STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION
OFFICE OF THE COMMISSIONER

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October 20, 2008

Elin Miller, Regional Administrator
U.S. Environmental Protection Agency Region 10
1200 Sixth Avenue, Suite 900
Mail Code: RA-140
Seattle, WA 98101-3140

Dear Ms. Miller:

The Alaska Department of Environmental Conservation (ADEC) has reviewed your August 18th letter regarding EPA's $PM_{2.5}$ designations for Alaska and the nonattainment boundaries for the communities of Fairbanks and Juneau. We have carefully considered the available data and analyses. ADEC believes the available scientific evidence does not support EPA's boundary recommendations which substantially expand upon those recommended by us. ADEC believes public health will be protected and the applicable legal requirements met by taking the actions described in this letter, which include a proposed nonattainment boundary for the Fairbanks area that is larger than originally proposed by ADEC, but smaller than proposed by EPA. For Juneau, we are requesting EPA revisit certain assumptions and include data from 2008 before making a final decision on whether a nonattainment designation is warranted, and if so, the appropriate boundaries of the nonattainment area.

Protecting public health is a goal we share with EPA. As you are already aware, we are proactively and expeditiously working with the local governments to address identified $PM_{2.5}$ concerns in Fairbanks and Juneau. To this end, ADEC does not believe EPA's proposed boundaries will ultimately assist in protecting public health. To ask the public to incur additional costs or forego what they may see as beneficial opportunities in their communities in order to reduce $PM_{2.5}$ emissions, we should have a much better basis for predicting air quality and health benefits than exists for EPA's proposed extended boundaries. Again, we believe public health will be protected with the actions we propose and appreciate your consideration of them along with the enclosed data and information.

<u>Fairbanks</u>
ADEC's original boundary recommendation for Fairbanks, Alaska followed the factor analysis approach set out in EPA guidance and was based on available data collected within the local community. The supplemental information provided with

this letter updates and adds to the original analyses provide by ADEC in support of its boundary proposal. The entirety of data supports a modification of both the original ADEC recommended boundary and the EPA proposed boundary. We have included a revised nonattainment boundary for consideration. We believe this boundary is appropriate, defensible, and is based on the best local data available at this time.

If you determine that the available data does not support this modified boundary, the ADEC encourages you to consider options that allow for additional data to be collected and included in the analyses used to set the final boundary. The ADEC and the Fairbanks North Star Borough have initiated an extensive monitoring program for this coming winter that will provide insight into source specific contributions as well as the size and extent of the area exceeding the 24-hour $PM_{2.5}$ standard. This $2.64 million dollar effort is underway and will generate significant new data over the next winter that would inform a final boundary. In addition, EPA is engaged in a $PM_{2.5}$ modeling research program in the Fairbanks area that will also inform the decision process.

ADEC believes there are two options available to allow for the time needed to make an informed boundary decision. First, EPA could use the extension provided under the CAA Section 107(d)(1)(B)(i) where the designation period can be extended for up to one year if the Administrator needs additional information. This would allow data from this winter's effort to be submitted and considered in the boundary decision. Second, EPA could consider and implement the proposal by ADEC to set a smaller boundary now and then expand the boundary in the future, if warranted, based on the data collected this winter. This would allow for timely initiation of the air quality planning process but still recognize the uncertainty in the scope of the problem and sources involved.

Juneau

The higher $PM_{2.5}$ design value for Juneau was not indentified until after ADEC submitted its initial nonattainment recommendations. Since that time, ADEC has focused on design value calculation procedures and determined that the nonattainment designation for Juneau may not be warranted. ADEC agrees that Juneau can approach the 24-hour $PM_{2.5}$ ambient air quality standard in the Mendenhall Valley under certain meteorological conditions, however, it is not clear that the design value actually exceeds the ambient air quality standard. Therefore, ADEC requests that EPA carefully review the design value for Juneau to insure it has been calculated appropriately. ADEC believes the design value may be biased high due to the inclusion of additional sample days.

Recognizing Juneau's Mendenhall Valley can approach the 24-hour $PM_{2.5}$ standard ADEC is proactively working with the City & Borough of Juneau to protect public health by controlling $PM_{2.5}$. The City & Borough of Juneau amended its existing wood stove control program in September 2008 to address the new $PM_{2.5}$ standard. The revised ordinance is in effect and allows for burn bans to be called when

concentrations approach the $PM_{2.5}$ ambient air quality standard. ADEC will include the revised ordinance in the Alaska SIP as part of the Limited Maintenance Plan for the Juneau PM_{10} area making the requirements state enforceable as well. As a result, ADEC requests EPA revisit Juneau's nonattainment designation based on the 2006-2008 monitoring data. The 2008 data should be available by February 2009. With the revised ordinance in place, it is likely that the design value for this three year period will be below the 24-hour $PM_{2.5}$ ambient air quality standard.

Because the higher design value for Juneau was not identified until this past spring, there was little to no time for proper development of a boundary proposal. As a result, ADEC made a boundary recommendation for Juneau that was based on the existing PM_{10} nonattainment boundary. This PM_{10} boundary was approved by EPA and has stood for more than twenty years as the community, ADEC, and Region 10 EPA successfully worked to bring this area into compliance. In Juneau, the PM_{10} nonattainment area was caused primarily by localized, short term episodes of high $PM_{2.5}$ from residential wood smoke. Juneau addressed the problem to meet the PM_{10} standard through the adoption of a burn ban ordinance. Now, wood smoke has reemerged as an episodic, localized problem. The only real change to the situation has been the more stringent $PM_{2.5}$ standard promulgated by EPA. An expansion of this boundary to the scale envisioned in the EPA proposal is not sensible and fails to account for the fact that this is not a new concern - a concern Juneau is already taking steps to solve. In the enclosure, ADEC provides data and information following the factor approach set out in EPA guidance to justify the existing PM_{10} boundary as the appropriate boundary for a $PM_{2.5}$ nonattainment area, should an area need to be designated.

ADEC encourages EPA to carefully review the Juneau monitoring data and additional information provided. ADEC recognizes that Juneau has the potential to approach the 24-hour $PM_{2.5}$ ambient air quality standard in the Mendenhall Valley under certain meteorological conditions. However, ADEC is not convinced the area meets the criteria for a nonattainment designation. Further, ADEC and the community of Juneau are already actively working on ways to control fine particulate air pollution. The wood smoke problem is already addressed through the PM_{10} air quality plan and that plan now includes a more stringent wood smoke control program. Public health is being protected. A new round of air quality planning would be redundant and a poor of use of limited resources.

Summary

The information provided by ADEC, with extensive support from local communities and military bases, demonstrates that smaller nonattainment area boundaries are appropriate in both Fairbanks and Juneau. Moreover, the inclusion of Juneau as a $PM_{2.5}$ nonattainment area should be further reviewed to insure that such a designation is truly warranted. We look forward to working with EPA to ensure compliance with controls and real-world protection of public health. We would be happy to discuss any of the data provided or the options proposed with you or staff. Our primary goal is to have nonattainment area boundaries that are based on sound

data and that allow for protection of public health. Our primary program contacts for this issue are Alice Edwards, Acting Air Quality Director, and Clint Farr, Air Non-Point Section Manager.

Sincerely,

Larry Hartig
Commissioner

Enclosures

cc: Governor Sarah Palin
Mayor Whitaker, Fairbanks North Star Borough
Rod Swope, City Manager, City and Borough of Juneau
Robert Meyers, Assistance Administrator, Office of Air and Radiation, EPA
Steve Page, Director, Office of Air Quality Planning and Standards, EPA
Bill Harnett, Director, OAQPS Division of Air Quality Policy, EPA

Fairbanks

The nonattainment boundary proposed by EPA for Fairbanks encompasses an area that is substantially larger than the nonattainment area recommended by the state. Presented below is a summary of local data that adds to and correct EPA's Technical Analysis for the Fairbanks, Alaska Nonattainment Area. This information serves to support a modified nonattainment area boundary that differs from both ADEC's original recommendation and EPA's proposal. A revised nonattainment boundary is included for consideration. We believe this boundary is appropriate, defensible, and based on the best local data currently available. The new data include updated emissions, monitoring data from the past winter, particulate matter monitoring data from the local military bases, additional meteorological analyses, and updated population and growth information.

Should EPA determine that these additional data do not support the modified boundary, ADEC encourages the consideration of options that allow for additional data to be included. ADEC and the Fairbanks North Star Borough have initiated an extensive monitoring program for this coming winter that will provide insight into source-specific contributions as well as the size and extent of the area exceeding the 24-hour $PM_{2.5}$ standard. This $2.64 million dollar effort is underway and will generate significant new data over the next winter that would inform a final boundary based on meaningful and real data, not supposition. In addition, EPA is engaged in a $PM_{2.5}$ modeling research program in the Fairbanks area that will also inform the decision process. ADEC requests that EPA consider these data in defining a technically supported boundary that can be justified to the public.

ADEC believes there are two options available to allow for the time needed to make an informed boundary decision. First, EPA could use the extension provided under the CAA Section 107(d)(1)(B)(i), where the designation period can be extended for up to one year if the Administrator needs additional information. This would allow data from this winter's effort to be submitted and considered in the boundary decision. Resolutions supporting this position have been made by the Fairbanks North Star Borough[1], the Fairbanks Metropolitan Area Transportation System[2], the City of Fairbanks[3], the Pollution Control Commission[4](to minimize the size of this document, these references will be submitted in a separate zip file, entitled Fairbanks Resolutions). A letter from the

[1] Fairbanks North Star Borough, Resolution 2008 – 37, A Resolution a One-Year's Extension to EPA's Final Designation Decision of the $PM_{2.5}$ Nonattainment Boundaries in the Fairbanks Banks North Star Borough, adopted 10/09/08

[2] Letter from Steve Titus, FMAT Chair to EPA Docket No. EPA-HR-OAR-2007-0562, Subject "Comments on EPA Responses to State and Tribal 2006 24-Hour $PM_{2.5}$ Designation Recommendation", September 17, 2008

[3] City of Fairbanks Resolution No. 4341, A Resolution Requesting the Environmental Protection Agency Delay Any Designation of the Fairbanks North Star Borough as a $PM_{2.5}$ Nonattainment Area for at Least One Year, approved September 22, 2008

[4] Letter from Chuck Machetta, Chairman PCC to EPA Docket No. EPA-HR-OAR-2007-0562, Subject "Comments on EPA Responses to State and Tribal 2006 24-Hour $PM_{2.5}$ Designation Recommendation", September 19, 2008

Mayor of Fairbanks to EPA also requested an extension.[5] Second, EPA could consider and implement the proposal by ADEC to set a smaller boundary now and then expand the boundary in the future, if warranted, based on the data collected this winter. This would allow for timely initiation of the air quality planning process, but still recognize the uncertainty in the scope of the problem and sources involved.

Factor 1: Pollutant Emissions

The estimated annual emissions for the Fairbanks North Star Borough for calendar year 2005 are shown in Table 1. Emission sources are located primarily in the populated areas of the borough; however, there are two notable source categories that are either naturally occurring or not focused inside the urban areas. These sources are wildfire emissions, which dominate emissions overall in the area source category, and dust from unpaved roads, which dominate the particulate matter emissions in the non-road mobile source category. Neither of these sources, however, is active during the winter months when high concentrations of $PM_{2.5}$ occur.

Table 1
Summary of Fairbanks Emissions in 2005
(tons/year)

Source Category	VOC	NOx	SO_2	PM_{10}_PRI	$PM_{2.5}$_PRI	NH_3	CO
Point	67	5,829	4,565	460	NA	NA	1,087
Area	4,473	1,872	1,055	7,523	6,444	337	76,433
Mobile - Onroad	1,160	2,218	161	71	56	55	14,510
Mobile - Nonroad	1,241	543	34	19,245	3,398	0	6144
Total Emissions	**6,941**	**10,462**	**5,815**	**27,299**	**9,898**	**392**	**98,174**

Tables summarizing the detailed data for each source category are included as Attachment A.

Due to a data error, there has been confusion regarding the location and number of point sources within the Fairbanks North Star Borough and EPA's proposed nonattainment boundary. In order to clarify this, Table 2 provides a summary of the permitted major facilities that are actually located and operating within EPA's proposed nonattainment boundary and their reported actual emissions for calendar year 2005.

[5] Letter from Jim Whitaker, Major of Fairbanks to Robert Myers, Principal Deputy Assistant Administrator, Office of Air and Radiation, Subject "$PM_{2.5}$ Boundary", September 12, 2008

Table 2
Reported Emissions in 2005 from Permitted Major Facilities
Within EPA's Proposed Nonattainment Boundary
(tons per year)

Facility	VOC	NOx	SO_2	PM_{10}_PRI	CO
Aurora Energy LLC Chena Power Plant	0	629	248	353	459
Flint Hills Resources Alaska, LLC North Pole Refinery	35	215	13	15	33
Golden Valley Electric Association North Pole Power Plant	2	3,604	3,019	50	14
Golden Valley Electric Association Zehnder Facility	1	28	24	0	1
US Air Force Eielson Air Force Base	21	367	281	8	125
US Army Fort Wainwright	6	471	697	14	262
University of Alaska Fairbanks Campus Power Plant	2	509	280	7	187
Wilder Construction Company Asphalt Plant*	0	6	3	13	6
Total Point Source Emissions	67	5,829	4,565	460	1,087

*Asphalt plant does not operate in winter when violations occur

Alyeska TransAlaska Pipeline Pump Station #8 is no longer a major point source inside the Fairbanks North Star Borough. Pump Station #8 was placed in standby June 30, 1996 and its air quality permit was rescinded in April 2008. Figure 1 shows that the following facilities are not located within either the Fairbanks North Star Borough or EPA's proposed nonattainment area:

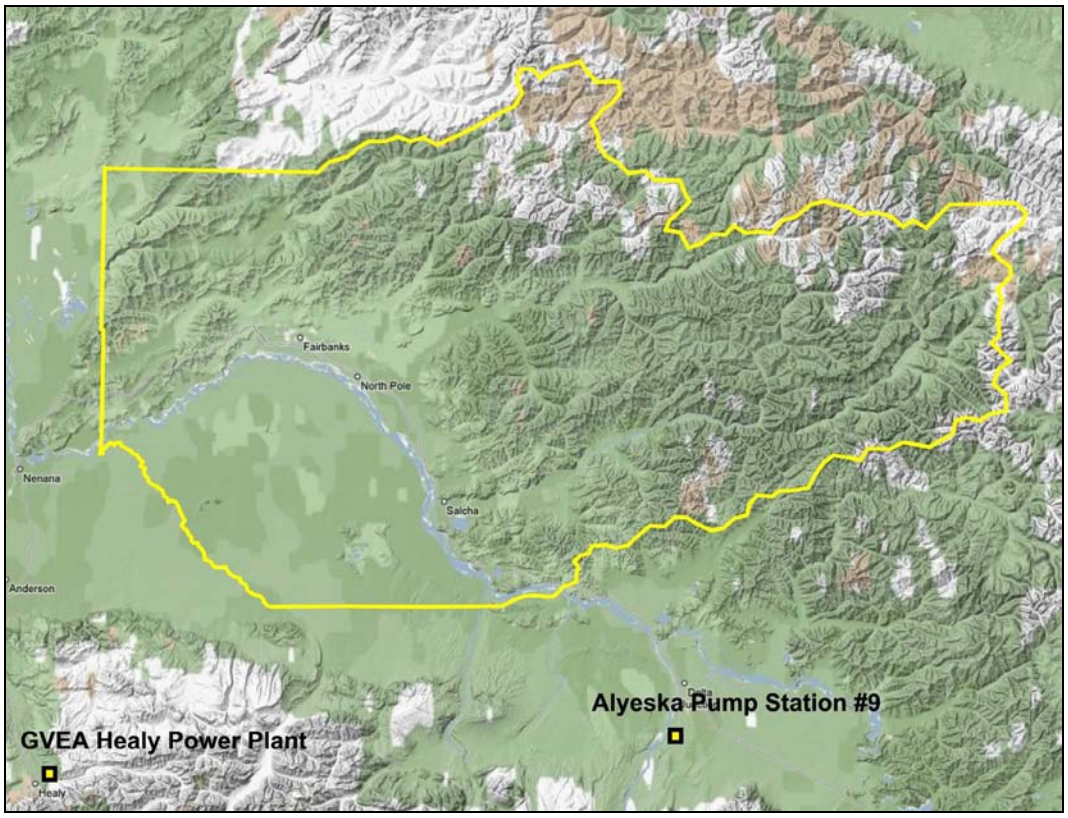
- Alyeska TransAlaska Pipeline Pump Station #9 – Located near Delta Junction, 105 miles from Fairbanks; and

- GVEA Healy Power Plant – Located in Healy, Alaska, approximately 100 miles south of Fairbanks.

Further information on the TransAlaska Pipeline pump stations may be found on the Alyeska Pipeline Service Company web site at http://www.alyeska-pipe.com/PipelineFacts/PumpStations.html

In a separate submission (to minimize the size of this document, the memorandum will be submitted in a separate zip file entitled "Eielson Memorandum", the attachments to the memorandum will be in a separate zipped file entitled "Eielson Attachments") Eielson Air Force Base provides data demonstrating that the principal source of emissions at the base is the Central Heat and Power Plant (CHPP). The 2007 values presented in that submission are quite similar to those presented in Table 2 and reflect the benefits of the recently installed full-stream bag houses. A comparison between the NOx and SO_2 values emitted by the CHPP and the totals presented in Table 1 show its share of precursor emissions to be below 5% for both pollutants. For the one-year period between June 2007 and May 2008, data submitted for the Blair Lakes Range Facility, a training

Figure 1
Location of Permitted Facilities Outside of Fairbanks North Star Borough Boundary



range located approximately 23 miles south of Fairbanks, showed emissions of 4.6 tons of PM_{10} and 35 tons of SO_2. The range's share of the totals presented in Table 1 is well below 1% for both pollutants. Additional information on winter training activity within both the Blair Lakes and Stewart Creek Ranges found that low level sorties (i.e., those most likely to impact ambient concentrations of $PM_{2.5}$) are flown at a rate of approximately one sortie every four days. Both facilities are located approximately 25 miles from Fairbanks.

A submission from Fort Wainwright (to minimize the size of this document, the memorandum will be submitted in a separate zip file entitled "Wainwright Letter") provides information on winter activity within two training areas located to the south of the Tanana River: the Tanana Flats Training Area (TFTA) and the Yukon Training Area (YTA). While no estimate of emissions is provided, the information demonstrates that winter activity within these facilities is extremely limited.

Summary – Source-specific emission estimates show that area and nonroad sources are responsible for 99% of directly emitted $PM_{2.5}$ and that point sources are responsible for 79% of the SO_2 and 56% of the NOx emitted in Fairbanks. A summary of major permitted facilities showed that two facilities are not located within the Fairbanks North Star Borough or EPA's proposed nonattainment area. Data presented for Eielson Air

Force Base showed that it is responsible for less than 5% of the NOx and SO_2 emitted within the Borough. Data provided for military training ranges located to the south of Fairbanks showed very limited activity during winter months.

Factor 2: Air Quality Data

ADEC has prepared several analyses of the $PM_{2.5}$ monitoring data collected in Fairbanks; this information was referenced in the State's nonattainment recommendations to EPA. The analysis documented temporal trends (i.e., summer versus winter) between 1999 and 2007, relations between $PM_{2.5}$ and individual chemical species, and used Positive Matrix Factorization (PMF) to assess source significance. All of the insight, however, was based on data collected at a single monitoring site in downtown Fairbanks. Recently, three sources of data were obtained that provide the first insight into the spatial extent of elevated concentrations:

- Data from a monitoring program conducted at Eielson Air Force Base between June 2004 and September 2005[6];
- Data from a monitoring program conducted at Fort Wainwright between February 2003 and January 2004[7]; and
- Monitoring data collected by the Borough this past winter at multiple sites within Fairbanks.

Presented below is a brief summary of findings from each new data source.

The Eielson monitoring program collected measurements of SO_2, NO_2, CO, ozone PM_{10}, and $PM_{2.5}$, as well as meteorological data on base, between June 2004 and September 2005. The 24-hour PM measurements were collected on a 1-in-6-day schedule with R&P Partisol 2000 filter samplers using a size-selective inlet. A comparison between the winter values collected at the base and FRM values from the Fairbanks downtown monitor on the same dates is presented in Table 3. It shows that on the days sampled between December 2004 and February 2005, all recorded concentrations were in the single digits, except for February 3, 2005, when values ranged between 11.1 and 11.3 $\mu g/m^3$. More importantly, on days when exceedances were recorded at the downtown monitoring site (highlighted in red), the values recorded at Eielson remained uniformly low. Based on these measurements, it appears that the emission levels at Eielson are insufficient to cause an exceedance of the ambient $PM_{2.5}$ standard even on days when high concentrations were recorded in downtown Fairbanks.

[6] Eielson Air Force Base Air Monitoring Program Annual Data Report, June 2004 – September 2005, prepared for the U.S. Air Force & Army Corps of Engineers by Hoefler Consulting Group, March 2006.

[7] Data Report for the Fort Wainwright Air Monitoring Network, Reporting Period, February 2003 – January 2004, prepared for Commander U.S. Army Center for Health Promotion and Preventive Medicine-Field Office Alaska by Battelle Eastern Science and Technology Center.

Table 3
Comparison Between Eielson and Downtown Fairbanks $PM_{2.5}$ Monitor Values Recorded During the 2004/2005 Winter
(ug/m^3)

Date	Eielson Monitors		Downtown FRM	Difference (downtown-main)
	Main	Co-located		
12/05/04	3.7	Invalid	21.1	17.4
12/11/04	4.1	Invalid	38.1	34.0
12/17/04	4.7	7.8	14.4	9.7
12/23/04	2.9	1.8	4.1	1.2
12/29/04	Invalid	7.4	31.9	24.5*
1/4/05	5.8	5.7	4.7	-1.1
1/10/05	6.9	9.5	28.9	22.0
1/16/05	5.0	7.9	40.6	35.6
1/22/05	6.1	6.6	32.7	26.6
1/28/05	8.8	8.8	29.2	20.4
2/3/05	11.3	11.1	60	48.7
2/9/05	7.9	7.8	23.8	15.9
2/15/05	4.6	5	15.7	11.1
2/21/05	6.9	6.7	34	27.1
2/27/05	3.7	3.3	6.1	2.4

*Downtown minus co-located

The Fort Wainwright monitoring program collected measurements of SO_2, NO_2, CO, PM_{10}, and meteorological data on base between February 2003 and January 2004. Measurements were collected at two locations—north and south of the primary source of emissions on the installation, which is a single coal-fired central heat and power plant (CHPP). The 24-hour PM measurements were collected on a 1-in-3-day schedule using a Tisch Environmental Model TE-6070 PM_{10} High Volume Air Sampler with a size selective inlet. A comparison between the winter values collected at the base and FRM values from the downtown monitor on the same dates is presented in Table 4.

While the values collected on base represent PM_{10} concentrations, which could be biased high for the purposes of $PM_{2.5}$, they are considered to be representative of $PM_{2.5}$ levels because the primary source of larger particles, fugitive dust, is not a contributor when the ground is frozen and covered with ice and snow. A review of the data shows that no exceedances of the ambient $PM_{2.5}$ standard were recorded during the winter months represented. It also shows that when an exceedance was recorded at the downtown monitor, the values at the base were almost 40 $\mu g/m^3$ lower. The data show that although concentrations are elevated relative to those observed at Eielson (for different dates), they are well below the ambient $PM_{2.5}$ standard. Thus, it appears that emissions on the base are insufficient to produce concentrations exceeding the ambient $PM_{2.5}$ standard even under conditions that cause exceedances at the downtown Fairbanks monitor.

