those that Fairbanks experiences in January and February. Ultra low sulfur kerosene and other specialized additives can be added to ULSD to lower the temperature of the fuel gelling.

Ultra Low Sulfur Diesel Fuel

A 2001 study by the Energy Information Administration estimated that ULSD will cost an additional 5 cents per gallon to manufacture, which does not cover the addition expense to transport the fuel (higher fuel prices). Additional maintenance costs of fuel filters, ULSD formulated engine treatments and non-gelling additives will vary depending on the year and type of vehicle.

A press release from the EPA estimated that once ULSD was fully used it would reduce the amount of total PM by 110,000 tons and would cost about $4 billion per year for those reductions. It did not break down those costs. This would put the price per ton removed annually at approximately $36,364.

Idling Regulations

Reducing idling of heavy-duty vehicles, school buses and gasoline vehicles would also reduce PM pollution. Pennsylvania estimates that their anti-idling regulation, when enacted, will remove almost 30 tons of total PM. While this paper only addresses heavy-duty vehicles, applying this to passenger cars would also significantly reduce PM. People are more likely to be idling vehicles when it is extremely cold and when air quality seems to be at its worst. However, it is already in the Alaskan Administrative Code to not allow unattended motor vehicles to idle and it is a $50 fine. Truck drivers idle to keep the engine warm, provide heat, cooling and electricity to their cabin while parked for their mandatory rest periods.

Idling Regulations

Installations of anti-idling devices vary. A cabin heater costs about $1,500, or auxiliary power unit or generator is about $6,000 - $8,500. Another option is electrified rest areas for truckers. There are two types of parking areas, one requires both site and truck modifications and may cost anywhere from $200 to $3,000 for the truck set-up plus a fee for electric used. The actual parking spaces themselves would also need to be set-up to provide power and range in cost from free (with a money sharing program) to $2,500 a space.

Idling Regulations

The second type of electrified parking spaces requires little if any modification to the truck and instead relies on the equipment of the space itself. The IdleAire brand electrified spot, for instance, requires a $10 window adapter to be installed and the utility hose hooks in to that. Piped in through this hose along with heat, are internet access, cable TV, and electricity. Basic service includes filtered heat and A/C, 120V electric outlets, built-in touch screen control with Internet access, phone access for incoming & outgoing calls, and television. Users pay $2.45 to $2.89 an hour for the service. At this time, setting up parking spaces for this service is free, and they pay out a percentage of what they make to the lot owner._However, this technology has not been tested in Alaska. It is an intriguing idea, but a pilot program needs to be done.

Anti-Idling Savings

On average, a semi truck uses a gallon of diesel for every hour of idling.

Use of these technology recommendations for the approximate 1,200 hours of idle time a truck will have during a year, adds up to $3,828 in saved fuel costs (at today's market prices).

Quickly pays off even the more expensive generator or auxiliary power supplies available today!

Implementation Options

The best possibility for meeting PM2.5 requirements is to implement mandatory PM devices on heavy-duty vehicles and buses. If at all possible they should use catalyzed diesel particulate filters, thought for some vehicles a DOCs may be the choice. Additionally, semi-trucks should be outfitted with APS or efficient generators and should not idle in the non-attainment area. Powered parking spaces should be investigated.

Implementation Options

Idling needs to be greatly reduced in the non-attainment area. A better public marketing system needs to be developed to educate the general public on idling laws and why they should not be idling their cars more than five minutes (new cars, and how bad it is on the engine and fuel efficiency.) Additionally, a law should be passed to not allow semi-trucks to idle in the identified non-attainment area. Adding an auxiliary power unit (APU) allows the engine heater to keep the engine un-frozen and to heat up the cabin. However, enforcing this will be more difficult than the exhaust units. Expensive units or global position systems can be installed to monitor idling time. However, this is costly to enforce, install and maintain.

However, in some ways anti-idling laws are self enforced once fleets start to realize money savings from less fuel being used.

Implementation Options

ULSD complements both of the items discussed above. Pairing a CDPF and ULSD fuel is estimated to reduce PM by 90% of the vehicles original PM output. This is already being addressed by the EPA, though it would help to meet attainment if the Fairbanks area could move to it sooner, though supply may not be available. Already local gas stations, such as Fred Meyer, are only selling ULSD.

