IMPACTS OF AIR QUALITY NON–ATTAINMENT ON LOCAL INDUSTRY

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Presenters

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Discussion Outline

- Overview of Facilities
- Existing Regulatory Burden
- Emission Rate Comparison
- Emission Modeling Map
- Benefits of District Heat
- BACT Analysis
- Ongoing Discussions with ADEC/EPA
The cantonment area covers approximately 13,500 acres
Supports 20,000 DOD residents, employees, and contractors
Family housing on the post totals approximately 1,400 units
2008 Utilities Privatization
20 MW coal fired Central Heat and Power Plant
Six identical 150,000 lb/hr steam generators
Operates to meet the heating and electricity demands of the post
Air Program Tracking – Wainwright

1 Air Permit
6 Industrial Boilers
29 Fuel Fired Generators or Pumps
6 Coal Handling Sources

108 air permit requirements totaling 920 conditions

1 Minute
Stack Opacity Data

Monthly
Fuel consumption and engine hours

Annually
5 reports certified by DU responsible official including Emission Estimates, Operating Reports, Compliance Reports
UAF Overview

Founded in 1917; 9,900 students, 3,400 faculty/staff; 9 colleges/schools; principal research center for UA

- Fairbanks Campus Heat and Power - Existing
  - 180 buildings w/3.1M square feet of area to heat
  - Two 84 MMBTU/hr coal-fired boilers
  - Two 180.9 MMBTU/hr diesel/NG-fired boilers
  - Annual coal usage: 66.6K TPY
  - Annual diesel usage: 79.8K GPY
  - Annual NG usage: 65.1K MCF
UAF Overview

*Six Rural Campuses; Community and Technical College; elearning and Distance Ed; we enroll students from most AK communities, 49 states, & 48 foreign countries*

- **Fairbanks Campus – New Coal Fired Boiler**
  - One 295.6 MMBTU/hr coal-fired boilers
  - 1 Ash handling system
  - 12 Coal handling sources
  - 1 Crusher
  - 3 Coal Silos
  - Draft Permit: 492 conditions
Air Permit Program Tracking (Existing) – UAF

- 3 Air Permits
- 1 Incinerator
- 2 Generators
- 5 Boilers
- 699 conditions

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Daily Reviews
- Opacity
- BH Temp and Pressure

Monthly Calcs
- Fuel consumption on all permitted units

1 Minute Data
- Stack Opacity Data
- BH Temp and Pressure

Annually
- 5 reports certified by UAF responsible official, including Emission Estimates, Operating Reports, Compliance Reports
Aurora Overview
Air Program Tracking – Aurora

1 Air Permit
4 Industrial Boilers
Ash handling Sources
Coal Handling Sources
88 air permit conditions totaling over 400 requirements

Monthly
- Fuel consumption
- Constituents loading
- Compliance Reviews

Continuous Monitoring
- Stack Opacity Data
- Oxygen Data
- Steam flow
- Differential Pressure

Annually
- Emission Estimates
- Operating Reports
- Compliance Reports
PM 2.5 Emission Factors in lbs/ton

- Wainwright: 0.632
- Aurora: 0.632
- UAF Existing: 0.284
- UAF New: 0.181
- Wood Stoves non-EPA: 11.600
- Wood Stoves EPA Certified: 7.570
- Hydronic Heater: 10.550
- Residential Oil: 0.457

*Note: Wood stove, hydronic heater and residential oil number are from the Moderate Area SIP; 0 added for formatting*
<table>
<thead>
<tr>
<th></th>
<th>Wainwright</th>
<th>Aurora</th>
<th>UAF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing</strong> Baghouse COMS Good Maintence Practices Low Sulfur Coal</td>
<td><strong>Existing</strong> Baghouse COMS Good Maintence Practices Low Sulfur Coal</td>
<td><strong>Existing</strong> Baghouse COMS Good Maintence Practices Low Sulfur Coal</td>
<td><strong>New</strong> All the above Limestone CEMS – SO₂, NOₓ</td>
</tr>
</tbody>
</table>
University
25-30 µg/m³

Aurora
25-30 µg/m³

Wainwright
25-30 µg/m³
## CALPUFF Model Output

### Table 5.8-1. Summary of Six Major Fairbanks Point Source Plumes from CALPUFF for the Episode (Jan. 23rd to Feb. 9th, 2008) Average Surface Concentrations at the State Office Building of PM$_{2.5}$ and SO$_2$ in $\mu g/m^3$