Table 4
Comparison Between PM_{10} Measurements at Fort Wainwright and $PM_{2.5}$ Measurements at Downtown Fairbanks Between February 2003 and January 2004 (ug/m^3)

Date	Fort Wainwright Monitors		Downtown FRM	Difference*
	North	South		
2/2/03	25.86	24.60	32.5	7.27
2/5/03	4.62	5.86	9.2	3.96
2/8/03	13.16	12.99	15.2	2.13
2/11/03	4.37	0.50	6.2	3.77
2/14/03	3.68	3.84	6.7	2.94
2/17/03	3.32	9.15	13.2	6.97
2/20/03	18.49	16.18	18.3	0.97
2/23/03	20.44	33.05	22.4	-4.35
2/26/03	22.36	21.75	22.8	0.75
12/05/03	9.76	11.34	30.1	19.55
12/11/03	13.15	12.83	21	8.01
12/17/03	8.62	6.93	8.7	0.93
12/23/03	6.09	8.34	20	12.79
12/29/03	5.17	4.99	9.7	4.62
1/04/04	3.87	3.92	14.6	10.71
1/10/04	7.43	7.83	14.4	6.77
1/16/04	14.40	14.30	54.2	39.85
1/22/04	5.87	3.67	11.1	6.33
1/28/04	24.85	24.68	25.5	0.73

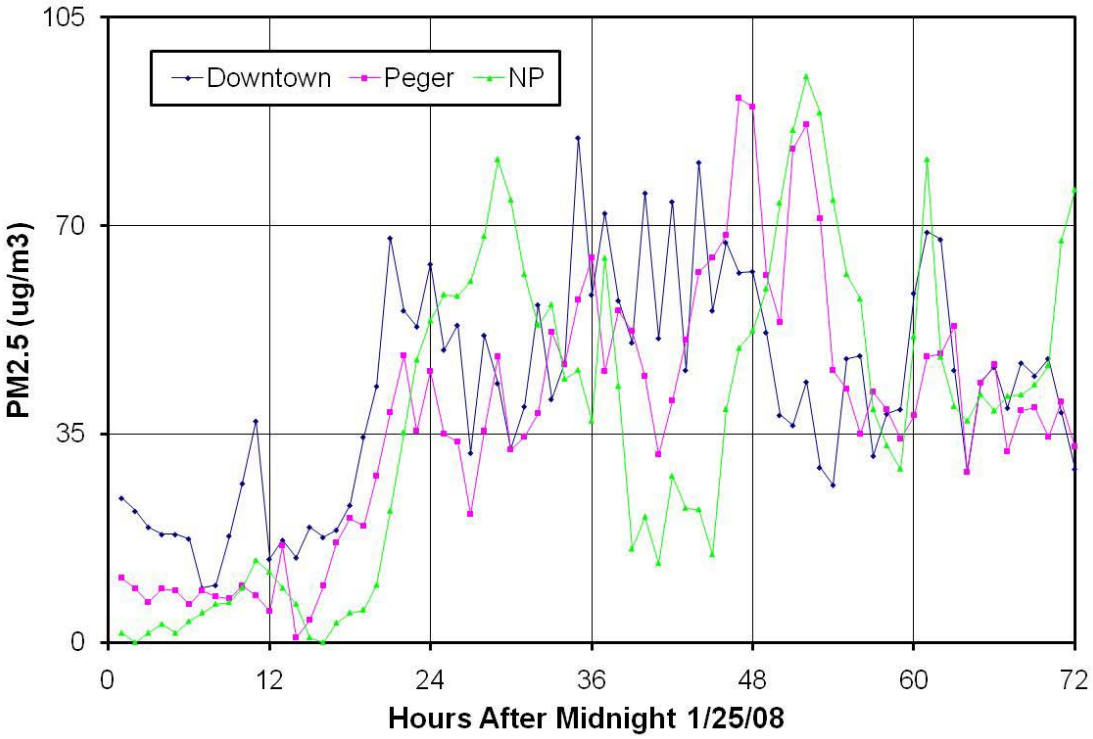
* Based on Downtown minus the mean of the north & south values.

The Borough placed $PM_{2.5}$ monitors at several fixed locations last winter and used a trailer equipped with a $PM_{2.5}$ monitor to collect data for 1-2 week periods at a number of locations. While equipment problems corrupted some of the measurements, good data were collected at three separate locations during an episode last winter:

- State office building, the long-term downtown monitoring site;
- Borough Transportation Department at Peger Rd. located approximately 2 miles to the southwest of the downtown monitor in a commercial/industrial area; and
- In a residential neighborhood located about 8 miles to the southeast of downtown.

A comparison of the hourly values recorded at those sites is presented in Figure 2. It shows that, despite the large distances between the monitors and the large differences in the localized source mix impacting the monitors, the concentrations recorded during the

Figure 2
Three-Site Comparison of Hourly BAM Measurements of $PM_{2.5}$
Downtown, Peger Road and North Pole Sites, 1/25/08 thru 1/27/08



onset of the inversion (between hours 12 and 24) at each monitor were strikingly similar, but lagged. After the inversion set up, the concentrations remained high, but were more discordant with each other. The key point seen in this chart is that elevated concentrations were recorded at multiple locations throughout the Borough during an episode. Because of the limited duration of the data collected, no insight is available into either the causes or the frequency of the occurrence.

Summary – Prior to last winter, the only source of $PM_{2.5}$ monitoring data was from the SLAMS monitor at the state office building in downtown Fairbanks. New monitoring data from other locations paint an inconsistent picture. The Eielson Air Force Base concentrations from an earlier winter remained well below the 24-hour $PM_{2.5}$ standard for an entire winter season and comparisons showed there were large differences between values recorded on base and those recorded at the downtown monitor. The Fort Wainwright values from an earlier winter show that, despite its close proximity to the downtown area, the values recorded over an entire winter season never exceeded the standard. The differences between the values recorded on base and those recorded at the downtown monitor, however, were much smaller. Data collected during an episode this past winter showed high concentrations at multiple locations. The military values suggest that concentrations throughout the region are not uniform and the data collected last winter during one episode show there maybe additional areas with higher concentrations. Clearly, the data do not support a conclusion and suggest the need for an intensive monitoring program, which is what ADEC and Borough are planning for the

coming winter. A description of that program was included in a recent letter from the Borough to EPA [8] (to minimize the size of this document, this letter and its attachments are included in the zip file entitled "Fairbanks Resolutions").

Factor 3: Population Density and Degree of Urbanization

A review of the proposed nonattainment boundary found that large portions of unpopulated areas are included within the proposed nonattainment area. To illustrate the extent of the discrepancy, the Borough's Department of Community Planning prepared a chart of population density using 2000 census data. The chart, presented in Figure 3, shows most of the Borough is either unpopulated or has a density of fewer than 10 people per square mile. More importantly, the chart shows large areas to the south, east, northeast, and west that are unpopulated, but included within EPA's proposed nonattainment boundary. Information submitted by the military confirms that while a limited number of permanent facilities are located on the training ranges, no one resides in them, there are no paved roads, and operations during winter months occur infrequently.

Summary – Population density cannot be used to support the expansive nonattainment boundaries proposed by EPA. Large unpopulated areas are included within the proposed nonattainment boundaries in all directions except directly to the north.

Factor 4: Traffic and Commuting Patterns

The annual VMT estimate reported by EPA for Fairbanks is significantly lower than values reported by the Northern Region of the Alaska Department of Transportation and Public Facilities (ADOT&PF). EPA reports a Borough wide value of 321 million miles in 2005; discussions with ADOT&PF[9] reported 723 million miles of travel in 2006. Roughly 58% of the travel (i.e., 418.7 million miles) occurred within the FMATS area. According to comments submitted by the ADOT&PF[10], EPA only reported VMT for a single category of roads (i.e., collectors) and failed to report travel for the rest of the road system.

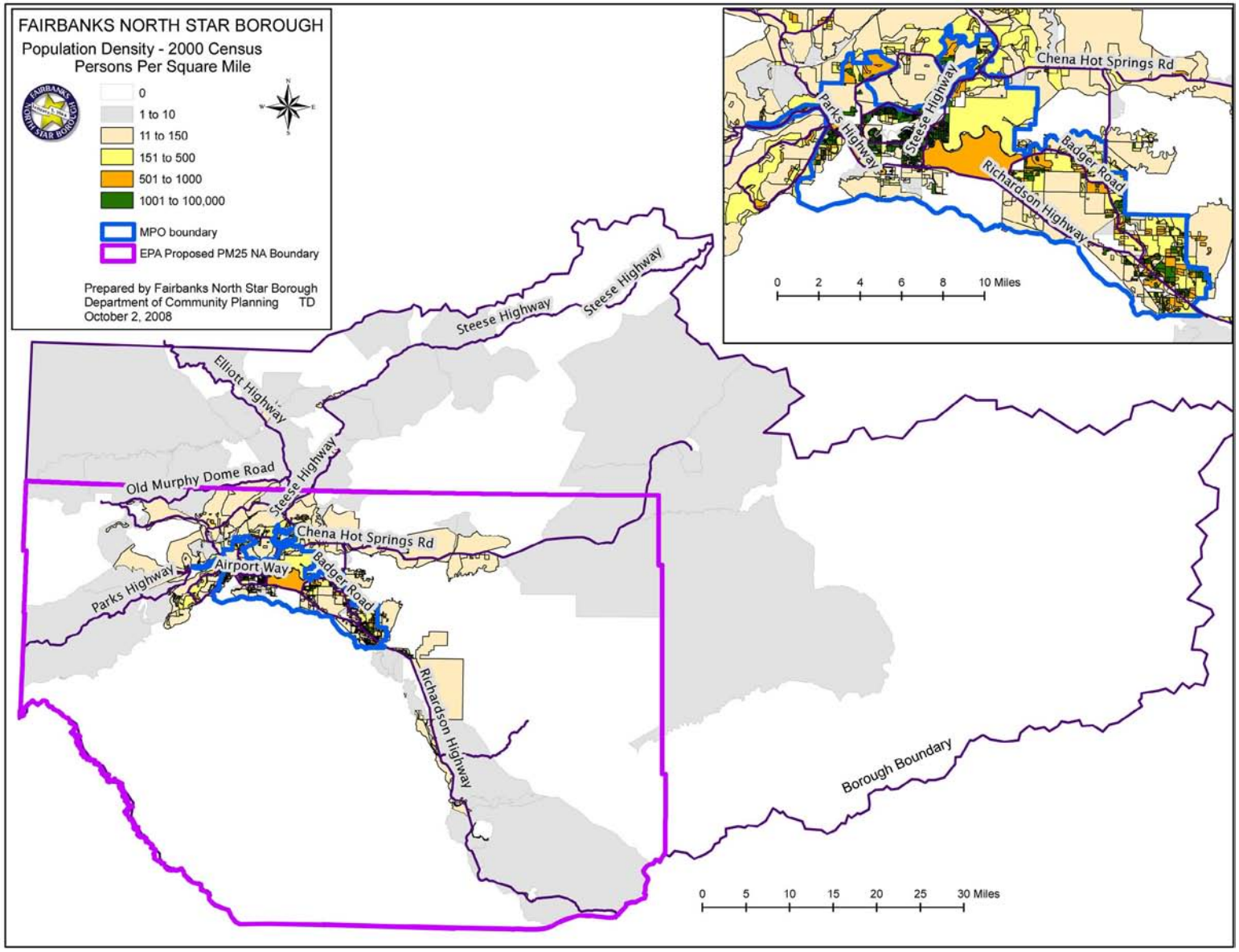
With regard to commuting there are only three routes into/out of Fairbanks. The Parks Highway to the east (roughly 30 miles to the Borough border and an additional 10 miles to the nearest population center at Nenana), the Elliot Highway to the north (a distance of roughly 25+ miles to the EPA's recommended boundary and no obvious population center) and the Richardson Highway to the southeast (roughly 60 miles to the Borough

[8] Letter from Jim Whitaker, Major of Fairbanks to Robert Myers, Principal Deputy Assistant Administrator, Office of Air and Radiation, Subject "$PM_{2.5}$ Boundary", October 8, 2008

[9] Email from Jennifer Eason, Traffic Data and Forecasting Manager, Northern Region, ADOT&PF to Bob Dulla, Sierra Research, 10/15/2008.

[10] Letter from Leo von Scheben, Commissioner, ADOT&PF submitted to EPA Docket No. EPA-HQ-OAR—2007-0562, dated October 2, 2008

Figure 3
Fairbanks North Star Borough Population Density, 2000 Census



border and an additional 25 miles to Delta Junction). These distances combined with mountainous terrain and relatively low population of the nearest outside communities ensure that external commutes are not contributing to $PM_{2.5}$ concentrations reported in Fairbanks.

Summary – Despite the error in EPA's estimate of travel within the Borough, the conclusion with regard to potential impacts of commuter's is correct. The long distances to the Borough borders and low overall population density of the region ensures that external commutes are not contributing to elevated $PM_{2.5}$ concentrations in Fairbanks.

Factor 5: Growth

Long-term population growth in the Borough has been relatively stable at about 1% per year. As shown in Table 5, year-to-year variations can be quite significant, ranging from -3.2% to +4.0%. Data are shown for the entire Borough because EPA's proposed boundary includes most of the populated areas within the Borough, yet its analysis of growth focused only on data from the City of Fairbanks and North Pole. Given the limited area for growth within the City of Fairbanks, most of the growth in recent years has occurred in outside areas, as demonstrated in the difference between growth rates seen in the City of Fairbanks and North Pole (i.e., 3% versus 16% between 2000-2006).

Table 5
Trends in Fairbanks North Star Borough Population Between 1996 and 2007

Year[a]	Population	Year-to-Year Change Relative to 1996
1996	81,883	-
1997	82,064	0.2%
1998	83,045	1.2%
1999	83,773	0.9%
2000[b]	82,840	-1.1%
2001	83,261	0.5%
2002	84,749	1.8%
2003	82,160	-3.2%
2004	85,453	4.0%
2005	87,704	2.7%
2006	87,766	0.1%
2007	90,963	3.9%

[a] Alaska Department of Labor and Workforce Development
[b] U.S. Census Bureau

The data presented in Table 5 demonstrate that despite the differences seen between these two areas, the long-term growth rate throughout the populated areas of the Borough has been stable on a long-term basis, roughly 1% per year, but erratic on a year-to-year basis.

As noted in the discussion of traffic and commuting patterns, the VMT values presented for Fairbanks are incorrect and only represent that portion of travel from one category of roads (i.e., collectors). Thus, the data presented are not representative of overall travel trends within either the FMATS area or within the Borough. Discussions with ADOT&PF staff responsible for travel forecasts within Fairbanks indicate that Borough wide estimates are not usually broken out within the northern region. Similarly, trends in estimates of FMATS values are complicated by expansions in the boundary over time. Thus, at present no uniform set of travel data is available to track trends over time. Despite this limitation, the population growth data provides insight into growth rates that have occurred within the Borough.

Summary – The data presented above demonstrate that the long-term growth rate throughout the populated areas of the Borough has been stable on a long-term basis, roughly 1% per year, but erratic on a year-to-year basis. This insight confirms there is no need to expand the nonattainment boundaries to ensure that emissions from projected growth within the Borough are captured and controlled.

Factor 6: Meteorology

The continuous Beta Attenuation Monitor (BAM) $PM_{2.5}$ monitor located in downtown Fairbanks, Alaska (Figure 4) measured exceedances of the current daily $PM_{2.5}$ standard (35 µg/m^3) on 11 days* during a 21-day period between January 23, 2008, and February 12, 2008. During the same period, a moveable trailer equipped with a BAM recorded two exceedances of the 24-hour $PM_{2.5}$ standard while it was located in North Pole. Meteorological data for the entire period were collected from the following three locations shown in Figure 4:

1. Fairbanks International Airport (Airport) – surface and upper-air data;
2. Fort Wainwright Army Air Field (Fort Wainwright) – surface data, available only on weekdays between 6 a.m. and 10 p.m.; and
3. Eielson Air Force Base (Eielson) – surface data.

The time series data from the above meteorological stations, as well as $PM_{2.5}$ data from the two monitors mentioned above, are shown in Figures 5 through 7.

The 21-day period began with temperatures ranging from 10-20° Fahrenheit (F) and west-northwesterly winds between 10-20 knots across the three meteorological stations

* A recent correlation analysis between data collected by the BAM and adjacent FRM values found a 32% bias in the BAM values. At this time the data has not been corrected to assess the impact of this bias on reported exceedances. Therefore, it is possible that exceedances are over-reported in this document.

evaluated, and the 24-hour average $PM_{2.5}$ concentration in downtown Fairbanks was low, about 10 $\mu g/m^3$. However, abrupt surface temperature cooling across the region on January 23–24 and again on January 25–26, as evidenced by the dark blue line in Figures 5–7, led to increased residential heating and associated emissions and the formation of a strong low-level temperature inversion that trapped emissions near the surface. Also, wind speeds, shown in red on each of the graphs, became calm (< 3 knots or 3.5 miles per hour) at all three meteorological monitoring locations, producing stagnant conditions. The winds did not increase until February 10, fifteen days later and after eleven $PM_{2.5}$ 24-hour ambient standard exceedances had been recorded. On several of the high $PM_{2.5}$ days, the Airport and Eielson sites did measure brief periods of non-calm winds; however, the winds remained less than 5 knots and did not produce any significant pollutant transport due to their short duration and infrequent nature.

The most dominant meteorological parameter during the $PM_{2.5}$ episode was the surface air temperature, which had a minimum of -40°F or less on all but two of the exceedance days. On the remaining two exceedance days, January 29 and 30, temperatures still dropped to between -20°F and -25°F at all three stations. However, on the days when the temperature increased (January 25, 28, and 31, and February 1, 2, 11, and 12), irrespective of the typical diurnal heating seen during the daylight hours, $PM_{2.5}$ concentrations dropped below the ambient $PM_{2.5}$ standard threshold, even with the winds remaining calm, due to increased vertical mixing in the boundary layer. The combination of continuous, extended periods of very cold temperatures and calm winds, especially from February 4 through the 10, produced the ideal meteorological conditions for high $PM_{2.5}$ concentrations.

Surface wind patterns during the 21-day period (excluding the times when the winds were calm) could be split into two main categories: (1) synoptically driven winds out of the west-northwest, shown by the thin green line in Figures 5-7 at the beginning and end of the analysis period and depicted by the higher speed, lower frequency wind classes on the left side of the wind roses in Figures 8-12; and (2) mesoscale drainage flows, mainly due to cold air descending down off the mountains surrounding the region on the western, northern, and eastern sides. Local, mesoscale air flows were also characterized by flow along the Tanana River, which was southeasterly (moving from the southeast to the northwest) near Eielson AFB (Figure 8); east-northeasterly near Fort Wainwright (Figure 9); and north-northeasterly near the Airport (Figure 10). The resulting counter-clockwise flow along the river could have transported air and pollutants across the region; however, any air over the river remained there and did not drift into the neighboring cities due to the prevailing land drainage flow that descended toward and merged into the river channel air flow.

To further understand air flow within the region, data from the upper-air soundings launched from FIA were evaluated at the surface and at a height of 200–300 meters, or the closest height available. The data plotted in Figures 11 and 12 are slightly different from the other wind roses because, instead of hourly data, they show data collected by the twice-daily upper-air soundings sent up at approximately 3 a.m. and 3 p.m. Alaska Standard Time (AKST). The surface level plot (Figure 11) is similar to the plot from the Airport surface station shown in Figure 10. Differences between the two can be

attributed to the sampling frequency and duration, where the surface station data are hourly and averaged over two minutes and the sounding data are twice-daily and instantaneous, due to the rapid ascent of the balloon. The aloft data (Figure 12) are from 200–300 meters (656–984 feet) above ground level and give an indication of the air flow above the shallow, nocturnal temperature inversion. As expected, the winds are stronger at the higher elevations, but, like at the surface, the dominant wind direction is northeasterly. In addition, the winds were calm over 40% of the time and those periods coincided with the high $PM_{2.5}$ concentration days, indicating that little or no pollution transport occurred in aloft layers up to 1,000 feet, supporting a conclusion that only local emission sources are contributing to the exceedances.

Another feature of the surface and upper-air wind roses is that four out of the five do not show any significant amount of southerly winds during the $PM_{2.5}$ episode, indicating that emissions from activities on the military range to the south of Fairbanks and the Tanana River could not have been transported into the metropolitan area or affected $PM_{2.5}$ concentrations. The only exception is the wind rose for Eielson AFB, which indicated occasional, short-duration periods of south-southeasterly winds; however, because it is on the eastern side of the region, the winds there have no bearing on the potential transport of air from the range.

Summary – High $PM_{2.5}$ days in Fairbanks are the result of very cold surface temperatures and shallow temperature inversions, calm winds creating stagnant conditions and inhibiting the transport and/or dispersion of pollutants, and local emissions in each community simultaneously producing localized air pollution increases and $PM_{2.5}$ concentrations high enough to exceed the standard in some areas. These factors indicate that the emission sources contributing to high pollution concentrations in Fairbanks are fairly localized and that the nonattainment boundary should be constrained to the populated areas where elevated concentrations occur. The large distances between the military ranges and the populated areas of Fairbanks, combined with an absence of southerly winds during $PM_{2.5}$ episodes, demonstrate that the limited emissions from these facilities do not contribute to exceedances recorded in Fairbanks. Similarly, data collected at Eielson show there is no transport of its emissions into Fairbanks prior to or during episodes except for brief periods of southeasterly flow that is shown to be part of drainage flow along the Tanana. Data collected at Fairbanks International Airport demonstrate that the dominant flow prior to and during episodes is from the northeast and there is little evidence of any flow from the west. These findings demonstrate that EPA's expansive boundaries are overly conservative and unwarranted and provide a basis for redefining the boundaries to the south, east, and west.