Funding Options

Federal monies are available for assisting programs reduce diesel emissions, particularly for those areas that are in nonattainment. EPA monies are primarily dispersed through two programs, the American Recovery and Reinvestment Act of 2009 (Recovery Act) and the EPA's Fiscal Year 2009 Appropriations. The Recovery Act will be $300 million in funding and the EPA's 2009 Fiscal Appropriations will be $60 million. These two programs will joint fund many of the available programs such as the National Diesel Campaign. Some grant programs require the state to match funds to receive additional monies, such as the State Clean Diesel Grant Program. Grants to provide low cost loans are also available through the SmartWay Clean Diesel Program. Most of these programs fund diesel retrofits with EPA or CARB certified or verified products, EPA-verified idle reduction equipment, and incremental costs associated with early replacement of some engines. Some idling reducing equipment, such as fuel operated heaters, APUs and shore connection systems, are excluded from the federal excise tax if they are from the federal list.

Funding Options

Particularly good year for grants and other funding, although deadlines are approaching

Applications for Recovery Act funded monies are due by April 28th from the state and Borough

Funding Program	Amount in Millions
The Recovery Act Funding for the National Clean Diesel Funding Assistance Program	$156
The Recovery Act Funding for the National Clean Diesel Emerging Technology Program	$20
The Recovery Act Funding for the SmartWay Clean Diesel Finance Program	$30
The Recovery Act Funding for the State Clean Diesel Grant Program	$88

Stakeholder Analysis

So, the Borough is in non-attainment.

Who are the major stakeholders or groups being impacted?

Stakeholder Analysis

- **“Any group or individual who can affect or who is affected by the achievement of the project objective”**
- **Stakeholder analysis gives insight into the support , or adverse reactions, expected from a change in policy.**
- **The project manager can utilize this information to convey the project goals with regard to the important issues of each stakeholder group.**

Stakeholder Analysis

1. Identify appropriate stakeholders
2. Measure the stakeholder's interest
3. Specify the nature of the stakeholder's interest
4. Predict what each stakeholder's future behavior will be to satisfy her or his stake in the project
5. Evaluate the impact of the stakeholder's behavior on the project team's decisions

Stakeholder Analysis

- **Identified 31 stakeholders affected by proposed regulations to woodstove and diesel emissions**
- **Determined categories and evaluated if the change would be benefit or a disbenefit for each stakeholder**
- **Benefit categories**
  - **Continued federal funding: 16%**
  - **Reduced EPA oversight: 36%**
  - **Better health and environment: 100%**
  - **Continued growth in the community: 68%**
- **Disbenefit categories**
  - **Who will be restricted by the regulations: 48%**
  - **Who will pay more: 16%**

Table 1 Identification of Stakeholders

STAKE-HOLDERS	SYSTEM	BENEFITS of coming into Attainment *Who benefits from ...*				DISBENEFITS of new FNSB restrictions		PROJECT FINANCIERS	CON-TRACTORS	DECISION MAKERS	INTEREST GROUPS AND ORGS.	LEGAL OR REG. INTEREST	TECH-NOLOGY INTEREST	TOTAL TIMES IDENTIFIED
	Who is in the System?	Federal Funding Maint.	Reduced EPA Oversight	Increase Health & Enviro.	Allows Cont'd Growth	Who will be restricted by regulations	Who will pay more money?	Who will pay for the project?	Who will make money from regulations?	Who holds decision authority	Other misc. groups	Who has legal resp. to this project?	Who has tech. interest or claims?	
FNSB	X	X	X	X	X	X		X		X		X	X	10
AK DOT	X	X	X	X	X	X		X		X		X	X	10
FNSB IM and Air Pollution Control Commission	X	X	X	X		X		X	X	X		X	X	10
ADEC	X		X	X		X		X		X		X	X	8
City of Fairbanks	X	X	X	X	X			X				X		7
EPA	X		X	X						X		X	X	6
City of North Pole	X	X	X	X	X			X				X		6
MACS	X			X	X	X		X	X					5
Power Plant Operators			X	X	X	X							X	5
Usibelli Coal			X	X	X	X							X	5
Fairbanks Int. Airport				X	X	X					X		X	5
Semi-truck Drivers				X	X	X	X						X	5
Diesel Fuel Producers/ Suppliers				X	X	X			X				X	5
Compliant Wood/Coal Stove Suppliers				X	X				X				X	4
Home Contractors				X	X				X				X	4
Real Estate Agents				X	X				X			X		4
School Bus Companies				X	X	X	X							4
Diesel Mechanics				X	X				X				X	4
Eielson AFB			X	X				X						3
Ft. Wainwright			X	X				X						3
Home Owners: Non-Compliant Solid Fuel				X		X	X							3
Tourism Industry/Tourists				X	X						X			3
University Students				X	X						X			3
Healthcare Industry				X	X						X			3
Fuel Suppliers Wood/Coal				X	X	X								3
School Districts				X	X		X							3
Northern Alaska Environmental Center				X							X			2
Alaska Railroad				X	X	X								
Home Owners: Compliant Solid Fuel				X									X	
Home Owners: Oil				X										
Non-Compliant Wood/ Coal Stove Suppliers				X		X	X							
% of Stakeholders *Identified*	23%	16%	35%	(100%)	69%	40%	16%	29%	23%	16%	16%	29%	45%	