<table>
<thead>
<tr>
<th>Power Plant</th>
<th>Episode average SO$_2$ ($\mu g/m^3$)</th>
<th>Episode average PM$_{2.5}$ ($\mu g/m^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UAF- 316</td>
<td>2.75</td>
<td>0.16</td>
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<td>Aurora- 315</td>
<td>0.75</td>
<td>0.02</td>
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<tr>
<td>Zehnder-109</td>
<td>0.48</td>
<td>0.19</td>
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<td>Flint Hills-071</td>
<td>0.016</td>
<td>0.38</td>
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<td>GVEA NP-110</td>
<td>3.8</td>
<td>1.45</td>
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<tr>
<td>Ft. WW- 1121</td>
<td>14</td>
<td>1.6</td>
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<tr>
<td>Total surface concentration</td>
<td>21.8</td>
<td>3.8</td>
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</tbody>
</table>
Summary PM 2.5 Concentration during Episode (Jan. 23 – Feb. 9, 2008)

Average PM2.5 concentration,
FRM data: 25.3 ug/m3

Average PM 2.5 Concentration,
BAM data: 39.1 ug/m3

Average PM 2.5 Concentration,
Modeled Point Source Total
Contribution: 3.8 ug/m3

<table>
<thead>
<tr>
<th>Date</th>
<th>FRM</th>
<th>BAM</th>
<th>Speciation Data Available</th>
<th>Daily Temperatures (°F)</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Max</td>
</tr>
<tr>
<td>01/23/08</td>
<td>5.9</td>
<td>27.2</td>
<td></td>
<td>23</td>
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<tr>
<td>01/24/08</td>
<td>22</td>
<td></td>
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<td>17.5</td>
<td>22.2</td>
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<td>0</td>
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<td>35.8</td>
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<td>01/30/08</td>
<td>55.1</td>
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<td>02/04/08</td>
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<td>68.2</td>
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<td>-29</td>
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<td>45.7</td>
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<tr>
<td>02/10/08</td>
<td>32.7</td>
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<td>-12</td>
</tr>
</tbody>
</table>

* FRMs are operated once every three days; BAMs collect hourly values, which are used to calculate 24-hour averages.
Figure 5
Meteorological and PM$_{2.5}$ data for Fairbanks International Airport
Fairbanks Airport Meteorological Data (Jan 23 - Feb 12, 2008)
Aurora Energy District Heating

- Provides Steam and Hot Water Heating to approximately 165 customers.
- Supplies approximately 280,000 MMBtu/year to District Heating customers.
- Equivalent to approximately 2,000,000 gallons of heating oil.

Potential low level annual emissions\(^1\) in the downtown area from residential heating in place of District Heating

<table>
<thead>
<tr>
<th>Potential Heat Source</th>
<th>Heat provided by DH</th>
<th>SO(_2)^4</th>
<th>NOx</th>
<th>PM(_{2.5})^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>MMBtu</td>
<td>lbs</td>
<td>lbs</td>
<td>lbs</td>
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<tr>
<td>Wood(^2)</td>
<td>280,000</td>
<td>6,474</td>
<td>32,370</td>
<td>317,225</td>
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<tr>
<td>Oil(^3,4)</td>
<td>280,000</td>
<td>1,420</td>
<td>36,000</td>
<td>2,600</td>
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<tr>
<td>NG</td>
<td>280,000</td>
<td>165</td>
<td>25,804</td>
<td>2,086</td>
</tr>
</tbody>
</table>

1 - Emission Factors based on AP-42
2 - Wood PM Emission is for PM\(_{10}\)
3 - 140 MMBtu/10\(^3\) gallon, No. 2 Heating oil
4 - Oil Sulfur content for No.2 Heating oil, 0.005%
UAF BACT Analysis

- Completed for Serious PM2.5 Non-Attainment Area Classification
- In Draft Final Form and submitted to ADEC
- Review included permitted units - including new boiler
- Currently reviewing Draft Final BACT
  - Due to EPA’s 8/24/2016 Federal Register Final Rule for 40 CFR Parts 50, 51, and 93 Fine Particulate Matter National Ambient Air Quality Standards: SIP Requirements
- BACT for the new coal-fired boiler includes
  - CFB with staged combustion
  - Fabric filter
  - Limestone injection and low sulfur fuel
Based on ADEC’s control technology evaluation, sources that emit >100 tons of NOx, SO2, and PM 2.5 must consider control technologies for source emissions.

Costly controls may not significantly reduce pollutant contribution to the area.
QUESTIONS AND COMMENTS