Figure 4
Map of Fairbanks Meteorological and $PM_{2.5}$ Monitoring Sites

Figure 5
Meteorological and $PM_{2.5}$ data for Fairbanks International Airport

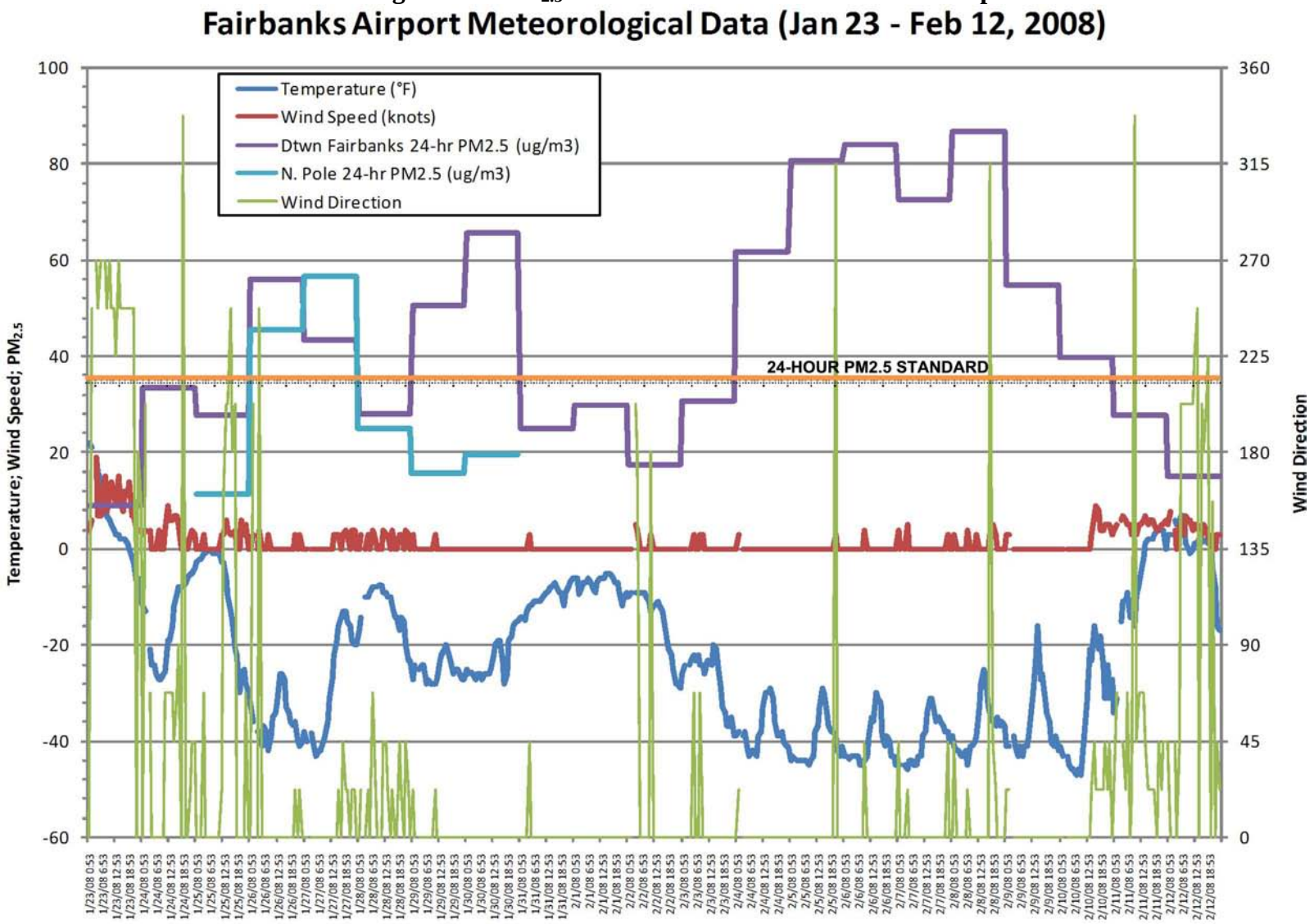


Figure 6
Meteorological and $PM_{2.5}$ data for Fort Wainwright Army Air Field

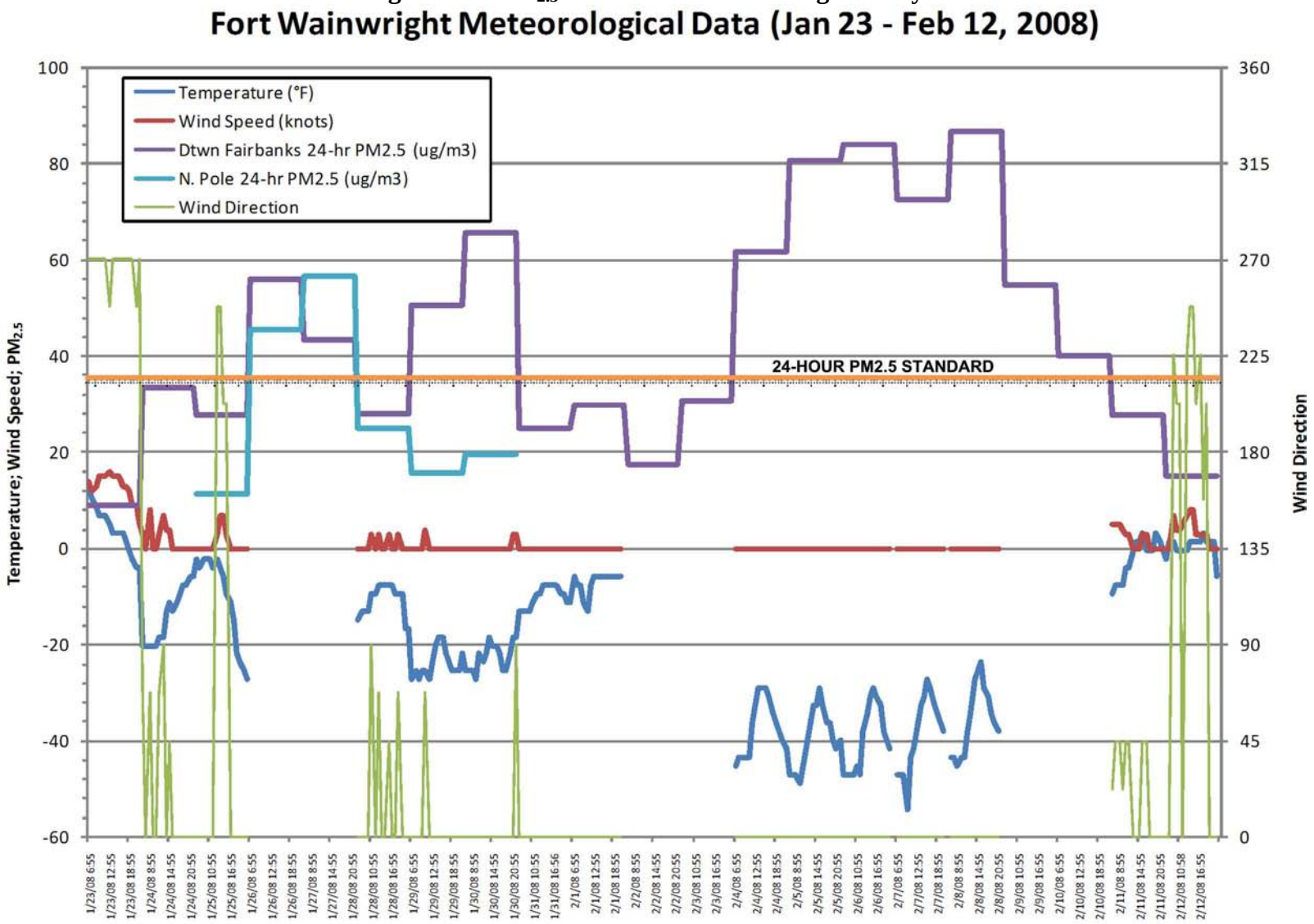


Figure 7
Meteorological and $PM_{2.5}$ data for Eielson Air Force Base

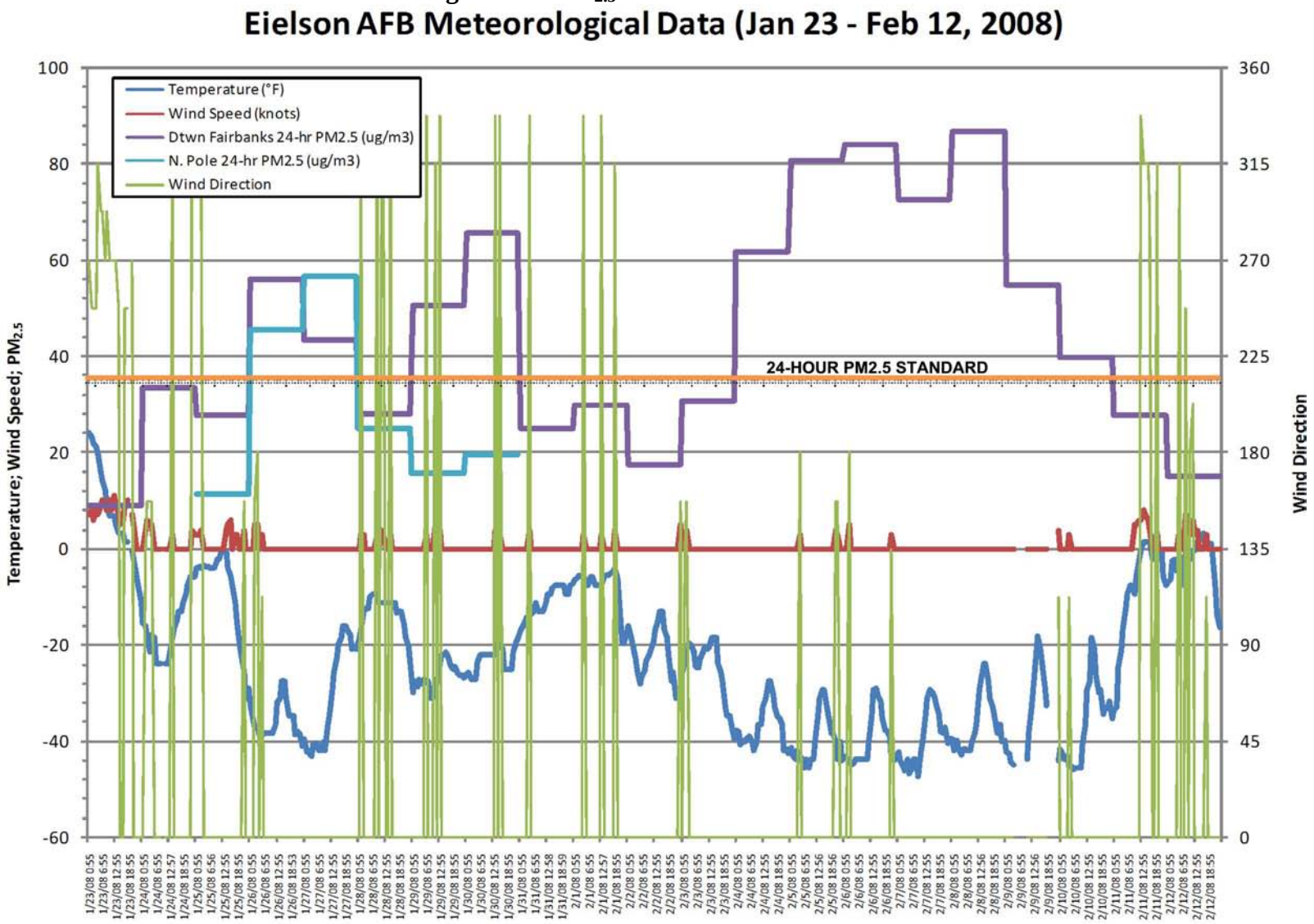
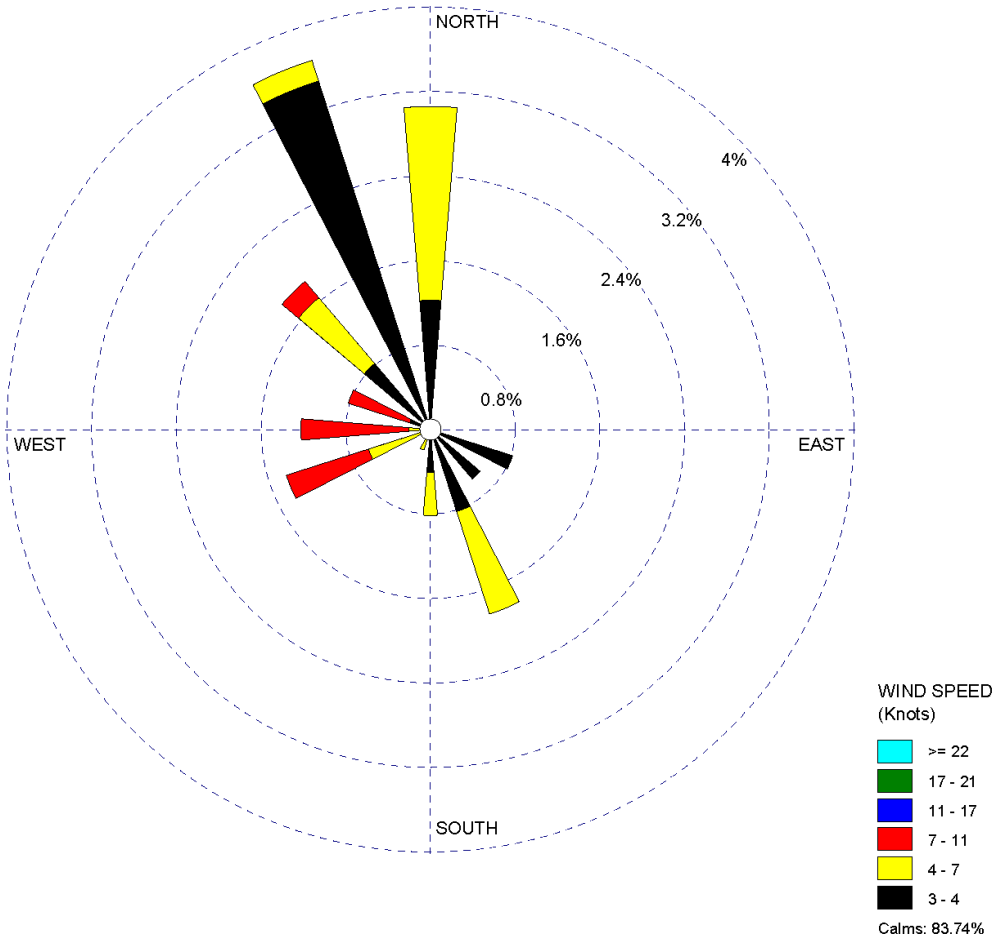


Figure 8
Wind Rose for the Surface Meteorological Station at the Eielson AFB

WIND ROSE PLOT:
FAIRBANKS/EIELSON AFB

DISPLAY:
Wind Speed
Direction (blowing from)

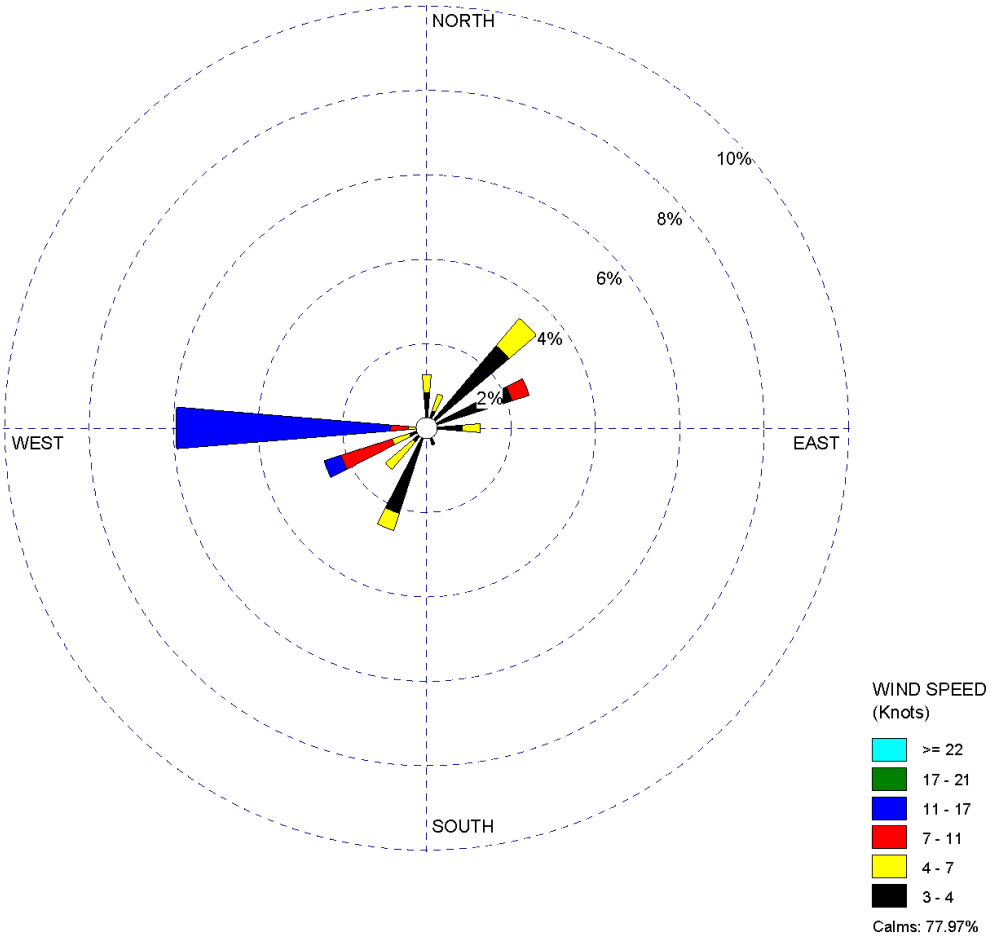


COMMENTS:	DATA PERIOD:	COMPANY NAME:	
- Surface data - Calm = WS<3 knots	2008 Jan 23 - Feb 12 00:00 - 23:00	MODELER:	
	CALM WINDS: 83.74%	TOTAL COUNT: 492 hrs.	
	AVG. WIND SPEED: 0.83 Knots	DATE: 10/15/2008	PROJECT NO.:

Figure 9
Wind Rose for the Surface Meteorological Station at the Fort Wainwright AAF

WIND ROSE PLOT:
FAIRBANKS/FORT WAINWRIGHT

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
- Surface data - Calm = WS<3 knots	2008 Jan 23 - Feb 12 00:00 - 23:00		
		MODELER:	
	CALM WINDS: 77.97%	TOTAL COUNT: 236 hrs.	
	AVG. WIND SPEED: 1.53 Knots	DATE: 10/15/2008	PROJECT NO.:

Figure 10
Wind Rose for the Surface Meteorological Station at the Fairbanks International Airport

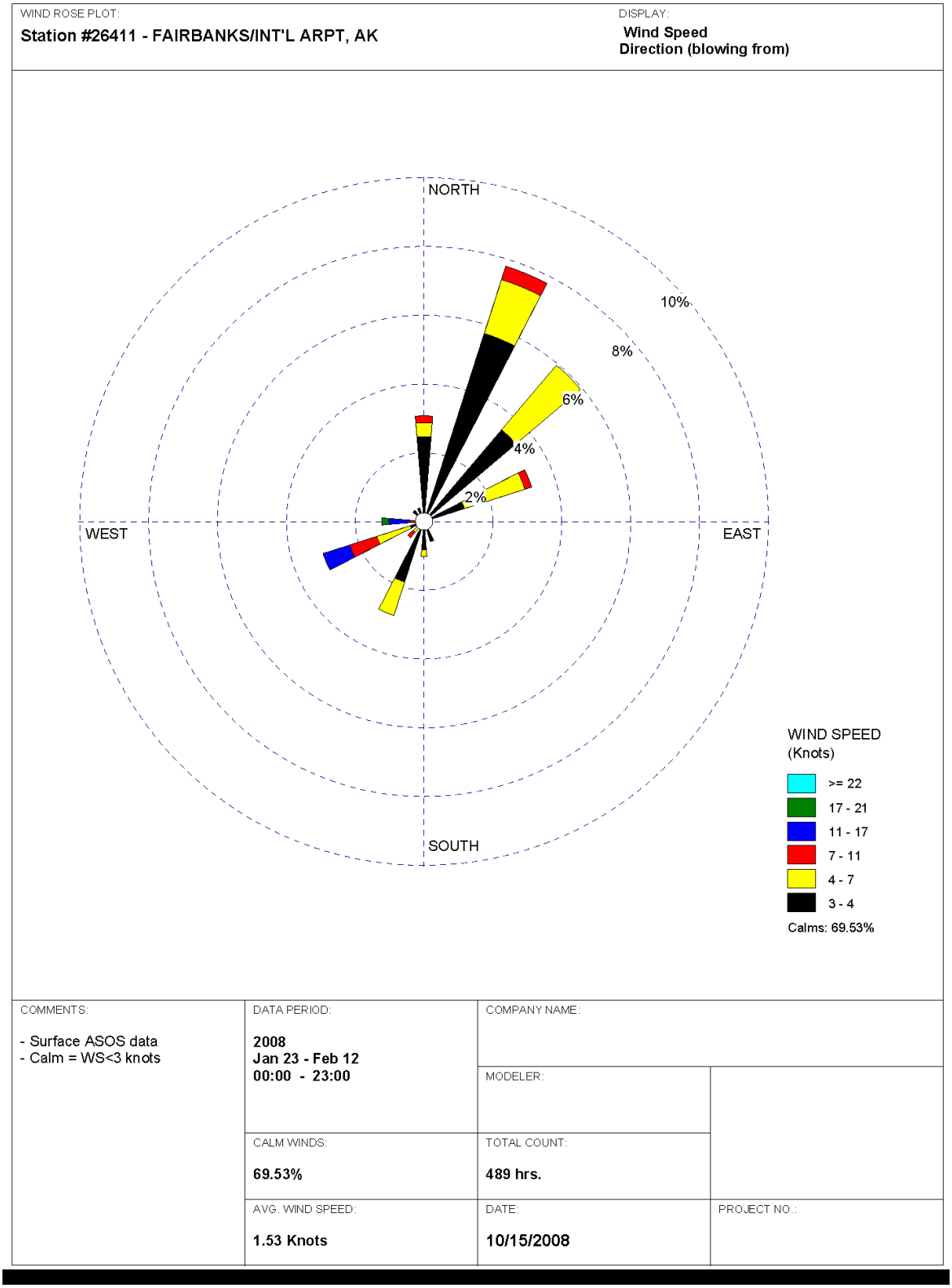


Figure 11
Wind Rose for the Surface Level of the Fairbanks International Airport Upper-Air Sounding

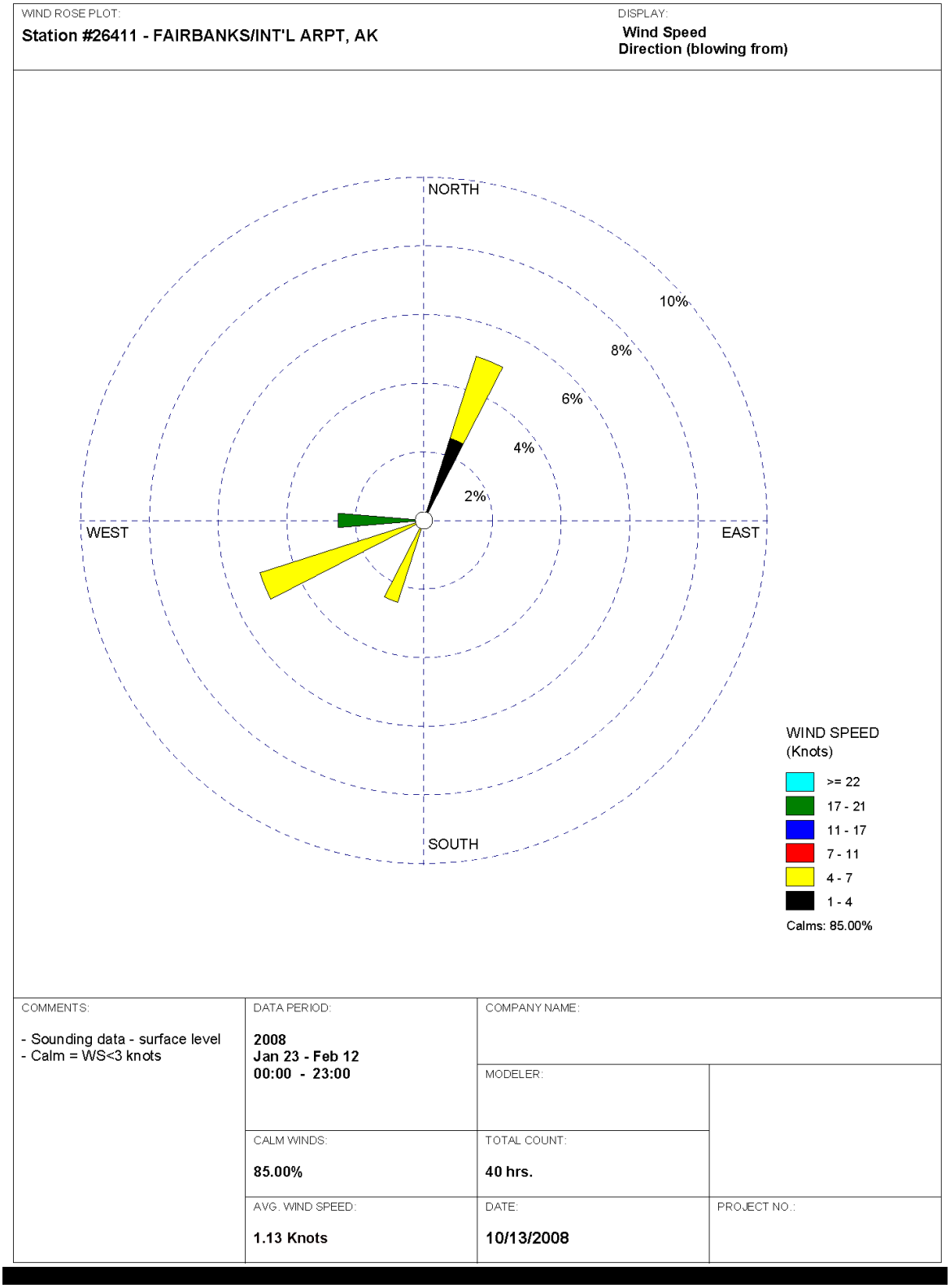
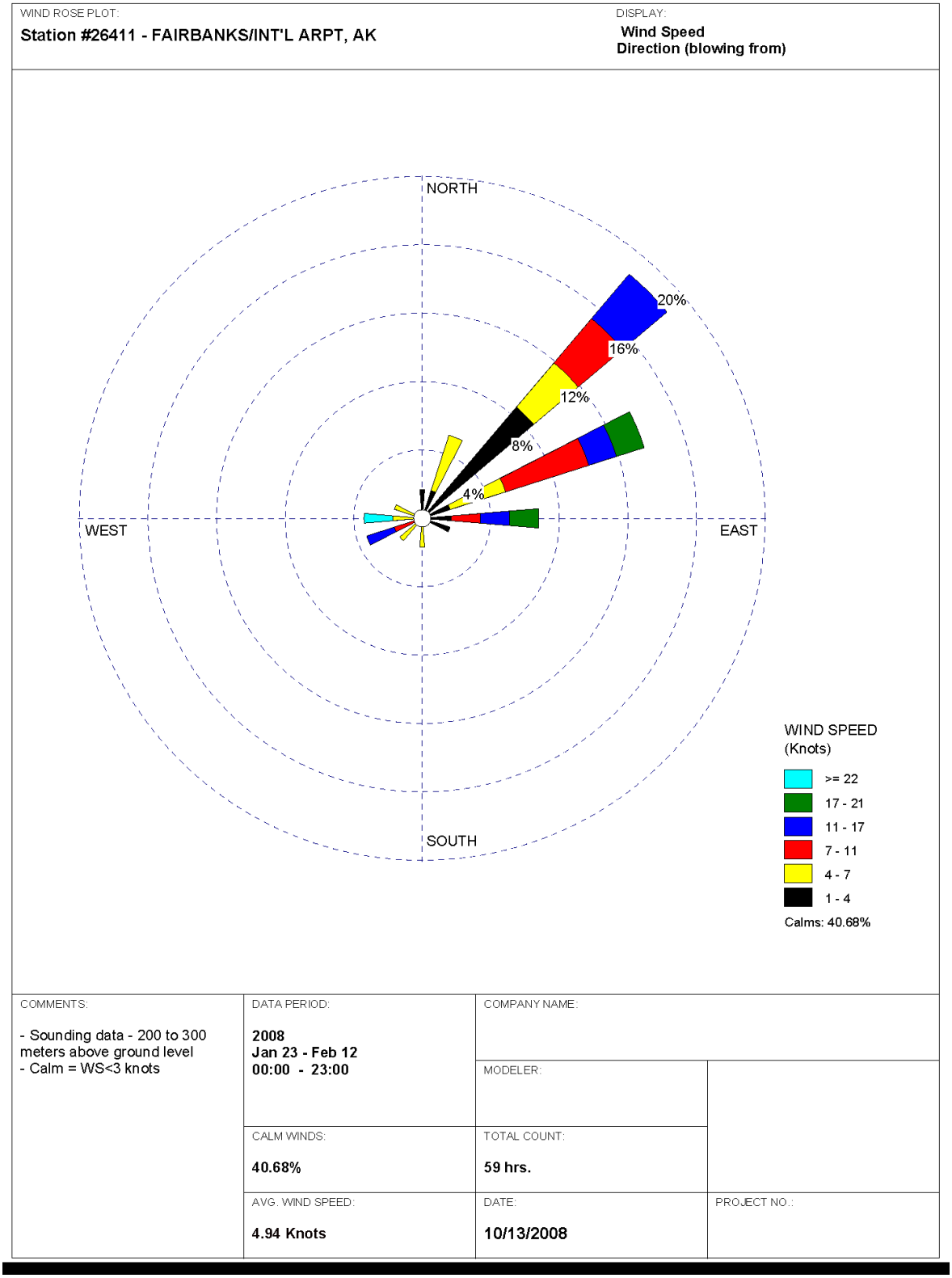


