Road Dust, Air Quality, and Health

By: LTJG Patrick Bloecher
2014 Tribal Transportation Symposium
Road Map

• Introduction and Background

• Road Dust, Air Quality, and Health

• Alaska Air Quality Activities
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Introduction

• **Who we are…**
  – The Alaska Native Tribal Health Consortium (ANTHC)
  – Largest tribally managed health organization in the nation
  – **Vision:** Alaska Native people are the healthiest people in the world
  – **Mission:** Providing the highest quality health services in partnership with our people and the Alaska Tribal Health System
Introduction

• What we do...
  – Integrated health care services:

Wellness

Alaska Native Medical Center

Business

Environmental Health, Engineering, & Construction
ANTHC Environmental Health

Environmental Health Services

- National Tribal Water Center
- Brownfield Program
- Tribal Air Program
- Healthy Homes Program
- Fluoride Program
- Field EH Program
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How is Health Affected?

Environment

Genetics

Culture/Lifestyle

Socioeconomics

Health Outcome

Metabolism

Behavior
How Environment Plays a Role

• Environmental Exposures and Risk

• Routes of Exposures
  – **Inhalation**
  – Ingestion
  – Absorption
Respiratory Health

- Alaska Native children have high rates of respiratory illness

Respiratory Health

• **Risk Factors**
  – Lack of in-home piped water services
  – Household overcrowding
  – Not Breastfeeding
  – Using a woodstove
  – Poor air quality (indoor and outdoor)
The Air We Breathe
The Air We Breathe
The Air We Breathe

- **PM$_{2.5}$**: Combustion particles, organic compounds, metals, etc. < 2.5 µm (microns) in diameter
- **PM$_{10}$**: Dust, pollen, mold, etc. < 10 µm (microns) in diameter

*Image courtesy of the U.S. EPA*
Air Quality and Health

Superior Airways of respiration

Coarse particles: 
Dp < 10 μm

Inferior Airways of respiration

Fine particles: 
Dp < 2.5 μm

Alvéolos

Inhalable particle 
Dp < 1 μm

Ultrafine particles 
Dp < 100 nm

Courtesy of http://www.intechopen.com/source/html/42164/media/image4.png
Air Quality and Health

• Particulate Matter
  – *The dose makes the poison*
    • *(size, time, amount exposed to, source, what’s attached to the dust, etc.)*
  – Cardiovascular problems
  – Respiratory problems
  – Eyes and skin
  – Dust as a safety issue
Air Quality and Health

• Evidence for Health Impact
  – Fine particle exposure studies
  – Dust storm and human health studies
  – WHO all cause mortality increase
    • 0.2–0.6% per 10 μg/m3 of PM10
    • Cardiopulmonary mortality risk increases 6–13% per 10 μg/m3 of PM2.5
Air Quality and Health

- **Size matters**
  - Ultrafine vs. PM$_{2.5}$ vs. PM$_{10}$

- **What’s in the dust matters**
  - Chemicals
  - Bacteria
  - Fungi
  - Heavy metals
Air Quality and Health

• What’s safe???
  – As little as possible
  – Below 24hr. NAAQS
    \[ PM_{10} \leq 150 \ \mu g/m^3 \]
    \[ PM_{2.5} \leq 35 \ \mu g/m^3 \]
Who is Most Vulnerable?
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ANTHC Air Quality

- Air Quality Consultation
- Technical Assistance
- Air Monitoring Support
- Mini-grants
ANTHC Air Quality

• Mini-grants
  – Up to $10,000
  – Includes onsite training visits from ANTHC staff
  – Air quality project, including road dust
ANTHC Air Quality

- What we’ve found
  - Biggest limitation is often $$$
  - Partnerships and collaboration are key to success
  - Road dust is #1 air quality concern in rural Alaska
State of the State

DUST COMPLAINTS IN RURAL ALASKA

As reported in ADEC rural dust surveys.
Regulating Air Quality

• EPA partners with States to meet NAAQS

• On reservations, EPA works with Tribes to protect air quality

• EPA, State, and Tribes partner to meet NAAQS, with the State holding ultimately responsible
Alaska Road Dust Workgroup

Goal: Reduce dust exposure in rural Alaska by collaborating and leveraging resources
Rural Alaska Opportunities

• What can rural communities do???
  – Create local partnerships
    • Environmental, Transportation, City, Tribe
  – Develop a plan
    • Dust management
    • Community education and promotion
  – Evaluate the Plan
Components of a Plan

- Speed limits
- Alternative transportation
- Speed bumps
- Education and Promotion
- Palliatives
Education vs. Promotion

Please Mom, go slow so we don’t make dust for other people.
Where to Start?

• Learn the options

• Ask, what might work best in my community?

• Then find partners to make it happen
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Thank You

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