ADEC - Alaska Department of Environmental Conservation	FNSB - Fairbanks North Star Borough	Northern Alaska Environmental Center
AK DOT - Alaska Department of Transportation	FNSB IM and Air Pollution Control Commission	Power Plant Operators
Alaska Railroad	FNSB Metropolitan Area Commuter System (MACS)	Real Estate Agents
City of Fairbanks	Ft. Wainwright	School Bus Companies
City of North Pole	Fuel Suppliers Wood/Coal	School Districts
Compliant Wood/Coal Stove Suppliers	Healthcare Industry	Semi-truck Drivers
Diesel Fuel Producers/Suppliers	Home Contractors	Tourism Industry/Tourists
Diesel Mechanics	Home Owners: Non-Compliant Solid Fuel	University Students
Eielson AFB	Home Owners: Oil	Usibelli Coal
EPA - Environmental Protection Agency	Home Owners: Compliant	
Fairbanks International Airport	Non-Compliant Wood/Coal Stove Suppliers	

Stakeholder Analysis

Also evaluated if the stakeholder was:

- **Project Financier**
  - **Funding agencies --- 29%**
- **Contractor**
  - **Benefits monetarily --- 26%**
- **Decision Makers**
  - **Hold decision authority ---16%**
- **Interest Groups**
  - **Organizations with vested interest --- 16%**
- **Legal**
  - **Agencies with legal or regulatory authority --- 26%**
- **Technology**
  - **Those with technological interest --- 45%**

Stakeholder Analysis

Government --- 27% **Commercial --- 19%**
Individual --- 27% **Special Interest --- 15%**

- **Fuel Suppliers - Wood - I**
  Individuals that make their living from cutting and supplying wood

- **Healthcare Industry - SI**
  Medical institutions, doctors and insurance providers are included in this group. As the health benefits of cleaner air are realized in our area, lower revenues may be received.

- **Home Contractors – C**
  Building contractors that will benefit from increased demand to retrofit stoves or to change-out stoves at time of sale of home.

Stakeholder Analysis

- **School Bus Companies – C**

  Like semi-trucks, can also require retrofitting school buses

- **School Districts - G**

  The Fairbanks North Star School District and several other schools contract for school bus services. The cost to these schools will increase as a result of the change.

- **Semi-truck Drivers - I**

  Diesel Semi-tractor trailer trucks can be retrofitted to reduce emissions and modified so that continuous running of the engine is not necessary in order to keep it warm. Requiring ultra-low sulfur fuel will also reduce emissions.

- **Tourism Industry/Tourists - SI**

  Fairbanks has a year-round appeal to tourists who want to experience the extremes that Alaska has to offer.

Stakeholder Analysis

- **Predict what each stakeholder's future behavior will be to satisfy her or his stake .**
- **Evaluate actions with regard to political, economic and social responsibilities.**
- **Evaluate the impact of the stakeholder's behavior on the project team's decisions.**
- **Goal is to show how the overall benefit outweighs the negative results, even though some stakeholders have to compromise to come into compliance with the EPA standard**

Conclusion

A Special Thanks To

Expert panel members:
- **Nathan Sapp, I/M & Air Control Commission of FNSB Member**
- **Francis Isgrigg, ?**
- **Larry Duffy, I/M & Air Control Commission of FNSB Member**
- **Mary Shields, Northern Alaska Environmental Center Board Member**

Graduate Advisory Committee members:
- **Dr. Robert Perkins (M. Fye, B. Havel, H. Havel, J. Putnam)**
- **Dr. J. Leroy Hulsey (M. Fye, B. Havel, H. Havel, J. Putnam)**
- **Dr. Ming Lee (B. Havel)**
- **Dr. Dennis Filler (H. Havel)**
- **Dr. David Barnes (M. Fye, J. Putnam)**

Jim Conner, FNSB Director of Air Quality

Todd Thompson, 2 pictures of wood stove output

Thank you for your time and attending

Questions?

End of Presentation

Ultra Low Sulfur Heating Fuel

Extra Content