Figure 12
Wind Rose for the 200–300 Meter Level of the Fairbanks International Airport Upper-Air Sounding



Factor 7: Geography and Topography

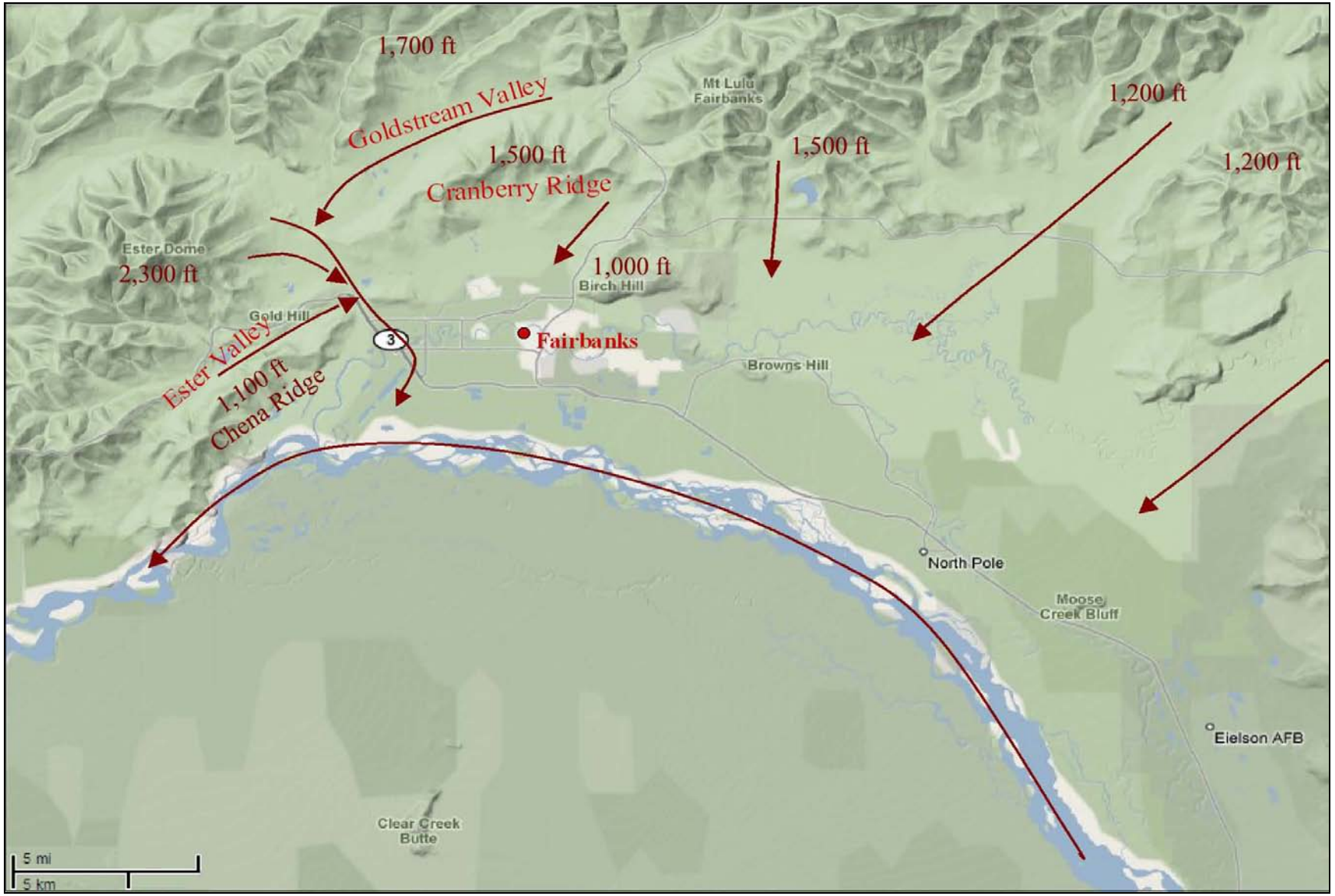
Fairbanks, Alaska is located at an elevation of approximately 440 feet above sea level (ASL) and is bordered on the west, north, and east by mountain ridges, such as Ester Dome and Cranberry Ridge (Figure 13), ranging in height from 1,000 feet to nearly 2,500 feet; on the south, it is bordered by the Tanana River Flat. The mountains create a clear barrier between the Fairbanks area and neighboring valleys, limiting the extent to which emissions in those valleys could impact Fairbanks. This fact is especially relevant under strong, low-level temperature inversion conditions that limit the vertical mixing of air to hundreds of feet, well below the nearest ridge heights. However, because of its low elevation relative to its surroundings, Fairbanks is the pooling area for some of the drainage flows coming down out of the mountainous regions, as indicated by the red lines in Figure 13. As a result, some valleys to the west and north of Fairbanks, namely Ester Valley and Goldstream Valley, could have an impact on Fairbanks. Valleys beyond Ester and Goldstream, though, are separated by ridges of at least 1,500 feet, which are more than sufficient to prevent air flow between those distant valleys and the valleys proximate to Fairbanks that drain into its basin.

Another type of drainage flow shown in Figure 13 is that along the Tanana River. Due to gradual descent in elevation from the east toward the west, air above the river will tend to flow in the same direction as the river and draw air from the adjacent land.

The wind flow arrows shown in Figure 13 are a depiction of typical flows that develop under strong high pressure patterns, when large-scale, synoptically forced winds are not a factor and wintertime $PM_{2.5}$ concentrations are most likely to increase. It is important to note that even with the drainage flows, winds in the predominately flat areas of Fairbanks and areas to its east can be calm to light and variable. As a result, the drainage flows can be limited to the valleys and mountain faces and may not extend much beyond the base of the mountains.

Summary – The mountains to the west, north, and east of Fairbanks create clear barriers from neighboring valleys which limit the exchange of emissions. However, because of its low elevation relative to the valleys located to the west and the north, it is likely that drainage flows coming out of those valleys could have an impact on Fairbanks. Conversely, drainage flow from mountainous areas to the east of Fairbanks are not likely to have much of an impact on Fairbanks because emissions in those areas are minimal to zero and the winds commonly decrease to calm once the flows exit the valleys and spread out across the flat, open areas.

Figure 13
Topography and Drainage Flows in Fairbanks Area



Factor 8: Jurisdictional Boundaries

The Fairbanks North Star Borough is located in the heart of Interior Alaska at approximately 64.833330° North Latitude and -147.716670° West Longitude. The area encompasses 7,361.0 sq. miles of land and 77.8 sq. miles of water (an area larger than either Delaware or Rhode Island). The Borough seat is located in the city of Fairbanks. A less densely urbanized area extends from Fairbanks along the Richardson Highway corridor through the city of North Pole to the southeast. The Borough also contains other smaller outlying residential areas (i.e., Ester, Fox, etc.) as well as two military bases (Fort Wainwright and Eielson Air Force Base). Fairbanks has a metropolitan planning organization, FMATS (Fairbanks Metropolitan Area Transportation System), whose boundary includes both Fairbanks and North Pole and extends further into population areas within the vicinity of both communities.

Figures 14 through 16 are maps of the borough, cities, and FMATS boundaries. Information submitted by the military shows that it has jurisdiction over the large training facilities located to the south and east of Fairbanks.

Figure 14
Fairbanks North Star Borough

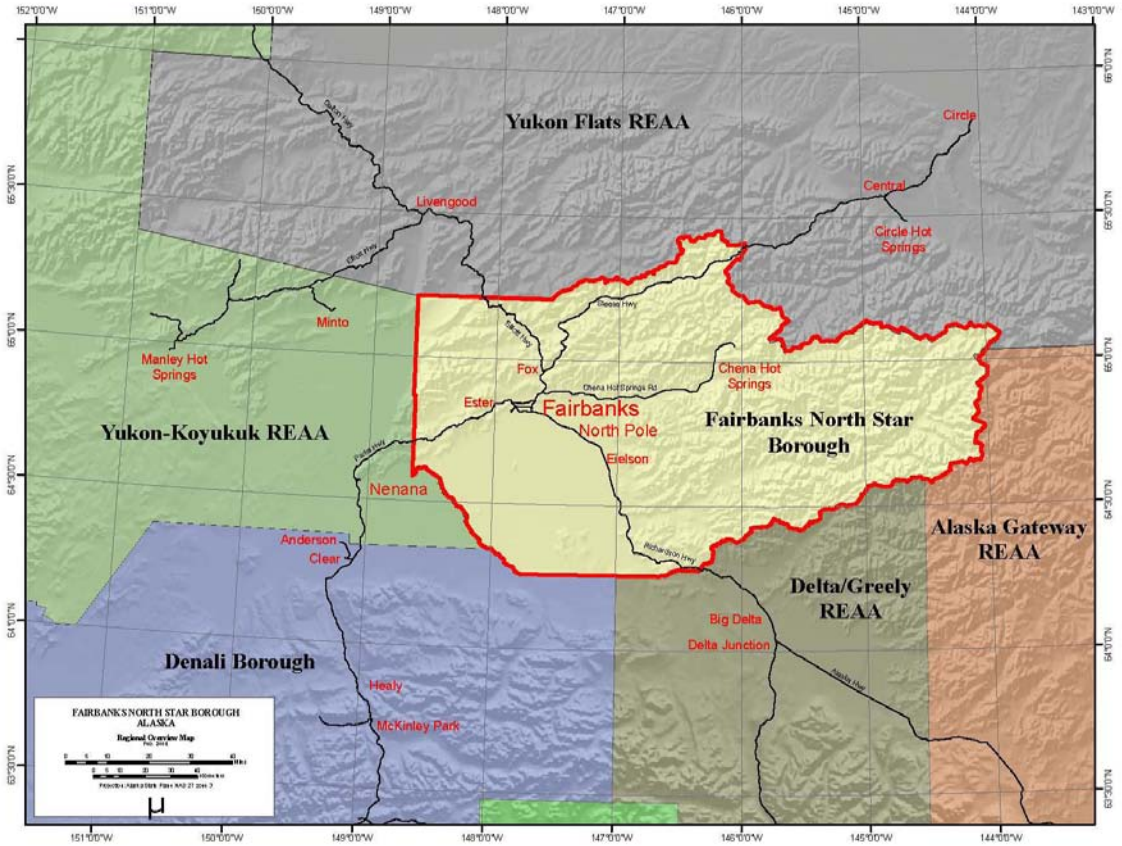


Figure 15
City Boundaries within the Fairbanks North Star Borough

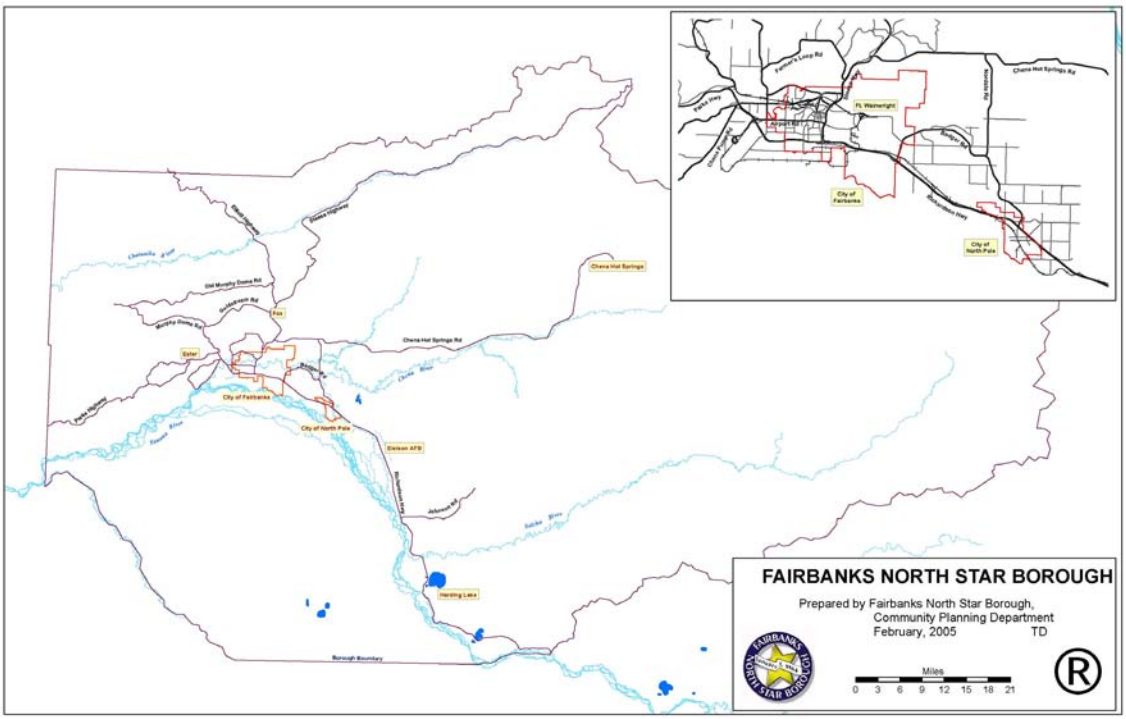
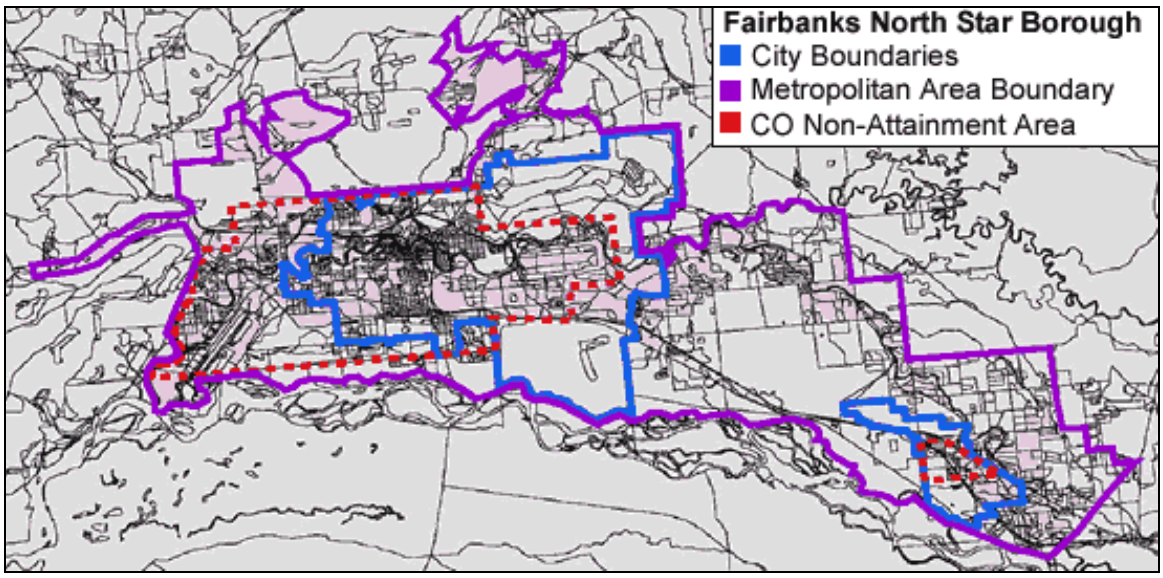


Figure 16
FMATS Boundary



Summary – The nonattainment boundaries proposed by EPA encompass several distinct jurisdictions, including FMATS; the cities of Fairbanks, North Pole, Ester, and Fox; the military bases; and the military training facilities. Many of these locations are not currently subject to existing Borough emission control measures.

Factor 9: Level of Control of Emissions Sources

While no Fairbanks area sources have been specifically targeted for control of fine particulates at this time, there are some existing controls in place, as summarized below.

- Major stationary sources are controlled through the Alaska Department of Environmental Conservation's permitting program. With regard to particulate matter, it should be noted that the coal-fired power plants in Fairbanks are controlled with bag houses.

- Mobile sources are controlled by federal fuel and emission rules that limit particulate matter and pre-cursor pollutants. It is not known how effective these controls are at the extreme cold temperatures found in Fairbanks, but improvements should continue to be made as the vehicle fleet turns over.

- Fairbanks has an extensive network of electrical plug-ins powered at 20° F that allows citizens to use engine block heaters to keep their motor vehicle engines warm during cold temperatures. This program significantly reduces CO emissions from cold starting vehicles, but it is not known how much benefit may exist for fine particulate emissions from the use of engine pre-heating.

- The Fairbanks North Star Borough operates a transit program that provides some benefits through reduced VMT from mobile sources.

- A local wood-burning control program exists under the carbon monoxide maintenance plan. To the extent that high $PM_{2.5}$ days occur on days with high CO concentrations, this control program could provide some benefit. It is more likely that a different program will be needed to fully address $PM_{2.5}$ emissions from wood-burning stoves.

- Open burning is prohibited from November 1 through the end of February within the areas of the Borough designated as Urban, Urban preferred commercial, Light or Heavy Industrial, or Perimeter area, with camp fires being an exception.

- Prescribed fire for burns over 40 acres is managed by the Alaska Department of Environmental Conservation through a permitting process and a smoke management plan.

- The Alaska Railroad switched to ultra low sulfur Diesel fuel in 2007, 5 years in advance of EPA's 2012 mandate.

Summary – Fairbanks, ADEC, and the military have implemented controls targeted at other pollutants that provide reductions in $PM_{2.5}$ emissions.

Overall Summary and Recommendations

The local information used in the nine-factor analysis presented above contradicts much of the evidence EPA used to expand the boundary proposed by the State. Presented below is a summary of why EPA's proposed boundary should be changed; it is organized by direction.

- North – The region between the FMATS boundary and EPA's proposed boundary contain areas of relatively high population density (up to 500 people per acre). No point sources however are located in this region. Meteorological data shows winds to be predominantly out of the east-northeast that are impacting Fairbanks prior to and during $PM_{2.5}$ episodes. The topographic data shows drainable flow from the Goldstream Valley could impact Fairbanks. While this information largely supports the northern boundary recommended by EPA, revisions are needed to address the location of specific neighborhoods.

- South – The entire region between the proposed southern boundary and the Tanana River is unpopulated. There are no paved roads in this region; no point sources are located in this region. Emissions data provided for the Blair Lakes facility, which is located approximately 23 miles south of Fairbanks represents a insignificant fraction of the NOx and SO_2 inventory. Data provided for the other ranges shows activity during winter months is limited and sporadic. Meteorological data show that winds prior to and during an episode are never from the south. In summary, there is no evidence supporting the southern boundary recommended by EPA. The data suggest the need for a substantial revision of the boundary to the north.

- East – Large areas of the region are unpopulated. Eielson is the only area east of North Pole with any population density and it is shown to be less than 150 people per acre. Monitoring data collected at Eielson showed winter $PM_{2.5}$ concentrations consistently in the single digits and significantly below concentrations recorded in downtown Fairbanks. Emissions data show the base's share of the NOx and SO_2 inventory to be below 5%. Surface meteorological data show there is no transport of base emissions into either North Pole or Fairbanks prior to or during episodes except for brief periods of southeasterly flow which is shown to be part of drainage flow along the Tanana River. Data on winds aloft is limited to soundings at Fairbanks International Airport, which shows winds to be predominantly out of the east-northeast with little flow from the southeast. Thus, the available data do not show an impact from Eielson's power plant emissions. Collectively, these data do not support the eastern boundary proposed by EPA. Instead, the data support a substantial revision of the boundary to the west.

- West – Large areas north of the Tanana and west of Fairbanks located within EPA's proposed nonattainment boundary are unpopulated. No point sources are located in the area between the western boundary of the FMATS region and western boundary proposed by EPA. Meteorological data collected at Fairbanks International Airport shows the dominant flow prior to and during episodes is from the northeast with little evidence of flow from the west. Higher density populated areas, however are located outside of the western FMATS boundary. Topographical data suggests drainage flow from Ester Valley could impact Fairbanks. Overall, the data provide no support for EPA's recommended western boundary and suggest the need for a substantial revision of the boundary to the east.

In light of the information, presented above, the State in concert with the Borough developed a recommended nonattainment boundary. The starting point for these recommendations was the FMATS area. Revisions to that boundary are primarily based on consideration of population density, meteorology, terrain, emissions and the lack of growth. Figure 17 displays the recommended nonattainment boundary. It presents both the FMATS boundary and the proposed revisions. As can be seen the bulk of the revisions are to the west and north, with limited changes to the east and no changes to the south. To simplify the review and discussion of the basis for the proposed boundaries, Figure 18 presents the final recommended boundary without the FMATS distinction. Also, included in Figure 18 are the names of specific landmarks impacting the selection of the boundary. Both figures also include information on terrain.

In addition to the factors noted above, care was taken to ensure the boundary is consistent with ownership (i.e., lots were not split) and that entire neighborhoods were included within the proposed nonattainment area unless they were divided by geographical features (e.g., ridgeline) that distinguished their potential to impact Fairbanks.

Starting with the south, the proposed boundary is consistent with the FMATS boundary, which is located just to the north of the Tanana River. The eastern edge follows the FMATS boundary, which excludes Eielson, but is expanded to include populated areas adjacent to Chena Lakes, east of Nordale Road and north of Badger Road. The areas excluded to the east include undeveloped areas and swamp land. Some of the excluded areas also appear to include populated areas, however, a discussion with the Borough demographer indicated that these were artifacts of arbitrary census boundaries and in fact no one lived in those locations (because the density reflects the average of the area represented, not the location of where people lived). The northern end of the eastern boundary is selected to incorporate the higher density valley to the west of Gilmore Dome but to exclude communities farther to the east. The low population density of these communities and distance from the higher density areas of Fairbanks and North Pole is seen to limit their potential impacts despite the predominant northeast wind flow.

Recognizing the potential of Goldstream Valley to impact Fairbanks, the FMATS boundary was expanded well to the north to include all areas with the potential to contribute to the drainage flow. The northern boundary is not located at the top of the

ridge separating the Chatinika Valley from the Goldstream Valley as recommended by EPA. Instead the northern edge of the populated areas was selected, hence the jog in the middle of the northern boundary. To the west, the FMATS boundary was expanded to include the higher population density areas with the potential to contribute drainage to Goldstream Valley. This includes the area to the east of Ester Dome. The areas along Murphy Dome Road further to the west were excluded because of the combination of low population density, distance from the higher density populated areas and prevailing meteorology. The southwestern FMATS boundary was expanded to include Ester Valley. This area, located to the south of Ester Dome and East of Chena Ridge is seen as having the potential to contribute to drainage into Fairbanks.

Fairbanks residents will be concerned about the size of the proposed nonattainment area. Many of the proposed areas are low density and located a considerable distance from downtown Fairbanks. These areas will be perceived as having no air quality problems since there is no monitoring data documenting violations of the 24-hour $PM_{2.5}$ standard. Communities that will have this perspective include Chena Ridge, Ester, Ester Valley, Fox, Goldstream Valley, and North Pole. Despite the lack of monitoring data, insight gained from the review of the nine-factors (particularly, the combination of population density, emissions sources, meteorology and terrain) indicates that it would be prudent to include these areas within the proposed nonattainment area. The recommended nonattainment area is therefore considered to be conservative and protective of public health.

Figure 17
Combined FMATS and Proposed PM_{10} Nonattainment Boundary

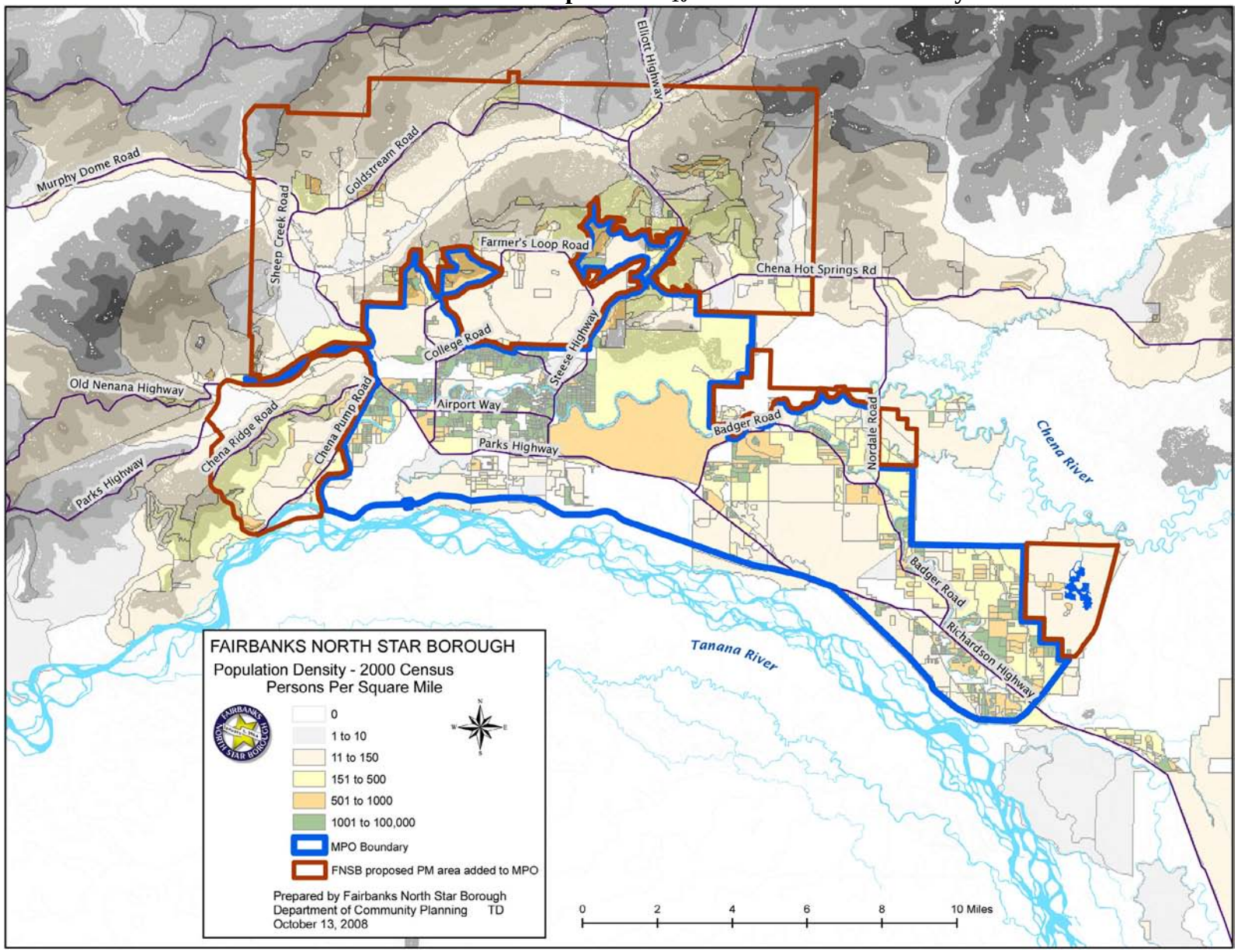
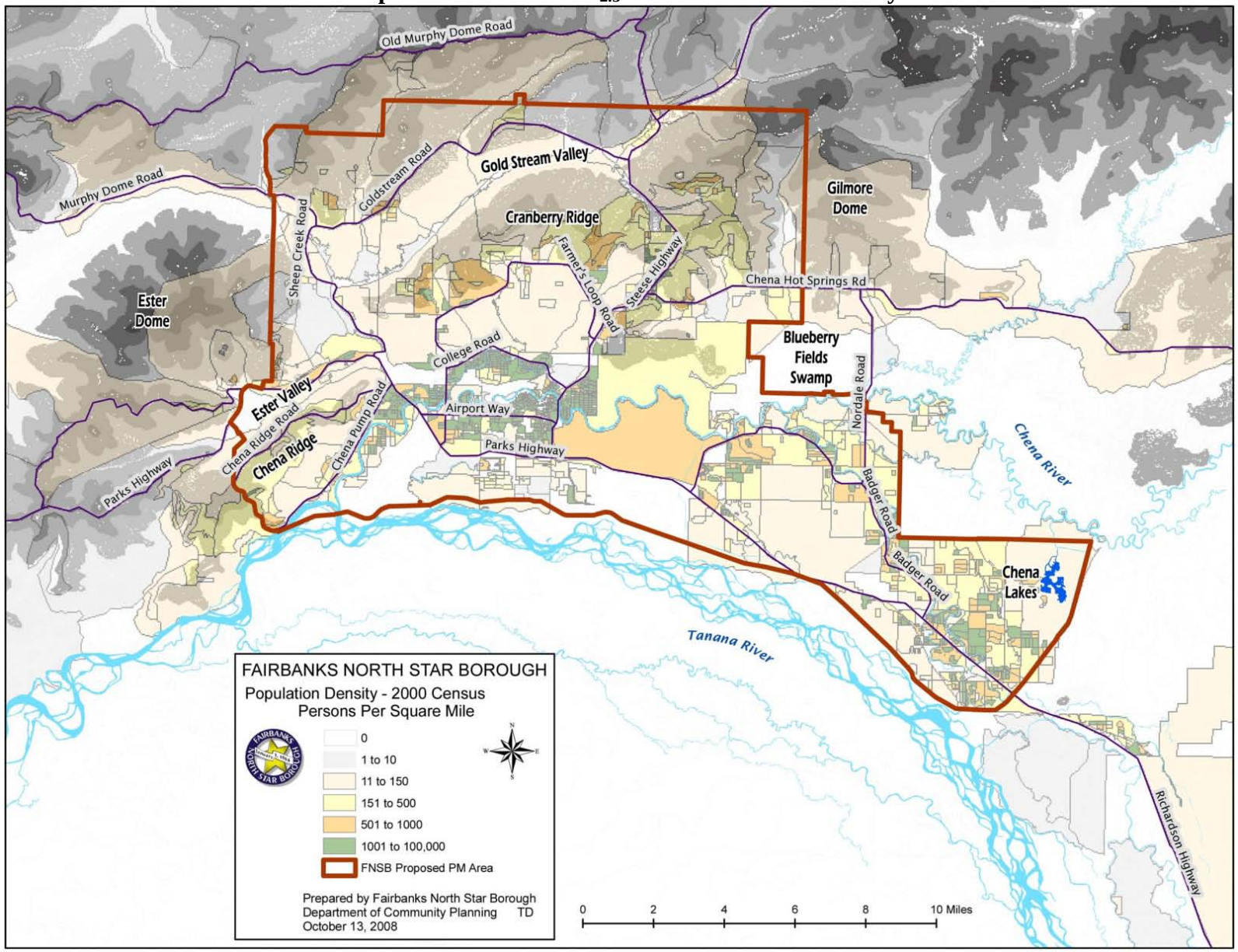


Figure 18
Proposed Fairbanks $PM_{2.5}$ Nonattainment Boundary



Attachment A

Emission Category	Fairbanks North Star Borough						
	2005 Emissions, TPY						
	VOC	NOx	SO_2	PM_{10}_PRI	$PM_{2.5}$_PRI	NH_3	CO
Point	67	5829	4565	460	NA	NA	1087
Area	4473	1872	1055	7523	6444	337	76433
Mobile - Onroad	1160	2218	161	71	56	55	14510
Mobile - Nonroad	1241	543	34	19245	3398	0	6144
Total Emissions	**6941**	**10462**	**5815**	**27299**	**9898**	**392**	**98174**

Fairbanks North Star Borough					
Facility	2005 Emissions (TPY)				
	VOC	NOx	SO_2	PM_{10}_PRI	CO
Aurora Energy LLC Chena Power Plant	0	629	248	353	459
Flint Hills Resources Alaska, LLC North Pole Refinery	35	215	13	15	33
Golden Valley Electric Association North Pole Power Plant	2	3604	3019	50	14
Golden Valley Electric Association Zehnder Facility	1	28	24	0	1
US Air Force Eielson Air Force Base	21	367	281	8	125
US Army Fort Wainwright	6	471	697	14	262
University of Alaska Fairbanks Campus Power Plant	2	509	280	7	187
Wilder Construction Company Asphalt Plant	0	6	3	13	6
Total Emissions	67	5829	4565	460	1087

Fairbanks North Star Borough - Area Sources							
	2005 Emissions, TPY						
Source Classification Code	**VOC**	**NOx**	**SO_2**	**PM_{10}_PRI**	**$PM_{2.5}$_PRI**	**NH_3**	**CO**
2103006000 Stationary Source Fuel Combustion Commercial/Institutional Natural Gas Total: Boilers and IC Engines	0	0	0	0	0	0	0
2104004000 Stationary Source Fuel Combustion Residential Distillate Oil Total: All Combustor Types	9	229	605	5	5	0	64
2104005000 Stationary Source Fuel Combustion Residential Residual Oil Total: All Combustor Types	0	2	5	0	0	0	1
2104006010 Stationary Source Fuel Combustion Residential Natural Gas Residential Furnaces	0	7	0	0	0	0	2
2104007000 Stationary Source Fuel Combustion Residential Liquified Petroleum Gas (LPG) Total: All Combustor Types	0	4	0	0	0	0	1
2104008000 Stationary Source Fuel Combustion Residential Wood Total: Woodstoves and Fireplaces	509	19	3	183	183	0	1325
2306010000 Industrial Processes Petroleum Refining: SIC 29 Asphalt Paving/Roofing Materials Total	0	1	1	40	2	0	4
2401001000 Solvent Utilization Surface Coating Architectural Coatings Total: All Solvent Types	241	0	0	0	0	0	0
2461020000 Solvent Utilization Miscellaneous Non-industrial: Commercial Asphalt Application: All Processes Total: All Solvent Types	1	0	0	0	0	0	0
2501000120 Storage and Transport Petroleum and Petroleum Product Storage All Storage Types: Breathing Loss Gasoline	15	0	0	0	0	0	0
2501060102 Storage and Transport Petroleum and Petroleum Product Storage Gasoline Service Stations Stage 2: Displacement Loss/Controlled	150	0	0	0	0	0	0
2501060103 Storage and Transport Petroleum and Petroleum Product Storage Gasoline Service Stations Stage 2: Spillage	8	0	0	0	0	0	0
2501995120 Storage and Transport Petroleum and Petroleum Product Storage All Storage Types: Working Loss Gasoline	8	0	0	0	0	0	0
2810001000 Miscellaneous Area Sources Other Combustion Forest Wildfires Total	3529	1609	441	7292	6254	337	74997
2810030000 Miscellaneous Area Sources Other Combustion Structure Fires Total	3	1	0	3	0	0	39
2810035000 Miscellaneous Area Sources Other Combustion Firefighting Training Total	0	0	0	0	0	0	0
Total Area Source Emissions	4473	1872	1055	7523	6444	337	76433

Fairbanks North Star Borough - OnRoad Mobile Sources							
	2005 Emissions, TPY						
Source Classification Code	**VOC**	**NOx**	**SO_2**	**PM_{10}_PRI**	**$PM_{2.5}$_PRI**	**NH_3**	**CO**
2201001000 Mobile Sources Highway Vehicles - Gasoline Light Duty Gasoline Vehicles (LDGV) Total: All Road Types	308	173	7	5	2	18	4101
2201020000 Mobile Sources Highway Vehicles - Gasoline Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5) Total: All Road Types	396	236	9	6	3	19	5658
2201040000 Mobile Sources Highway Vehicles - Gasoline Light Duty Gasoline Trucks 3 & 4 (M6) = LDGT2 (M5) Total: All Road Types	304	194	8	4	2	13	3711
2201070000 Mobile Sources Highway Vehicles - Gasoline Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV) Total: All Road Types	91	240	5	5	4	2	717
2201080000 Mobile Sources Highway Vehicles - Gasoline Motorcycles (MC) Total: All Road Types	7	5	0	0	0	0	39
2230001000 Mobile Sources Highway Vehicles - Diesel Light Duty Diesel Vehicles (LDDV) Total: All Road Types	0	1	0	0	0	0	1
2230060000 Mobile Sources Highway Vehicles - Diesel Light Duty Diesel Trucks 1 thru 4 (M6) (LDDT) Total: All Road Types	2	3	1	0	0	0	3
2230070000 Mobile Sources Highway Vehicles - Diesel All HDDV including Buses (use subdivisions -071 thru -075 if possible) Total: All Road Types	52	1366	131	51	45	3	280
Total On-Road Emissions	1160	2218	161	71	56	55	14510

Fairbanks North Star Borough - NonRoad Mobile Emissions							
Source Classification Code	2005 Emissions, TPY						
	VOC	NOx	SO_2	PM_{10}_PRI	$PM_{2.5}$_PRI	NH_3	CO
2260001010 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Recreational Equipment Motorcycles: Off-road	40	0	0	1	1	0	55
2260001020 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Recreational Equipment Snowmobiles	829	6	0	18	17	0	2021
2260001030 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Recreational Equipment All Terrain Vehicles	25	0	0	1	1	0	84
2260001060 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Recreational Equipment Specialty Vehicles/Carts	0	0	0	0	0	0	4
2260002006 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Tampers/Rammers	1	0	0	0	0	0	4
2260002009 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Plate Compactors	0	0	0	0	0	0	0
2260002021 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Paving Equipment	0	0	0	0	0	0	0
2260002027 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Signal Boards/Light Plants	0	0	0	0	0	0	0
2260002039 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Concrete/Industrial Saws	2	0	0	0	0	0	12
2260002054 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Crushing/Processing Equipment	0	0	0	0	0	0	0
2260003030 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Industrial Equipment Sweepers/Scrubbers	0	0	0	0	0	0	0
2260003040 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Industrial Equipment Other General Industrial Equipment	0	0	0	0	0	0	0
2260004015 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Rotary Tillers < 6 HP (Residential)	0	0	0	0	0	0	1
2260004016 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Rotary Tillers < 6 HP (Commercial)	0	0	0	0	0	0	0
2260004020 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Chain Saws < 6 HP (Residential)	1	0	0	0	0	0	5
2260004021 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Chain Saws < 6 HP (Commercial)	0	0	0	0	0	0	1
2260004025 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Trimmers/Edgers/Brush Cutters (Residential)	2	0	0	0	0	0	12
2260004026 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Trimmers/Edgers/Brush Cutters (Commercial)	0	0	0	0	0	0	1
2260004030 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Leafblowers/Vacuums (Residential)	2	0	0	0	0	0	8
2260004031 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Leafblowers/Vacuums (Commercial)	0	0	0	0	0	0	1
2260004035 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Snowblowers (Residential)	0	0	0	0	0	0	0
2260004036 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Snowblowers (Commercial)	0	0	0	0	0	0	0
2260004071 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Turf Equipment (Commercial)	0	0	0	0	0	0	0
2260005035 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Agricultural Equipment Sprayers	0	0	0	0	0	0	0
2260006005 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Commercial Equipment Generator Sets	0	0	0	0	0	0	1
2260006010 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Commercial Equipment Pumps	1	0	0	0	0	0	4
2260006015 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Commercial Equipment Air Compressors	0	0	0	0	0	0	0
2260006035 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Mobile Sources : Off-highway Vehicle Gasoline, 2-Stroke: Commercial Equipment Mobile Sources : Off-highway Vehicle Gasoline, 2-Stroke: Commercial Equipment : Hydro-power Units	0	0	0	0	0	0	0
2260007005 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Logging Equipment Chain Saws > 6 HP	1	0	0	0	0	0	6
2265001010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Recreational Equipment Motorcycles: Off-road	2	0	0	0	0	0	20
2265001030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Recreational Equipment All Terrain Vehicles	21	2	0	0	0	0	267

Fairbanks North Star Borough - NonRoad Mobile Emissions							
	2005 Emissions, TPY						
Source Classification Code	VOC	NOx	SO_2	PM_{10}_PRI	$PM_{2.5}$_PRI	NH_3	CO
2265001050 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Recreational Equipment Golf Carts	2	1	0	0	0	0	141
2265001060 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Recreational Equipment Specialty Vehicles/Carts	0	0	0	0	0	0	3
2265002003 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Pavers	0	0	0	0	0	0	5
2265002006 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Tampers/Rammers	0	0	0	0	0	0	0
2265002009 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Plate Compactors	0	0	0	0	0	0	9
2265002015 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Rollers	0	0	0	0	0	0	9
2265002021 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Paving Equipment	0	0	0	0	0	0	18
2265002024 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Surfacing Equipment	0	0	0	0	0	0	8
2265002027 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Signal Boards/Light Plants	0	0	0	0	0	0	0
2265002030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Trenchers	0	0	0	0	0	0	14
2265002033 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Bore/Drill Rigs	0	0	0	0	0	0	4
2265002039 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Concrete/Industrial Saws	0	0	0	0	0	0	37
2265002042 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Cement and Mortar Mixers	0	0	0	0	0	0	16
2265002045 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Cranes	0	0	0	0	0	0	0
2265002054 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Crushing/Processing Equipment	0	0	0	0	0	0	2
2265002057 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Rough Terrain Forklifts	0	0	0	0	0	0	0
2265002060 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Rubber Tire Loaders	0	0	0	0	0	0	0
2265002066 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Tractors/Loaders/Backhoes	0	0	0	0	0	0	12
2265002072 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Skid Steer Loaders	0	0	0	0	0	0	4
2265002078 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Dumpers/Tenders	0	0	0	0	0	0	2
2265002081 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Other Construction Equipment	0	0	0	0	0	0	0
2265003010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Aerial Lifts	0	0	0	0	0	0	1
2265003020 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Forklifts	0	0	0	0	0	0	2
2265003030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Sweepers/Scrubbers	0	0	0	0	0	0	1
2265003040 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Other General Industrial Equipment	0	0	0	0	0	0	3
2265003050 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Other Material Handling Equipment	0	0	0	0	0	0	0
2265003060 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment AC\Refrigeration	0	0	0	0	0	0	0
2265003070 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Terminal Tractors	0	0	0	0	0	0	0
2265004010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Lawn Mowers (Residential)	7	1	0	0	0	0	222
2265004011 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Lawn Mowers (Commercial)	0	0	0	0	0	0	6
2265004015 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Rotary Tillers < 6 HP (Residential)	1	0	0	0	0	0	19
2265004016 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Rotary Tillers < 6 HP (Commercial)	0	0	0	0	0	0	3
2265004025 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Trimmers/Edgers/Brush Cutters (Residential)	0	0	0	0	0	0	1
2265004026 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Trimmers/Edgers/Brush Cutters (Commercial)	0	0	0	0	0	0	0

Fairbanks North Star Borough - NonRoad Mobile Emissions							
	2005 Emissions, TPY						
Source Classification Code	VOC	NOx	SO_2	PM_{10}_PRI	$PM_{2.5}$_PRI	NH_3	CO
2265004030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Leafblowers/Vacuums (Residential)	0	0	0	0	0	0	2
2265004031 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Leafblowers/Vacuums (Commercial)	0	0	0	0	0	0	6
2265004035 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Snowblowers (Residential)	0	0	0	0	0	0	0
2265004036 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Snowblowers (Commercial)	0	0	0	0	0	0	0
2265004040 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Rear Engine Riding Mowers (Residential)	1	0	0	0	0	0	57
2265004041 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Rear Engine Riding Mowers (Commercial)	0	0	0	0	0	0	1
2265004046 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Front Mowers (Commercial)	0	0	0	0	0	0	1
2265004051 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Shredders < 6 HP (Commercial)	0	0	0	0	0	0	0
2265004055 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Lawn and Garden Tractors (Residential)	12	4	0	0	0	0	764
2265004056 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Lawn and Garden Tractors (Commercial)	0	0	0	0	0	0	11
2265004066 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Chippers/Stump Grinders (Commercial)	0	0	0	0	0	0	1
2265004071 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Turf Equipment (Commercial)	0	0	0	0	0	0	33
2265004075 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Other Lawn and Garden Equipment (Residential)	1	0	0	0	0	0	23
2265004076 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Other Lawn and Garden Equipment (Commercial)	0	0	0	0	0	0	1
2265005010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment 2-Wheel Tractors	0	0	0	0	0	0	0
2265005015 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Agricultural Tractors	0	0	0	0	0	0	0
2265005020 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Combines	0	0	0	0	0	0	0
2265005025 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Balers	0	0	0	0	0	0	0
2265005030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Agricultural Mowers	0	0	0	0	0	0	0
2265005035 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Sprayers	0	0	0	0	0	0	2
2265005040 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Tillers > 6 HP	0	0	0	0	0	0	6
2265005045 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Swathers	0	0	0	0	0	0	0
2265005055 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Other Agricultural Equipment	0	0	0	0	0	0	1
2265005060 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Irrigation Sets	0	0	0	0	0	0	0
2265006005 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Commercial Equipment Generator Sets	6	1	0	0	0	0	297
2265006010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Commercial Equipment Pumps	1	0	0	0	0	0	65
2265006015 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Commercial Equipment Air Compressors	1	1	0	0	0	0	52
2265006025 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Commercial Equipment Welders	1	0	0	0	0	0	82
2265006030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Commercial Equipment Pressure Washers	3	1	0	0	0	0	129
2265006035 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Mobile Sources : Off-highway Vehicle Gasoline, 4-Stroke: Commercial Equipment Mobile Sources : Off-highway Vehicle Gasoline, 4-Stroke: Commercial Equipment : Hydro-power Units	0	0	0	0	0	0	7
2265007010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Logging Equipment Shredders > 6 HP	0	0	0	0	0	0	18
2265007015 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Logging Equipment Forest Eqp - Feller/Bunch/Skidder	0	0	0	0	0	0	0

Fairbanks North Star Borough - NonRoad Mobile Emissions							
	2005 Emissions, TPY						
Source Classification Code	VOC	NOx	SO_2	PM_{10}_PRI	$PM_{2.5}$_PRI	NH_3	CO
2265010010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Other Oil Field Equipment	0	0	0	0	0	0	27
2267001060 Mobile Sources LPG Recreational Equipment Specialty Vehicles/Carts	0	0	0	0	0	0	0
2267002003 Mobile Sources LPG Construction and Mining Equipment Pavers	0	0	0	0	0	0	0
2267002015 Mobile Sources LPG Construction and Mining Equipment Rollers	0	0	0	0	0	0	0
2267002021 Mobile Sources LPG Construction and Mining Equipment Paving Equipment	0	0	0	0	0	0	0
2267002024 Mobile Sources LPG Construction and Mining Equipment Surfacing Equipment	0	0	0	0	0	0	0
2267002030 Mobile Sources LPG Construction and Mining Equipment Trenchers	0	0	0	0	0	0	0
2267002033 Mobile Sources LPG Construction and Mining Equipment Bore/Drill Rigs	0	0	0	0	0	0	0
2267002039 Mobile Sources LPG Construction and Mining Equipment Concrete/Industrial Saws	0	0	0	0	0	0	0
2267002045 Mobile Sources LPG Construction and Mining Equipment Cranes	0	0	0	0	0	0	0
2267002054 Mobile Sources LPG Construction and Mining Equipment Crushing/Processing Equipment	0	0	0	0	0	0	0
2267002057 Mobile Sources LPG Construction and Mining Equipment Rough Terrain Forklifts	0	0	0	0	0	0	0
2267002060 Mobile Sources LPG Construction and Mining Equipment Rubber Tire Loaders	0	0	0	0	0	0	0
2267002066 Mobile Sources LPG Construction and Mining Equipment Tractors/Loaders/Backhoes	0	0	0	0	0	0	0
2267002072 Mobile Sources LPG Construction and Mining Equipment Skid Steer Loaders	0	0	0	0	0	0	0
2267002081 Mobile Sources LPG Construction and Mining Equipment Other Construction Equipment	0	0	0	0	0	0	0
2267003010 Mobile Sources LPG Industrial Equipment Aerial Lifts	0	0	0	0	0	0	0
2267003020 Mobile Sources LPG Industrial Equipment Forklifts	1	5	0	0	0	0	24
2267003030 Mobile Sources LPG Industrial Equipment Sweepers/Scrubbers	0	0	0	0	0	0	0
2267003040 Mobile Sources LPG Industrial Equipment Other General Industrial Equipment	0	0	0	0	0	0	0
2267003050 Mobile Sources LPG Industrial Equipment Other Material Handling Equipment	0	0	0	0	0	0	0
2267003070 Mobile Sources LPG Industrial Equipment Terminal Tractors	0	0	0	0	0	0	0
2267004066 Mobile Sources LPG Lawn and Garden Equipment Chippers/Stump Grinders (Commercial)	0	0	0	0	0	0	0
2267005055 Mobile Sources LPG Agricultural Equipment Other Agricultural Equipment	0	0	0	0	0	0	0
2267005060 Mobile Sources LPG Agricultural Equipment Irrigation Sets	0	0	0	0	0	0	0
2267006005 Mobile Sources LPG Commercial Equipment Generator Sets	0	0	0	0	0	0	2
2267006010 Mobile Sources LPG Commercial Equipment Pumps	0	0	0	0	0	0	0
2267006015 Mobile Sources LPG Commercial Equipment Air Compressors	0	0	0	0	0	0	1
2267006025 Mobile Sources LPG Commercial Equipment Welders	0	0	0	0	0	0	0
2267006030 Mobile Sources LPG Commercial Equipment Pressure Washers	0	0	0	0	0	0	0
2267006035 Mobile Sources LPG Mobile Sources : LPG: Commercial Equipment Mobile Sources : LPG: Commercial Equipment : Hydro-power Units	0	0	0	0	0	0	0
2268002081 Mobile Sources CNG Construction and Mining Equipment Other Construction Equipment	0	0	0	0	0	0	0
2268003020 Mobile Sources CNG Industrial Equipment Forklifts	0	0	0	0	0	0	2
2268003030 Mobile Sources CNG Industrial Equipment Sweepers/Scrubbers	0	0	0	0	0	0	0

Fairbanks North Star Borough - NonRoad Mobile Emissions							
	2005 Emissions, TPY						
Source Classification Code	VOC	NOx	SO_2	PM_{10}_PRI	$PM_{2.5}$_PRI	NH_3	CO
2268003040 Mobile Sources CNG Industrial Equipment Other General Industrial Equipment	0	0	0	0	0	0	0
2268003060 Mobile Sources CNG Industrial Equipment AC\Refrigeration	0	0	0	0	0	0	0
2268003070 Mobile Sources CNG Industrial Equipment Terminal Tractors	0	0	0	0	0	0	0
2268005055 Mobile Sources CNG Agricultural Equipment Other Agricultural Equipment	0	0	0	0	0	0	0
2268005060 Mobile Sources CNG Agricultural Equipment Irrigation Sets	0	0	0	0	0	0	0
2268006005 Mobile Sources CNG Commercial Equipment Generator Sets	0	0	0	0	0	0	1
2268006010 Mobile Sources CNG Commercial Equipment Pumps	0	0	0	0	0	0	0
2268006015 Mobile Sources CNG Commercial Equipment Air Compressors	0	0	0	0	0	0	0
2268006020 Mobile Sources CNG Commercial Equipment Gas Compressors	0	0	0	0	0	0	3
2268006035 Mobile Sources CNG Mobile Sources : CNG: Commercial Equipment Mobile Sources : CNG: Commercial Equipment : Hydro-power Units	0	0	0	0	0	0	0
2268010010 Mobile Sources CNG Industrial Equipment Other Oil Field Equipment	0	0	0	0	0	0	0
2270001060 Mobile Sources Off-highway Vehicle Diesel Recreational Equipment Specialty Vehicles/Carts	0	0	0	0	0	0	0
2270002003 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Pavers	0	1	0	0	0	0	0
2270002006 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Tampers/Rammers	0	0	0	0	0	0	0
2270002009 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Plate Compactors	0	0	0	0	0	0	0
2270002015 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Rollers	0	2	0	0	0	0	1
2270002018 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Scrapers	0	2	0	0	0	0	1
2270002021 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Paving Equipment	0	0	0	0	0	0	0
2270002024 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Surfacing Equipment	0	0	0	0	0	0	0
2270002027 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Signal Boards/Light Plants	0	1	0	0	0	0	0
2270002030 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Trenchers	0	2	0	0	0	0	1
2270002033 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Bore/Drill Rigs	0	2	0	0	0	0	1
2270002036 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Excavators	1	6	0	0	0	0	2
2270002039 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Concrete/Industrial Saws	0	0	0	0	0	0	0
2270002042 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Cement and Mortar Mixers	0	0	0	0	0	0	0
2270002045 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Cranes	0	2	0	0	0	0	1
2270002048 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Graders	0	1	0	0	0	0	1
2270002051 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Off-highway Trucks	1	8	0	0	0	0	1
2270002054 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Crushing/Processing Equipment	0	0	0	0	0	0	0
2270002057 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Rough Terrain Forklifts	0	3	0	0	0	0	2
2270002060 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Rubber Tire Loaders	1	11	0	1	1	0	4
2270002066 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Tractors/Loaders/Backhoes	2	10	0	1	1	0	9
2270002069 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Crawler Tractor/Dozers	1	8	0	0	0	0	3
2270002072 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Skid Steer Loaders	2	8	0	1	1	0	8

Fairbanks North Star Borough - NonRoad Mobile Emissions							
	2005 Emissions, TPY						
Source Classification Code	VOC	NOx	SO_2	PM_{10}_PRI	$PM_{2.5}$_PRI	NH_3	CO
2270002075 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Off-highway Tractors	0	1	0	0	0	0	0
2270002078 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Dumpers/Tenders	0	0	0	0	0	0	0
2270002081 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Other Construction Equipment	0	1	0	0	0	0	1
2270003010 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Aerial Lifts	0	0	0	0	0	0	0
2270003020 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Forklifts	0	1	0	0	0	0	0
2270003030 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Sweepers/Scrubbers	0	0	0	0	0	0	0
2270003040 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Other General Industrial Equipment	0	0	0	0	0	0	0
2270003050 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Other Material Handling Equipment	0	0	0	0	0	0	0
2270003060 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment AC\Refrigeration	0	5	0	0	0	0	2
2270003070 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Terminal Tractors	0	0	0	0	0	0	0
2270004031 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Leafblowers/Vacuums (Commercial)	0	0	0	0	0	0	0
2270004036 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Snowblowers (Commercial)	0	0	0	0	0	0	0
2270004046 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Front Mowers (Commercial)	0	0	0	0	0	0	0
2270004056 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Lawn and Garden Tractors (Commercial)	0	0	0	0	0	0	0
2270004066 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Chippers/Stump Grinders (Commercial)	0	0	0	0	0	0	0
2270004071 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Turf Equipment (Commercial)	0	0	0	0	0	0	0
2270004076 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Other Lawn and Garden Equipment (Commercial)	0	0	0	0	0	0	0
2270005010 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment 2-Wheel Tractors	0	0	0	0	0	0	0
2270005015 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Agricultural Tractors	1	10	0	1	1	0	4
2270005020 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Combines	0	1	0	0	0	0	0
2270005025 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Balers	0	0	0	0	0	0	0
2270005030 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Agricultural Mowers	0	0	0	0	0	0	0
2270005035 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Sprayers	0	0	0	0	0	0	0
2270005040 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Tillers > 6 HP	0	0	0	0	0	0	0
2270005045 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Swathers	0	0	0	0	0	0	0
2270005055 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Other Agricultural Equipment	0	0	0	0	0	0	0
2270005060 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Irrigation Sets	0	0	0	0	0	0	0
2270006005 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Generator Sets	0	3	0	0	0	0	1
2270006010 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Pumps	0	1	0	0	0	0	0
2270006015 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Air Compressors	0	3	0	0	0	0	1
2270006020 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Gas Compressors	0	0	0	0	0	0	0
2270006025 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Welders	0	1	0	0	0	0	1
2270006030 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Pressure Washers	0	0	0	0	0	0	0
2270006035 Mobile Sources Off-highway Vehicle Diesel Mobile Sources : Off-highway Vehicle Diesel: Commercial Equipment Mobile Sources : Off-highway Vehicle Diesel: Commercial Equipment : Hydro-power Units	0	0	0	0	0	0	0

Fairbanks North Star Borough - NonRoad Mobile Emissions							
	2005 Emissions, TPY						
Source Classification Code	VOC	NOx	SO_2	PM_{10}_PRI	$PM_{2.5}$_PRI	NH_3	CO
2270007010 Mobile Sources Off-highway Vehicle Diesel Logging Equipment Shredders > 6 HP	0	0	0	0	0	0	0
2270007015 Mobile Sources Off-highway Vehicle Diesel Logging Equipment Forest Eqp - Feller/Bunch/Skidder	0	1	0	0	0	0	0
2270009010 Mobile Sources Off-highway Vehicle Diesel Underground Mining Equipment Other Underground Mining Equipment	0	0	0	0	0	0	0
2270010010 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Other Oil Field Equipment	0	1	0	0	0	0	0
2280002030 Mobile Sources Marine Vessels, Commercial Diesel Fishing Vessels	0	2	1	0	0	0	0
2280004030 Mobile Sources Marine Vessels, Commercial Gasoline Fishing Vessels	0	0	0	0	0	0	4
2282005010 Mobile Sources Pleasure Craft Gasoline 2-Stroke Outboard	4	0	0	0	0	0	13
2282005015 Mobile Sources Pleasure Craft Gasoline 2-Stroke Personal Water Craft	1	0	0	0	0	0	5
2282010005 Mobile Sources Pleasure Craft Gasoline 4-Stroke Inboard/Sterndrive	1	1	0	0	0	0	8
2282020005 Mobile Sources Pleasure Craft Diesel Inboard/Sterndrive	0	1	0	0	0	0	0
2282020010 Mobile Sources Pleasure Craft Diesel Outboard	0	0	0	0	0	0	0
2285002015 Mobile Sources Railroad Equipment Diesel Railway Maintenance	0	1	0	0	0	0	1
2285004015 Mobile Sources Railroad Equipment Gasoline, 4-Stroke Railway Maintenance	0	0	0	0	0	0	2
2285006015 Mobile Sources Railroad Equipment LPG Railway Maintenance	0	0	0	0	0	0	0
2294000000 Mobile Sources Paved Roads All Paved Roads Total: Fugitives	0	0	0	5507	1312	0	0
2296000000 Mobile Sources Unpaved Roads All Unpaved Roads Total: Fugitives	0	0	0	13626	2042	0	0
2275001000	202	155	18	61		0	329
2275020000	33	82	7	16	16	0	405
2275050000	17	5	1	7		0	642
2275060000	0	0	0	0	0	0	0
2285002000	9	179	7	5	5	0	22
Total NonRoad Emissions	1241	543	34	19245	3398	0	6144

Juneau

Several categories of information assembled by EPA to designate the area of Juneau that violates the ambient $PM_{2.5}$ standard do not represent local conditions. This flawed information appears to have biased the selection of the nonattainment boundary. The one area of Juneau where monitoring data indicates that $PM_{2.5}$ concentrations approach the ambient standard is the Mendenhall Valley. EPA's proposed boundary includes large areas that do not exceed or contribute to exceedances of the ambient $PM_{2.5}$ standard in the Mendenhall Valley. Presented below is a summary of local data that add to and correct EPA's Technical Analysis for Juneau, Alaska Nonattainment Area. In its entirety, this information supports use of the existing PM_{10} nonattainment boundary as the $PM_{2.5}$ nonattainment area, should one be warranted.

Factor 1: Pollutant Emissions

The estimated annual emissions for the City and Borough of Juneau, Alaska for calendar year 2005 are presented below in Table 1. Emission sources are focused primarily in the populated areas of the borough. Because of Southeast Alaska's complex terrain and the fact that Juneau can be accessed from outlying areas only by boat or plane, emissions from sparsely populated neighboring areas are not contributing factors to emissions in Juneau. With the exception of wildfire smoke transporting into Juneau during the summer fire season, the emissions contributing to pollution in Juneau are the result of local activities. Wintertime area source particulate matter emissions are dominated by wood smoke from residential wood burning. Dust from paved and unpaved roads dominates the particulate matter emissions in the non-road mobile source category. This is generally a seasonal source, which is observed primarily on dry days in the springtime just following winter break-up.

Table 1
Summary of City & Borough of Juneau Emissions in 2005
(tons/year, TPY)

Source Category	VOC	NOx	SO_2	PM_{10}_PRI	$PM_{2.5}$_PRI	NH_3	CO
Point	68	1,275	744	162	NA	NA	176
Area	420	74	7	104	64	0	448
Mobile - Onroad	817	716	17	19	15	27	8,794
Mobile – Nonroad[a]	266	156	16	2,791	673	0	2,504
Total Emissions	**1,571**	**2,221**	**784**	**3,076**	**752**	**27**	**11,922**

[a] Please note that emissions from cruise ships and other large ocean going vessels are not included in this inventory summary. These emissions occur seasonally during the summer months in downtown Juneau and do not impact the wintertime particulate matter concentrations in the Mendenhall Valley.

Tables summarizing the detailed data for each source category are included as Attachment A.

Table 2 provides a summary of the permitted major facilities that are actually located and operating within the City & Borough of Juneau and their reported actual emissions for calendar year 2005. The two mines, Kensington and Greens Creek, are remote. Both facilities are off the road system with Greens Creek over 20 miles to the southwest on Admiralty Island and Kensington 35 miles to the northwest across Berner's Bay from the terminus of Glacier Highway. As shown in Figure 1, neither mine is in proximity to the populated areas of town or the proposed nonattainment area. The Kensington mine is not fully permitted or operational at this time and recently scaled back its development operations pending the outcome of on-going litigation. Given the location of the mines in relation to the Mendenhall Valley and based on the meteorological information provided later in this document, transport of emissions from these facilities cannot be directly impacting the valley or the other populated areas of Juneau through either primary emissions or secondary formation.

Table 2
Annual Emissions from Permitted Major Facilities in the City and Borough of Juneau

Facility	2005 Emissions, TPY				
	VOC	NOx	SO_2	PM_{10}_PRI	CO
Alaska Electric Light & Power Auke Bay Standby Generation Station	0	3	1	0	0
Alaska Electric Light & Power Lemon Creek Standby Generation Station	0	9	2	1	4
Coeur Alaska Inc. Kensington Mine Project	3	49	3	3	12
Kennecott Greens Creek Mining Company Kennecott Greens Creek Mine	65	1,214	738	158	160
Total Emissions	68	1,275	744	162	176

In general, there is limited industrial activity and few permitted stationary sources within the populated areas of Juneau. Juneau is not on a power grid and electricity is generated at a hydroelectric project southeast of town. The local power company, Alaska Electric Light & Power (AEL&P), has two facilities that provide standby or backup power in the event that the community's hydroelectric power is compromised or cannot meet demands. The two backup power generating facilities are located in the Lemon Creek Valley and at Auke Bay; their locations are shown in Figure 2. In addition, there is a permitted asphalt plant located at the southern end of the Mendenhall Valley, but this facility is a minor source and does not operate during the winter months when $PM_{2.5}$ concentrations are of concern in the Mendenhall Valley.

Figure 1
Location of Kensington and Kings Creek Mines

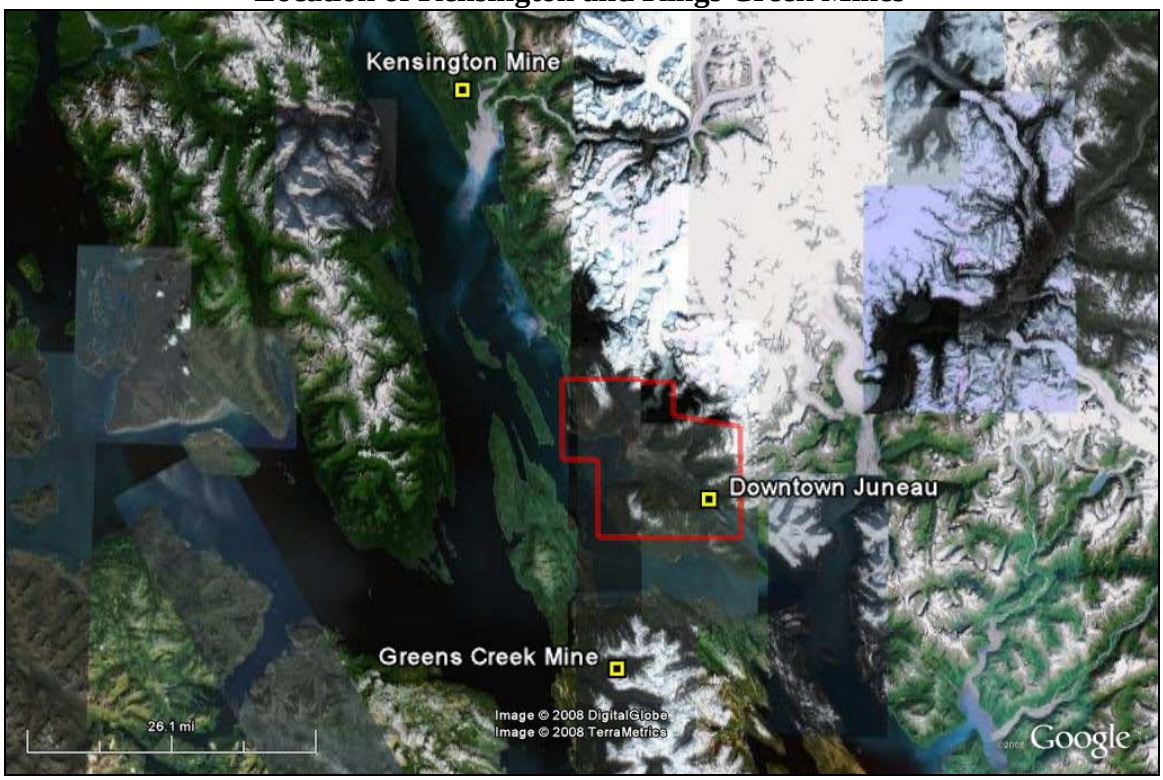


Figure 2
Location of Standby Generators in Juneau

The AEL&P Auke Bay Standby Generating Station has three units: one diesel generator and two gas turbines. The permit (AQ0202TVP02) shows an annual potential to emit as follows:

Potential Emissions (TPY):

NOx	249.9
SO_2	214.0
PM_{10}	32.0
VOC	8.9
CO	68.0
Total	572.8

Potential to Emit (PTE) means the maximum quantity of a release of an air contaminant, considering a stationary source's physical or operational design, based on continual operation of all emission units within the stationary source for 24 hours a day, 365 days a year, reduced by the effect of pollution control equipment and approved state or federal limitations on the capacity of the stationary source's emission units or the stationary source to emit an air contaminant, including limitations such as restrictions on hours or rates of operation and type or amount of material combusted, stored, or processed as defined in AS 46.14.990(21), effective January 18, 1997. Because these are backup generators, the units do not typically approach their annual PTE. In fact, these units typically show a combined annual emission total of less than 10 TPY for all reported pollutants (NOx, SO_2, PM_{10}, and CO). The annual PM_{10} emissions for 2007 were 0.3 TPY. These units are simply not contributing in any meaningful way to concentrations at the Floyd Dryden Monitoring site. In fact, during each of the wintertime episodes during 2005, 2006, and 2007 presented in this document, the Auke Bay Standby Generating Station was not operating and could not have contributed to the concentrations observed at the Floyd Dryden monitoring site in the Mendenhall Valley.

The AEL&P Lemon Creek Standby Generating Station has eleven units: nine diesel generators and two gas turbines. The permit (AQ0209TVP02) shows an annual potential to emit as follows:

Potential Emissions (TPY):

NOx	1,446
SO_2	419
PM_{10}	66
VOC	42
CO	347
Total	2,320

Because these are backup generators, the units do not typically approach their annual PTE. In fact, in 2007 the following actual emissions were reported for this facility for their annual emission fees:

2007 Actual Emissions (TPY):

NOx	71.50
SO_2	7.70
PM_{10}	2.30
CO	18.40
Total	99.90

In 2005, the actual emissions were even less than in 2007. Given the local complex terrain and meteorology, coupled with infrequent operations, these units are not contributing in any meaningful way to concentrations at the Floyd Dryden Monitoring site.

On April 16, 2008, a massive avalanche severed the power lines from the hydroelectric project to Juneau. AEL&P was able to complete repairs to the line by early June, but during the intervening period, the AEL&P standby generating systems were operating 24/7 to provide power to the community. However, during this time of maximum daily emissions from the power stations, there were no elevated concentrations of fine particulate matter noted at the Floyd Dryden monitoring site. The maximum concentration observed during this period was 13.1 $\mu g/m^3$ on April 24, 2008.

Summary –There are a limited number of point sources located within Juneau that appear to be responsible for a significant portion of precursor emissions to $PM_{2.5}$ (primarily NOx and SO_2). Two of the sources—the Kensington and Greens Creek mines—are remote, off the road system, and separated from populated areas of the community by bodies of water and mountains. They do not contribute emissions within Juneau and their contribution to the NOx and SO_2 inventory should be eliminated from further consideration. Actual emissions from the two remaining standby generating stations, located in Auke Bay and Lemon Creek, are significantly lower than their PTE values. When the actual values are used, these two sources account for 1% of the aggregate NOx and 7% of the SO_2 emitted in Juneau in 2005.

Factor 2: Air Quality Data

The Alaska Department of Environmental Conservation has concerns about the calculation of the $PM_{2.5}$ 24-hour design value for the Mendenhall Valley monitoring site in Juneau, Alaska. The State acknowledges that this monitoring site can approach the levels of the ambient air quality standard during wintertime inversion episodes; however, the calculation of the design value for this site has been biased to a higher value as a result of Region 10's inclusion of additional sample days.

During 2005–2007, the Floyd Dryden monitor was typically operated on a standard 1-in-3- or 1-in-6-day sampling schedule. However, State monitoring staff sampled additional days (1/10-1/11/2005, 11/27/2006, 11/30-12/1/07, 12/3-12/4/2007, 12/6/2007, and 12/11/2007) during inversion episodes in order to better calibrate continuous monitors to the Federal Reference Method (FRM) samplers. All data were reported to the EPA AQS database, and subsequently State staff discussed the design value calculation with EPA Region 10 staff. The regional office staff directed the State to include the additional samples in the design value calculation, a process that biases the 98th percentile to a higher value. Region 10 staff believed that all data, even data that were not substituted for missing data but instead represented additional consecutive sampling days, should be ranked according to value and included in the 98th percentile calculation (without adjustment to the 98th percentile level). The State requests that EPA revisit the Juneau design value to ensure that it has been properly calculated with respect to the national ambient air quality standard. Presented below is a detailed description of Juneau sampling data, why additional data were collected, and why some of the data need to be omitted from the design value calculations.

$PM_{2.5}$ design values are calculated using the 98th percentile assuming an every third or sixth day sampling schedule. The creditable number of days determines which ranking value will be the design value. In the case of 1-in-6-day sampling with 85% data capture, the 98th percentile value would be the 2nd highest value. This is also the case with 1-in-3-day sampling having minimum data capture (75% to 82%). For 1-in-3-day sampling with data capture greater than 82%, the design value equals the 3rd highest value for the year. Adding additional data does not alter the creditable number of days, as this number is based on a sampling frequency. However, by counting all values—especially elevated values collected on consecutive days during an inversion episode—the annual design values no longer accurately represent the 98th percentile.

The FRM at the Floyd Dryden site in the Mendenhall Valley of Juneau (AQS ID: 02-110-0004-88101-1) typically measures very low $PM_{2.5}$ concentrations. The average 24-hour concentration for the years from 2004 to 2007 was 7.2 $\mu g/m^3$. From January 2004 through January 2006, the site housed a Met One BAM. The BAM was de-installed to help with monitoring the eruptions of St Augustine January through March 2006. In September 2006, a Thermo Fischer Scientific TEOM was installed at Floyd Dryden. Between October and December of 2007, a BAM was operating as part of a two-month inter-sampler comparative study. To effectively establish a correlation between the FRM and the continuous analyzers, the operator was directed to collect samples over the full range of the measurement scale, if possible. This effort emphasized days when concentrations were expected to be higher than normal. During the majority of the year, the low values bias correlations between the FRM and the continuous sampler. For a meaningful comparison between the sampling methods, sample values over the full range of the instrument scales are needed. Due to the lack of a State-owned data acquisition system, the DEC has used the AQS database as the main data repository. All valid data are recorded to AQS.

Empirically, $PM_{2.5}$ levels increase at the Floyd Dryden site during cold windless winter conditions when inversions set up and stagnant air is trapped in the Valley. The majority

of the increase in $PM_{2.5}$ levels is due to the use of wood stoves to augment heating by a small number of Valley residents. (In the past, Juneau was designated nonattainment for PM_{10} due to wood smoke, and a wood stove ban in the Mendenhall Valley has been effective in controlling the problem.) In 2005, weather conditions indicated the occurrence of an inversion event with potential for elevated PM levels. On January 10, 2005, the FRM sampler was set up to run on the 1-in-3-day national monitoring schedule. The operator **sampled daily for the next three consecutive days** and recorded an exceedance on January 12, 2005. On the next scheduled run day, January 13, 2005, the concentrations had decreased to 20.7 $\mu g/m^3$. Table 3 summarizes this sampling schedule and recorded values. Without the additional sampling, the exceedance on January 12, 2005, would have been missed. ADEC contends that although five consecutive days were sampled, only the two run days, as defined by the national monitoring schedule, should count in calculating the annual design value.

Table 3
2005 Juneau Sampling Schedule

Date	$PM_{2.5}$ Concentration ($\mu g/m^3$)	Comment
20050107	23.5	**scheduled run**
20050110	8.7	**scheduled run**
20050111	15	additional sample
20050112	45.1	additional sample
20050113	20.7	**scheduled run**
20050116	28.2	**scheduled run**
20050119	6.1	**scheduled run**

In 2006, the sampling schedule switched to 1-in-6-days during the winter. As listed in Table 4, the scheduled run days were Nov 13, 19, and 25 and December 1 and 7. Due to instrument problems, no sample was collected on November 19, 2006. As the weather conditions set up for a winter-time inversion, the site operator collected additional samples on November 23 and November 27, 2006, along with the scheduled run days on November 25, and December 1, 2006. As the sample on November 23, 2006, can be considered a make-up sample for the missed scheduled day on November 19, 2006, the State does not contest the 2006 design value.

Table 4 2006 Juneau Sampling Schedule		
Date	$PM_{2.5}$ concentration ($\mu g/m^3$)	Comment
20061113	5.0	**scheduled run**
20061119	not sampled	**scheduled run**
20061123	36.7	make-up run for 11/19/08
20061125	27.9	**scheduled run**
20061127	48.5	additional sample
20061201	17.3	**scheduled run**
20061207	3.3	**scheduled run**

In 2007, eight consecutive days around an inversion event were again sampled, as listed in Table 5. Scheduled samples were collected on November 26 and 29, and December 2, 5, 8, and 11. Additional samples were collected on November 30, and December 1, 3, 4, and 6. The scheduled sample on December 8 was not collected. The samples from December 4-6 all show exceedances of the standard. The December 6 value will be used to substitute for the missed December 8 sample day, but the December 4 sample should not be counted towards the design value calculation.

Table 5 2007 Juneau Sampling Schedule		
Date	$PM_{2.5}$ concentration ($\mu g/m^3$)	Comment
20071126	4.0	**scheduled run**
20071129	21.8	**scheduled run**
20071130	17.8	additional sample
20071201	20.0	additional sample
20071202	2.7	**scheduled run**
20071203	7	additional sample
20071204	39.6	additional sample
20071205	46.2	**scheduled run**
20071206	45.9	additional sample, make-up run for 12/8/07
20071208	not sampled	**scheduled run**
20071211	4.7	**scheduled run**

The State suggests calculating the design values as follows. For 2005, based on the creditable number of days (for 1-in-6 sampling), use the 2nd highest value, after omitting

the extra sample on January 12, 2005. This would result in a 2005 design value of 34.5 $\mu g/m^3$. The 2006 value remains unchanged at 36.7$\mu g/m^3$. The new design value for 2007 would be the 3rd highest data point (1-in-3 sampling), which is 25.8 $\mu g/m^3$, after omitting the value from December 4, 2007. The average of 34.5$\mu g/m^3$, 36.7$\mu g/m^3$, and 25.8 $\mu g/m^3$ for the three years results in an overall design value of 32.3 $\mu g/m^3$.

In a conversation with Neil Frank (Senior Advisor EPA/OAR/OAQPS/AQAD) during the recent AQS conference in Milwaukee (August 2008), Barbara Trost (Acting Air Monitoring Program Manager, DEC/AQ) explained the State's concern and objection to how the design values for the Floyd Dryden site in Juneau had been calculated. Mr. Frank indicated that consecutive sampling days should not be included in the design value calculation. Given that Mr. Frank believed that the calculation of the Juneau design value may be flawed and considering the information provided above, the State respectfully requests that EPA review and revisit the Juneau design value to ensure that it has been properly calculated with respect to the national ambient air quality standard.

In addition to the re-verification of the 2005–2007 24-hour $PM_{2.5}$ design value, the State also requests that EPA calculate the 2006–2008 design value prior to finalizing Juneau as a nonattainment area. The 2008 monitoring data will be available by February 2009. With recent changes to the enforceable wood smoke control program in the Mendenhall Valley, it is likely that the monitoring data from the 2006–2008 period will have a design value lower than the 24-hour ambient health standard.

Other Juneau $PM_{2.5}$ Monitoring Sites – In the past, $PM_{2.5}$ FRM monitoring was conducted at two sites within the Lemon Creek Valley area of Juneau. One site was located on the Lemon Creek valley floor and the other site was located in the Mountainside Estates subdivision along the hillside. The intent was to investigate if the valley adjacent to the Mendenhall Valley exhibited a similar pattern with regards to fine particulate pollution. These two sites were in operation for periods between 1999 and 2003. The hillside site at Mountainside Estates never saw any concentrations approaching the 24-hour $PM_{2.5}$ standard. The other site, located on the valley floor, did see increased concentrations on an episodic basis. However, in the three years of monitoring at the site on the valley floor, the data did not show a design value in violation of the 24-hour $PM_{2.5}$ ambient air quality standard. The monitoring data from these sites are stored and available in the EPA AQS database.

Mendenhall Valley PM_{10} to $PM_{2.5}$ Comparison – The Mendenhall Valley was found to be in nonattainment of the 24-hour PM_{10} health standard during the 1980s. The primary pollution source of concern during winter months was wood smoke from residential heating. Table 6 compares PM_{10} concentrations to $PM_{2.5}$ concentrations during the winter months. It clearly shows that most of the PM_{10} measured is actually the fine fraction of $PM_{2.5}$. Combustion sources have been and continue to be the sources causing particulate pollution during Juneau winter months. This correlation does not hold true in the spring months (March–June) when dust from road sanding can be lifted into the air, increasing concentrations of PM_{10}.

Summary – Monitoring data were presented for two areas: the Mendenhall Valley, the largest residential area of Juneau; and the Lemon Creek Valley, a smaller area with a mixture of commercial and residential facilities. Between 2005–2007, the State expanded the sampling schedule of the Mendenhall Valley's Floyd Dryden $PM_{2.5}$ monitor to obtain data during high concentration episodes for use in calibrating continuous monitors to FRM samplers. All of the additional data were reported to the EPA AQS database. The inclusion of the additional data biased the calculation of the design value for Juneau. Since some of the additional data are needed to fill gaps on days when normal sampling did not occur, the State has documented which data should be removed from the AQS database. It appears to the State that the removal of these data produces a design value that does not exceed the ambient $PM_{2.5}$ standard. Therefore, the State respectfully requests that EPA verify which data should be removed from the AQS database and confirm the impact on the design value calculation. A comparison of $PM_{2.5}$ and PM_{10} monitoring data collected in the Mendenhall Valley shows little difference during winter months, which indicates that there is little or no fugitive dust contribution and that combustion is the dominant source of particulate. A review of $PM_{2.5}$ monitoring data collected in Lemon Creek between 1999–2003 showed the resulting design value did not exceed the 24-hour $PM_{2.5}$ standard.

Table 6 PM_{10} and $PM_{2.5}$ Concentrations at Floyd Dryden Monitoring Site			
Date	PM_{10} High-Vol Actual ($\mu g/m^3$)	Partisol $PM_{2.5}$ ($\mu g/m^3$)	Difference
1st Quarter 2008 – Floyd Dryden Monitoring Site			
1/1/2008	8.7	7.8	0.9
1/7/2008	9.0	8.3	0.7
1/13/2008	4.1	2.4	1.7
1/19/2008	13.6	11.6	2.0
1/25/2008	4.4	4.1	0.3
1/31/2008	30.9	30.2	0.7
2/6/2008	7.3	5.9	1.4
2/8/2008	26.3	21.4	4.9
2/12/2008	6.5	5.7	0.8
2/18/2008			
2/24/2008	10.9	10.3	0.6
3/1/2008			0.0
3/7/2008	0.9	0.9	0.0
3/13/2008	4.0	4.6	-0.6
3/19/2008		1.5	
3/21/2008	2.0	10.1	0.5
3/25/2008	17.4	7.0	7.3
3/31/2008	7.2		0.2
2nd Quarter2008 – Floyd Dryden Monitoring Site			
4/19/2008	19.6	12.0	7.6
4/24/2008	19.7	13.1	6.6
4/27/2008	1.8	1.8	0.0
4/30/2008	4.8		
5/6/2008			
5/7/2008	8.9	6.3	2.6
5/12/2008	1.2	1.3	-0.1
5/18/2008			
5/19/2008	7.2	4.9	2.3
5/24/2008			
5/25/2008	16.0	10.4	5.6
5/30/2008	13.7	7.3	6.4
6/5/2008	3.0	1.7	1.3
6/11/2008	7.1	6.5	0.6
6/17/2008	6.8		
6/23/2008			
6/26/2008	3.6	0.0	3.6

Factor 3: Population Density and Degree of Urbanization

According to the U.S. Census, the borough covers an area of 3,255 square miles (2,716.7 on land and 538.3 on water), which is larger than Rhode Island or Delaware. Large portions of the land area, however, are unpopulated because they are made up of steep mountains and glaciers. The result is that the populated area is confined to a narrow range of coastal land that is of low density relative to other areas of the country. Figures 3-7 present a detailed display of population density, based on data collected in the 2000 Census, for Juneau and its communities. As can be seen in the summary chart, Juneau is divided into four areas:

- *Lena Cove to Eagle Beach* – This is a low density area in the northwest that is largely isolated from the rest of Juneau by terrain and water. The number of people per acre ranges from 0.01 to 5, the lowest reported in Juneau.

- *Mendenhall Valley & North Douglas* – The Mendenhall Valley, located nine miles to the northwest from downtown Juneau, is the largest residential area in the Juneau. A portion of North Douglas Island located directly across the Gastineau Channel is also included. When combined with North Douglas Island, this area accounts for more than 50% of Juneau's population.[1] The population density for this area never exceeds more than 100 people per acre.

- *Lemon Creek & North Douglas* – Lemon Creek is a smaller valley located to the southeast of the Mendenhall Valley which includes a mixture of residential and commercial facilities. A portion of North Douglas Island is also included. While the population density for this area is predominantly less than 5 people per acre, there are several sites with population density exceeding more than 100 people per acre.

- *Downtown Juneau & Douglas* – Downtown Juneau is located at the base of Mount Juneau directly across the Gastineau Channel from Douglas Island. This area contains the second largest share of Juneau's population and is relatively densely populated, with many areas ranging between 5 and 100 people per acre.

Summary – Despite Juneau's enormous size, the populated areas are limited to four well-defined coastal areas. Three of these areas account for the bulk of Juneau's population. While a few isolated locations exceed a population density of 100 people per acre, most locations have a population density of less than 5 people per acre.

[1] http://www.juneau.org/cddftp/demographics/2001_CBJ_Pop_map.pdf

Figure 3

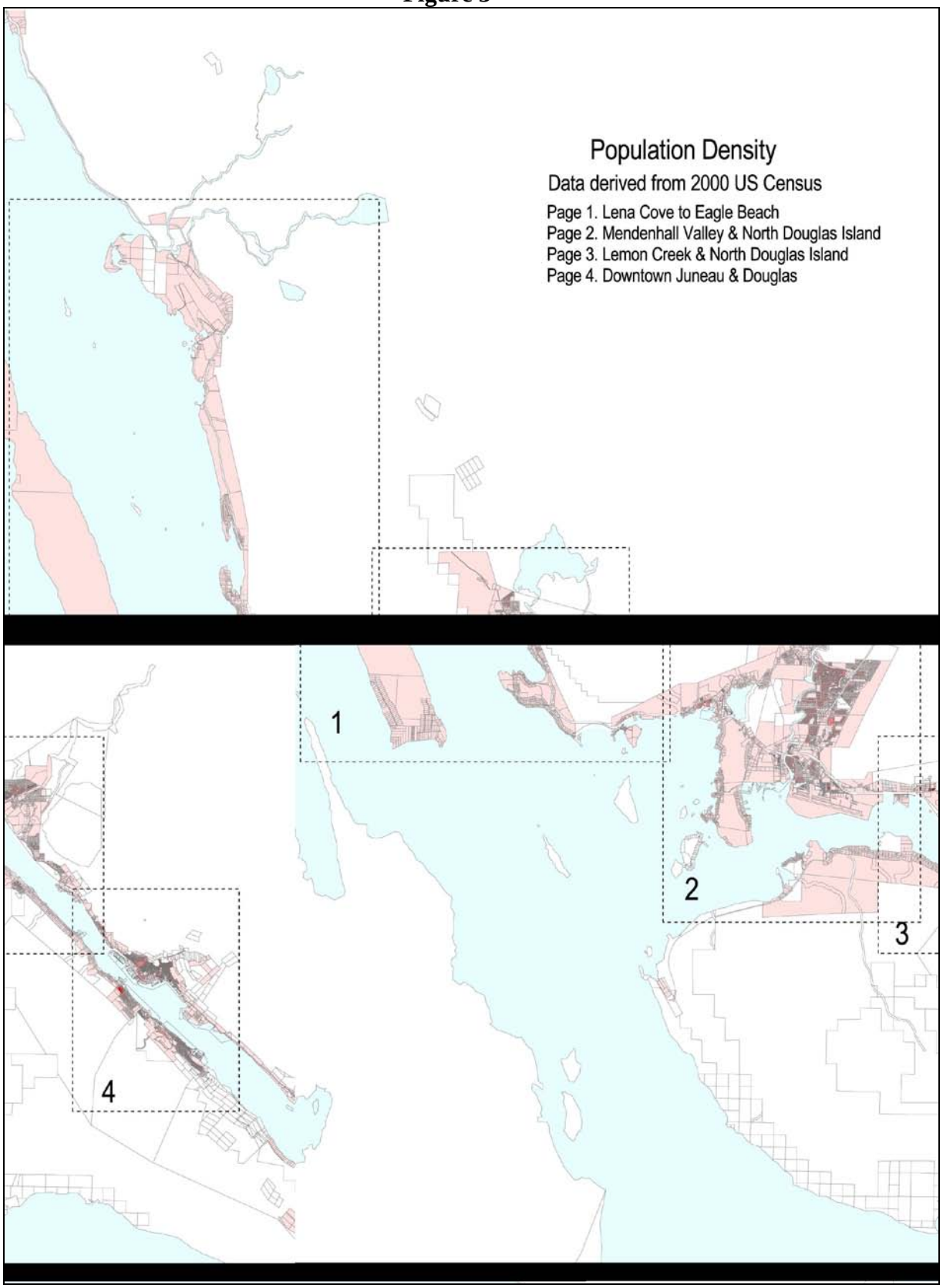

Population Density
Data derived from 2000 US Census
Page 1. Lena Cove to Eagle Beach
Page 2. Mendenhall Valley & North Douglas Island
Page 3. Lemon Creek & North Douglas Island
Page 4. Downtown Juneau & Douglas
1
2
3
4

Figure 4


Lena Cove to Eagle Beach
Eagle Beach
Favorite
Channel
Tee Harbor
Shelter Island
Lena Cove
Population Density
Persons per acre
0.01 - 5
5.01 - 15
15.01 - 40
40.01 - 100
> 100

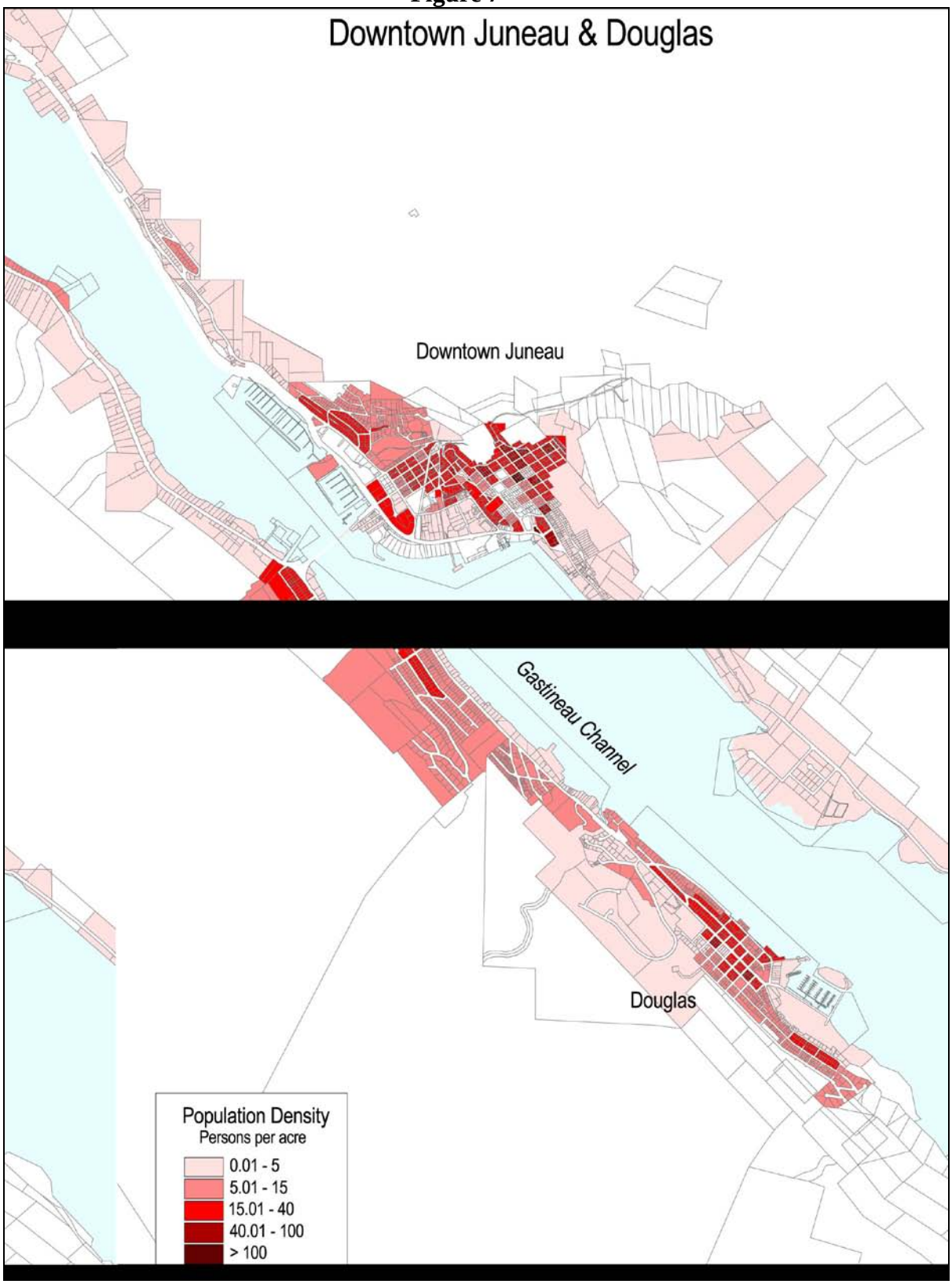
Figure 5


Mendenhall Valley & North Douglas
Auke Lake
Auke Bay
Mendenhall Valley
Juneau International Airport
Population Density
Persons per acre
0.01 - 5
5.01 - 15
15.01 - 40
40.01 - 100
> 100

Figure 6


Lemon Creek & North Douglas
Lemon Creek
Gastineau Channel
Douglas Island
Population Density
Persons per acre
0.01 - 5
5.01 - 15
15.01 - 40
40.01 - 100
> 100

Figure 7


Downtown Juneau & Douglas
Downtown Juneau
Gastineau Channel
Douglas
Population Density
Persons per acre
0.01 - 5
5.01 - 15
15.01 - 40
40.01 - 100
> 100

Factor 4: Traffic and Commuting Patterns

As shown in the above figures and discussed further in the section addressing geography/topography, the populated areas of Juneau are located on a narrow coastal plane that is surrounded by water, tall mountains, and glaciers. The result is that Juneau is land-locked—the only access from the outside is by ship or plane. To facilitate access, Juneau is connected to the Alaska Marine Highway System, which means that it has scheduled ferry service. Travel times on the ferry range from roughly one to four hours, although longer trips are available. Practically, this means that Juneau travel activity is not impacted by commutes from outside areas. Further evidence of this conclusion can be seen in the counts of vehicles disembarking from the ferries serving Juneau.[2] Using Alaska Marine Highway Statistics, a total of 17,281 vehicles entered and 17,486 vehicles left Juneau in 2005. This translates to fewer than 100 vehicles per day entering and leaving Juneau on average. During the winter months, this value can be reduced by more than 50%. Clearly, vehicles commuting into or out of Juneau are not having a significant impact on local air quality.

Within Juneau, the principal commute patterns are between Auke Bay, Mendenhall Valley, Lemon Creek, and downtown along Egan Drive; and between Douglas Island and downtown. Since the Mendenhall Valley is approximately 9 miles from downtown Juneau and it has the largest share of population, the commute along Egan Drive is responsible for a large portion of the travel generated within the community. As noted in the meteorology discussion, emissions produced along Egan Drive, which parallels the Gastineau Channel, are not transported into the Mendenhall Valley prior to or during exceedance conditions.

Summary – Juneau is isolated from outside communities, the only access is by ship or plane. Vehicle counts show that fewer than 100 vehicles entered and left Juneau on an average day in 2005. During winter months, when $PM_{2.5}$ exceedances are a concern, this number can be reduced by more than 50%. Emissions from external commutes are not contributing to $PM_{2.5}$ violations in Juneau. In contrast, a significant share of travel is produced by commutes between the Mendenhall Valley and downtown Juneau. Emissions from that travel, however, occur primarily outside of the Mendenhall Valley airshed and do not impact concentrations recorded there.

Factor 5: Growth

EPA's technical analysis for Juneau presented information indicating that while the population within the Juneau area had been stable for a period of five years, vehicle miles traveled (VMT) had increased by 62% between 1996 and 2005. Since this information appears contradictory and the VMT estimates presented are undocumented, data were obtained to assess whether the claimed growth in VMT could be correct. Estimates of VMT for Juneau are not readily available because the community is too small to qualify as a metropolitan planning organization (MPO) and therefore does not maintain a travel

[2] http://www.dot.state.ak.us/amhs/info/general/stats/05tvr/ATVR2005.pdf

demand model. The principal insight into travel activity in Juneau comes from traffic count data. The Alaska Department of Transportation and Public Facilities (ADOT&PF) maintains a network of traffic counting stations within Juneau and provided a summary of counts (average annual daily traffic [AADT] counts) for a mixture of high-volume roads in Juneau for the period between 1996 and 2005. The data, summarized in Table 7, show that, contrary to the 62% growth in VMT claimed by EPA, Juneau experienced no growth at all—instead, all roads showed a decline in traffic. Outlined below are the reasons why the stations included within Table 7 are relevant.

- *Egan Drive* – Provides the only link between downtown Juneau and populated areas to the northwest (i.e., Mendenhall Valley, Lemon Creek, etc.). Since there is no other route from downtown to these areas, it captures changes in both commute and work trips and should be highly representative of activity within Juneau.

- *Glacier Highway* – Is a continuation of Egan Drive to the west of the Mendenhall Valley into Auke Bay, Eagle Beach, and Lena Cove. Thus, it captures commute and work trips between these communities and downtown.

- *Douglas Highway* – Runs along the northern edge of Douglas Island. It captures both commute and work trips between Douglas Island and downtown Juneau.

- *Riverside Drive* – Runs the entire length of the populated portion of the Mendenhall Valley with a north-south orientation. It captures traffic activity within the largest populated area within Juneau. It also provides insight into vehicle activity impacting concentrations recorded at the Floyd Dryden monitoring site.

Table 7
Juneau Annual Average Daily Traffic Counts 1996–2005

Station #	Station Description	RU/FC[a]	CDS Route	Mile Post	AADT by Year										AADT % change (1996 to 2005)
					2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	
60333000	Egan Drive	U/OPA	296000	2.579	23,341	23,863	23,902	23,637	23,514	23,681	23,785	24,433	23,992	23,947	-2.531
60311000	Glacier Highway	U/MART	296000	14.072	2,028	2,089	2,015	2,019	2,007	2,005	2,333	2,487	2,419	2,454	-17.359
60348000	Douglas Highway	U/MART	296110	1.036	8,528	8,638	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-1.273
60500370	Riverside Drive	U/COL	296500	1.471	4,522	4,613	4,563	4,615	4,617	4,641	4,630	4,727	4,914	5,036	-10.207

[a] U=Urban (in Juneau's case "small"); OPA = Other Principle Arterial – Other; MART = Minor, Arterial; COL = Collector

To place EPA's estimate of travel growth in perspective, several calculations were performed. First, the 2005 estimate of 207,000 miles was adjusted to represent baseline travel in 1996, which, after correcting for errors[3] and the projected 62% increase, is 127.8 million miles/year (350,076 miles per day). Next, the station-specific % change values presented in Table 7 were weighted in proportion to the miles of roadway represented by each count station. A summary of that calculation is presented in Table 8. Combining the weighted average 9.7% reduction in traffic activity with the 1996 estimate of travel produces an annual estimate of 115.4 million miles per year in 2005 (316,254 miles per day).

Table 8
Weighted Average Juneau AADT Growth 1996 – 2005
(% change)

Facility Type	Length in Miles[a]	% Share	% Change in AADT
Collector	62.4	19.7	-10.207
Minor Arterial	38.2	12.1	-9.316
Principal Arterial	17.3	5.5	-2.531
Local	198.2	62.7	-10.207[b]
Total	316.1	100.0	-9.677

[a] http://www.dec.state.ak.us/air/anpms/as/doc/JAN06_Draft_Juneau_EI_&_Apps.pdf
[b] Since no values were collected for local roads, they were assumed to be represented by measurements on the nearest road category (i.e., collectors).

The local traffic count data demonstrate that, contrary to EPA's estimated 62% increase in travel between 1996–2005, travel activity within Juneau actually declined by almost 10% over the same timeframe. This in turn demonstrates that motor vehicle emissions in Juneau have declined over the past decade because of reductions in VMT and the benefits of a cleaner vehicle fleet (due to the replacement of older dirtier vehicles with newer vehicles meeting more stringent emissions standards).

Another insight into growth in Juneau comes from a review of population changes over the past decade. The stability of Juneau's population is illustrated below in Table 9. It shows that between 1996 and 2007, the population had increased by a total of 3.7% (an annualized rate of growth of 0.3%/year). The annual change is quite volatile, with year-to-year changes frequently changing from positive to negative. These data support the finding that travel activity has not grown by 62%, but instead actually declined between 1996 and 2005.

[3] The VMT estimate of 207,000 presented in Table 5 of the Juneau analysis in Attachment 1 of EPA's August 18, 2008 letter to Gov. Palin, is an annual estimate of travel. Using this value, the daily estimate of travel in Juneau would be 567 miles per day. Discussions with Region 10 staff confirmed the error and determined that it was off by a factor of 1,000. The adjusted value of 207 million miles was used in calculating the baseline 1996 value.

Table 9 Trends in Juneau Population between 1996 and 2007		
Year[a]	Population	Year-to-Year Change Relative to 1996
1996	29,230	-
1997	29,713	1.7%
1998	30,021	1.1%
1999	30,189	0.6%
2000[b]	30,711	1.8%
2001	30,453	-0.9%
2002	30,997	1.9%
2003	30,294	-2.4%
2004	31,122	2.8%
2005	31,225	0.4%
2006	30,811	-1.4%
2007	30,305	-1.7%

[a] Alaska Department of Labor and Workforce Development
[b] U.S. Census Bureau

Summary – The data presented above show that EPA's estimate of travel growth is incorrect. Instead of growing, the traffic count data indicate that travel activity in Juneau declined by almost 10% over the past decade. Population data show that growth is almost non-existent and support this finding. Since emissions changes over time are proportional to the combination of growth and control factors, this means that emissions in Juneau attributable to vehicles have been declining over time and that new controls on mobile sources will not be required to bring Juneau into attainment. This also means the nonattainment area does not have to be expanded to capture mobiles sources as these emissions are already in decline. The lack of growth suggests that trends observed in $PM_{2.5}$ concentrations over time in Juneau are valid (i.e., the standard has not been exceeded) and are unlikely to escalate over time.

Factor 6: Meteorology

The Federal Reference Method (FRM) $PM_{2.5}$ monitor located at the Floyd Dryden Middle School in Juneau, Alaska (Figure 8) measured exceedances of the current daily $PM_{2.5}$ standard (35 µg/m^3) on at least one day during three periods between January 2005 and December 2007:

- January 10, 2005 – January 19, 2005;
- November 20 – December 2, 2006; and
- December 2 – December 9, 2007.

The concentrations recorded at the Floyd Dryden Middle School are not representative of conditions throughout Juneau—instead, they represent conditions within an isolated airshed located nine miles from downtown Juneau in the Mendenhall Valley. That airshed is the largest residential area in Juneau and is bounded by sharply rising mountains on the east and west and the Mendenhall Glacier to the north. This topography, combined with a low winter sun angle that limits solar heating, supports the development of relatively severe temperature inversions. These inversions trap emissions close to the Valley floor and in the past led to severe concentrations of airborne particulate matter that exceeded state and federal standards for $PM_{10.}$

To assess whether emissions can be transported from any of the other populated areas within Juneau into the Mendenhall Valley, surface meteorological data were obtained from four sites distributed through the region during the periods when exceedances occurred. The location of each site is displayed in Figure 8; a brief description of each follows.

- *Juneau Forecast Office* – Operated by the local National Weather Service (NWS); the data record began in 1999. This site is located in the northern portion of the Mendenhall Valley and documents meteorology within the area adjacent to the $PM_{2.5}$ monitor.

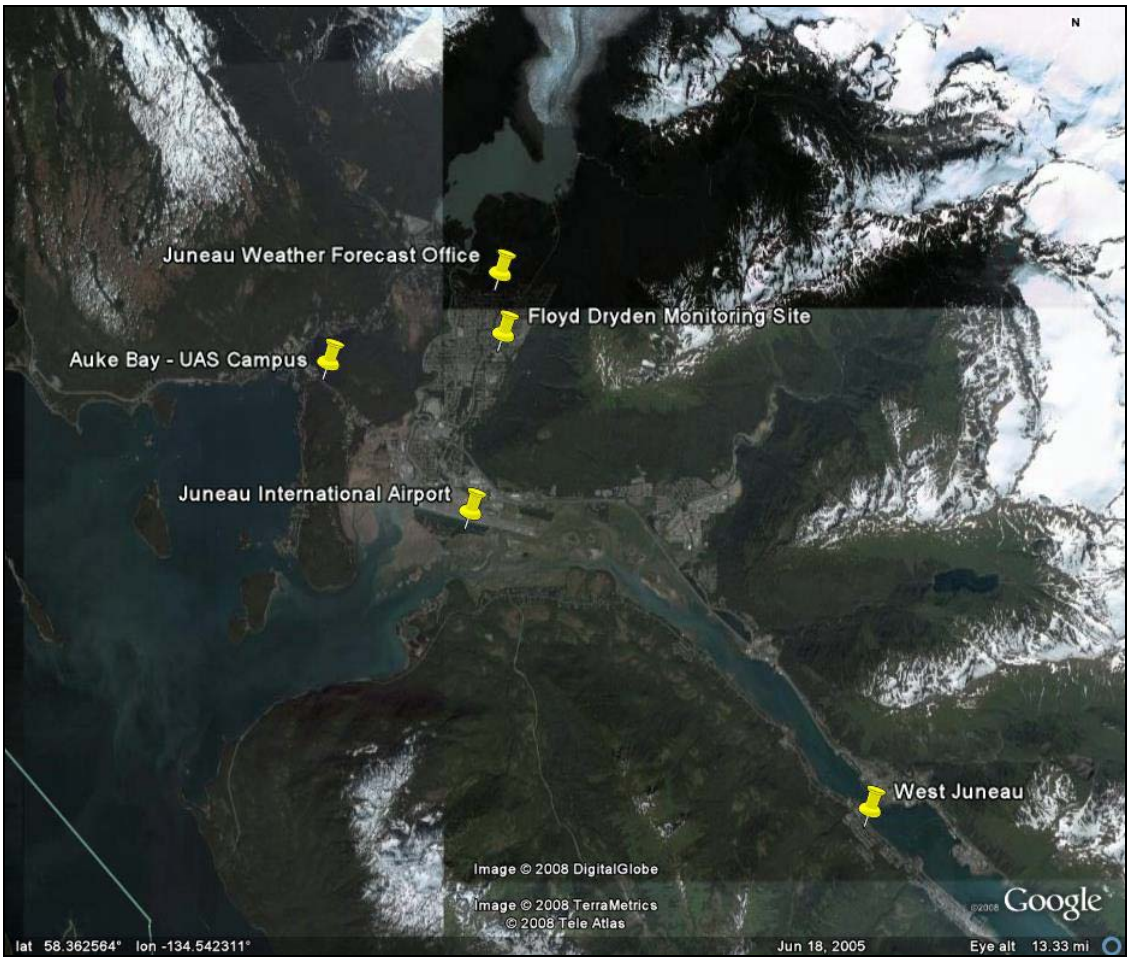
- *Juneau International Airport* – Operated by the NWS/Federal Aviation Administration (FAA); the data record began in 1943. This site is located at the mouth of the Mendenhall Valley and documents whether the transport of any emissions from North Douglas Island, Lemon Creek, or downtown Juneau into the Valley occurred.

- *Auke Bay – UAS Campus* – Operated by the University of Alaska Southeast; the data record began in 1963. This site is located to the west of the Mendenhall Valley and documents whether emissions from Auke Bay, the location of standby generators and a populated area, impacted the $PM_{2.5}$ monitor on days preceding and during periods when exceedances occurred.

- *West Juneau* – Operated by a local resident; the data record began in 2003. This site documents meteorology within the Gastineau Channel, a waterway oriented from the southeast to the northwest that is bounded by sharply rising mountains and populated areas, including downtown Juneau. Data from this site document the direction and speed of surface winds prior to and during exceedances.

Prior to the highest $PM_{2.5}$ day during each period, winds at the Juneau International Airport (Airport), located at the mouth of the Mendenhall Valley, and the Juneau Weather Forecast Office (WFO), located deep within the Mendenhall Valley, showed predominantly easterly winds, resulting in wind flow along the Gastineau Channel and over a very steep mountain ridge, respectively, for the two locations. This flow regime could not have produced transport of particulate matter from one area to another due to the low $PM_{2.5}$ concentrations observed during the easterly wind periods and the

Figure 8
Map of Meteorological and $PM_{2.5}$ Monitoring Sites



dispersion of pollutants by the winds. In addition, only a couple of isolated measurements at either the Airport or the WFO prior to or during a high $PM_{2.5}$ pollution event had winds out of the south, which is the only way for air within the Gastineau Channel to flow into the Mendenhall Valley; however, there were just as many measurements with wind from the north, canceling any effect of the southerly air flow and further proving that the Mendenhall Valley did not receive air from neighboring communities. On the high pollution event days, winds at the WFO, approximately 0.75 miles from the $PM_{2.5}$ monitoring site, were northwesterly, northeasterly, or calm, confirming that no pollution transport from the south occurred. As a result, during all three $PM_{2.5}$ events, the pollution measured in the Mendenhall Valley appeared to be completely generated from local emissions within the Valley and the extent of the nonattainment area should be limited to the Mendenhall Valley itself.

A description of the meteorology during each of the three high $PM_{2.5}$ periods follows.

Event 1: January 12, 2005 – The 24-hour average $PM_{2.5}$ concentration in the Mendenhall Valley increased from 15 µg/m^3 on January 10 to 45.1 µg/m^3 on January 12, and then it decreased to 20.7 µg/m^3 on January 13. The 10th and 11th were characterized by gradually decreasing surface temperatures at all meteorological stations and east-northeasterly winds around 10 miles per hour (mph), with higher gusts, at the Airport and WFO; calm winds at Auke Bay; and variable winds around 5-10 mph at West Juneau. However, by the evening of the 11th, the winds subsided to less than 5 mph at all locations and the temperatures dropped from around 25° Fahrenheit (F) on the 10th to below 0°F on the morning of January 12. The drop in temperatures resulted in an increased use of heating by residents and allowed a shallow temperature inversion to form, trapping emissions near the surface and allowing $PM_{2.5}$ concentrations to rapidly rise from January 11 to January 12.

On January 12, winds at the WFO, the Airport, and Auke Bay were mostly calm to light out of the northwest-to-north-to-northeast. No directions were conducive to the transport of air into the Mendenhall Valley from any outside areas; therefore, the emissions that led to the high daily $PM_{2.5}$ concentration were locally generated. At the same time, winds in West Juneau, across the Gastineau Channel from downtown Juneau, were variable, with a tendency to be from the southwest, likely due to local terrain flow on Douglas Island. This flow kept emissions from downtown Juneau within the city due to steep terrain on its northern, northeastern, and eastern sides, further supporting the conclusion that pollution within the Mendenhall Valley did not come from external sources, namely those in downtown Juneau.

A summary of the meteorological data at the Airport and $PM_{2.5}$ values from Floyd Dryden is shown in Figure 9. Figure 10 provides a similar summary from the Juneau Forecast Office, located in the Mendenhall Valley, during the same time period. Figure 11 shows data for the Auke Bay – UAS Campus site, also during the same period.

Figure 9
Meteorological Data from the Juneau International Airport and $PM_{2.5}$ Data for the January 12, 2005 Exceedance

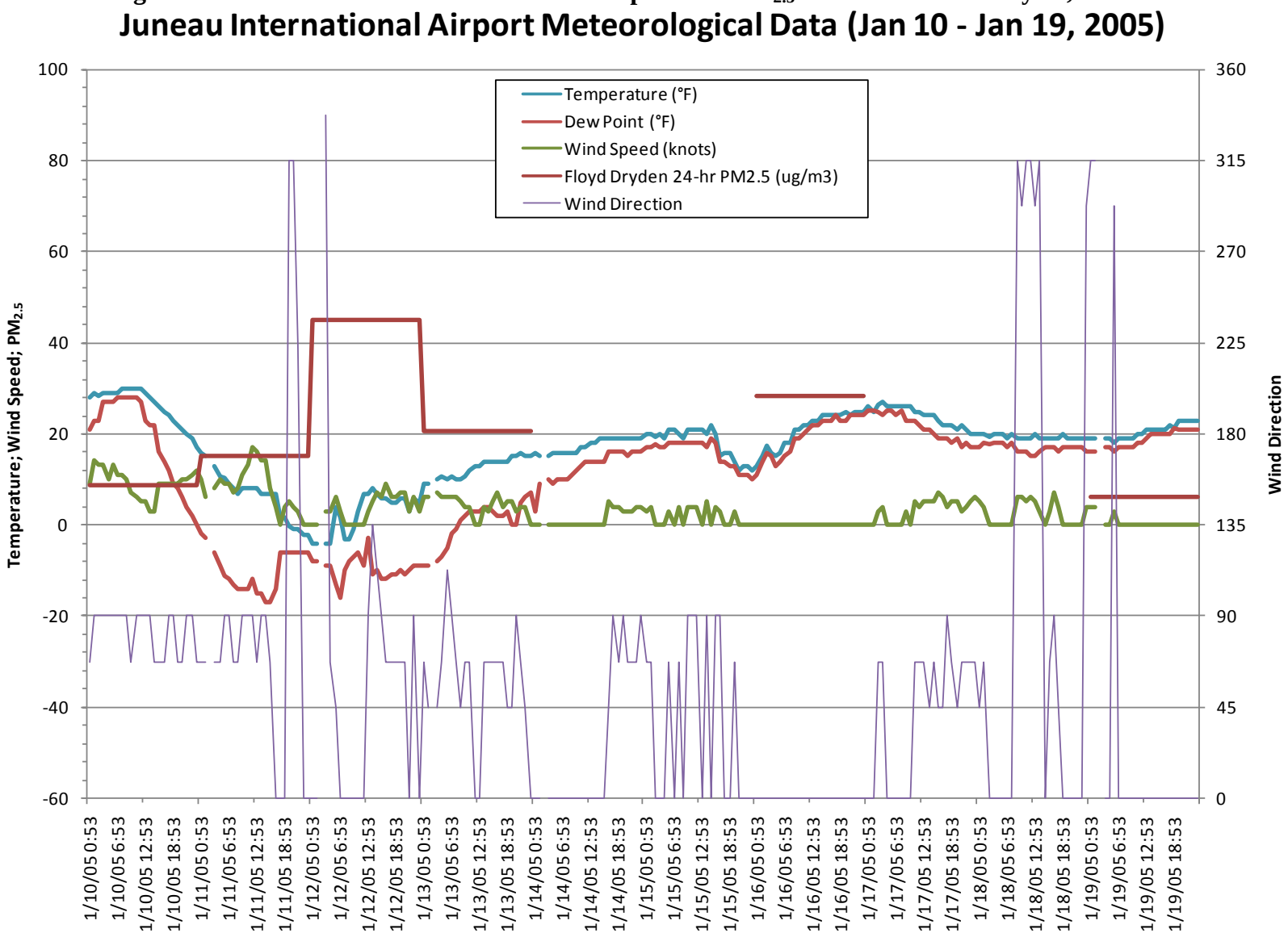


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Figure 10
Meteorological Data from the Juneau WFO and $PM_{2.5}$ Data for the January 12, 2005 Exceedance

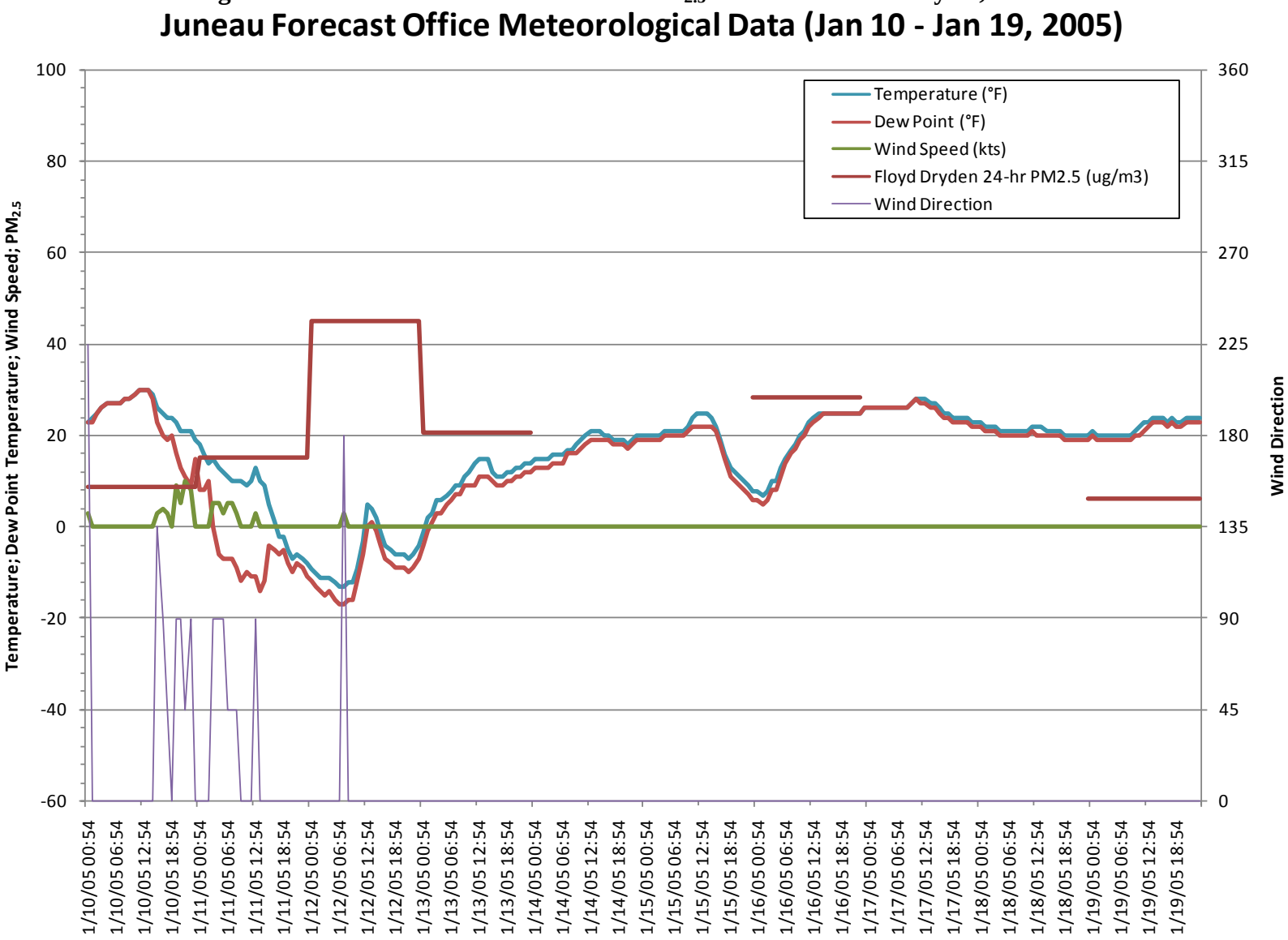
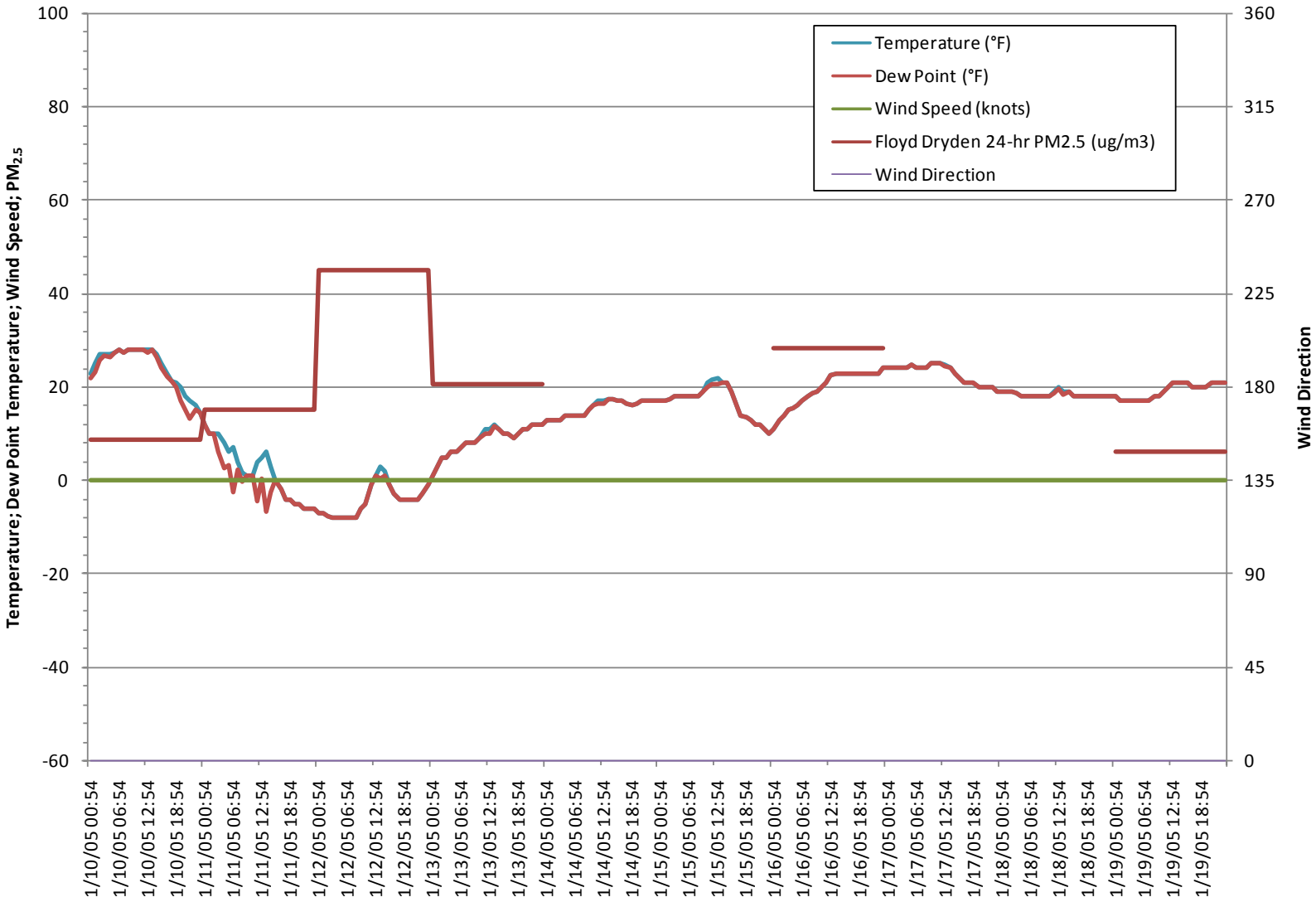


Figure 11
Meteorological Data from Auke Bay – UAS Campus and $PM_{2.5}$ Data for the January 12, 2005 Exceedance



Event 2: November 23 & 27, 2006 – The 24-hour average $PM_{2.5}$ concentration in the Mendenhall Valley rapidly rose on November 23 to 36.7 $\mu g/m^3$, then decreased to 27.9 $\mu g/m^3$ by November 25, and increased again to 48.5 $\mu g/m^3$ by November 27 before dropping to 17.3 $\mu g/m^3$ on December 1. The few days prior to the 23rd were characterized by gradually decreasing daytime maximum and nighttime minimum surface temperatures and light to calm winds at all meteorological stations. However, on the afternoon of November 22, the Airport and West Juneau sites reported east-northeasterly winds around 10 miles per hour (mph), with higher gusts, while winds at the WFO and Auke Bay remained calm. The stark contrast in winds between the Gastineau Channel and the Mendenhall Valley confirms that the two areas can experience vastly different wind flow patterns at the same time. By the morning of November 23, the winds subsided to less than 5 mph at all locations and the temperatures dropped from about 20°F on the 22nd to below 0°F. The drop in temperatures resulted in an increased use of heating by residents and allowed a shallow temperature inversion to form, trapping emissions near the surface.

On November 23, winds at the WFO, the Airport, and Auke Bay were calm to light out of the northwest-to-north-to-northeast, all directions that would prevent air flow into the Mendenhall Valley from any outside areas; therefore, the emissions that led to the high daily $PM_{2.5}$ concentration were locally generated. At the same time, winds in West Juneau, just across the Gastineau Channel from downtown Juneau, were variable, with a slight tendency out of the southwest, likely due to local terrain flow on Douglas Island. This flow kept emissions from downtown Juneau within the city due to steep terrain on its northern, northeastern, and eastern sides, further supporting the conclusion that pollution within the Mendenhall Valley did not come from external sources, namely those in downtown Juneau.

During the following three days, November 24–26, temperatures warmed into the teens and winds at the Airport, WFO, and West Juneau sites increased to 5-10 knots, with slightly weaker winds during the late evening each day, while the winds at Auke Bay remained calm. However, the $PM_{2.5}$ concentration only dropped to 27.9 $\mu g/m^3$, which was quite surprising given the strength and duration of the wind. As a result, once the temperature decreased to near 0°F and the winds slowed to around 5 knots out of the east-northeast at the Airport and calm at the WFO on the November 27, the $PM_{2.5}$ concentration rapidly rose again.

Figure 12 summarizes the meteorological data at the Airport and $PM_{2.5}$ values from Floyd Dryden. Figure 13 provides a similar summary from the Juneau Forecast Office, located in the Mendenhall Valley, during the same time period. A graph for Auke Bay during this event was not produced, because, like the January 2005 event, the winds were calm through the entire period.

Figure 12
Meteorological Data from the Juneau International Airport and $PM_{2.5}$ Data for the November 23 & 27, 2006 Exceedances

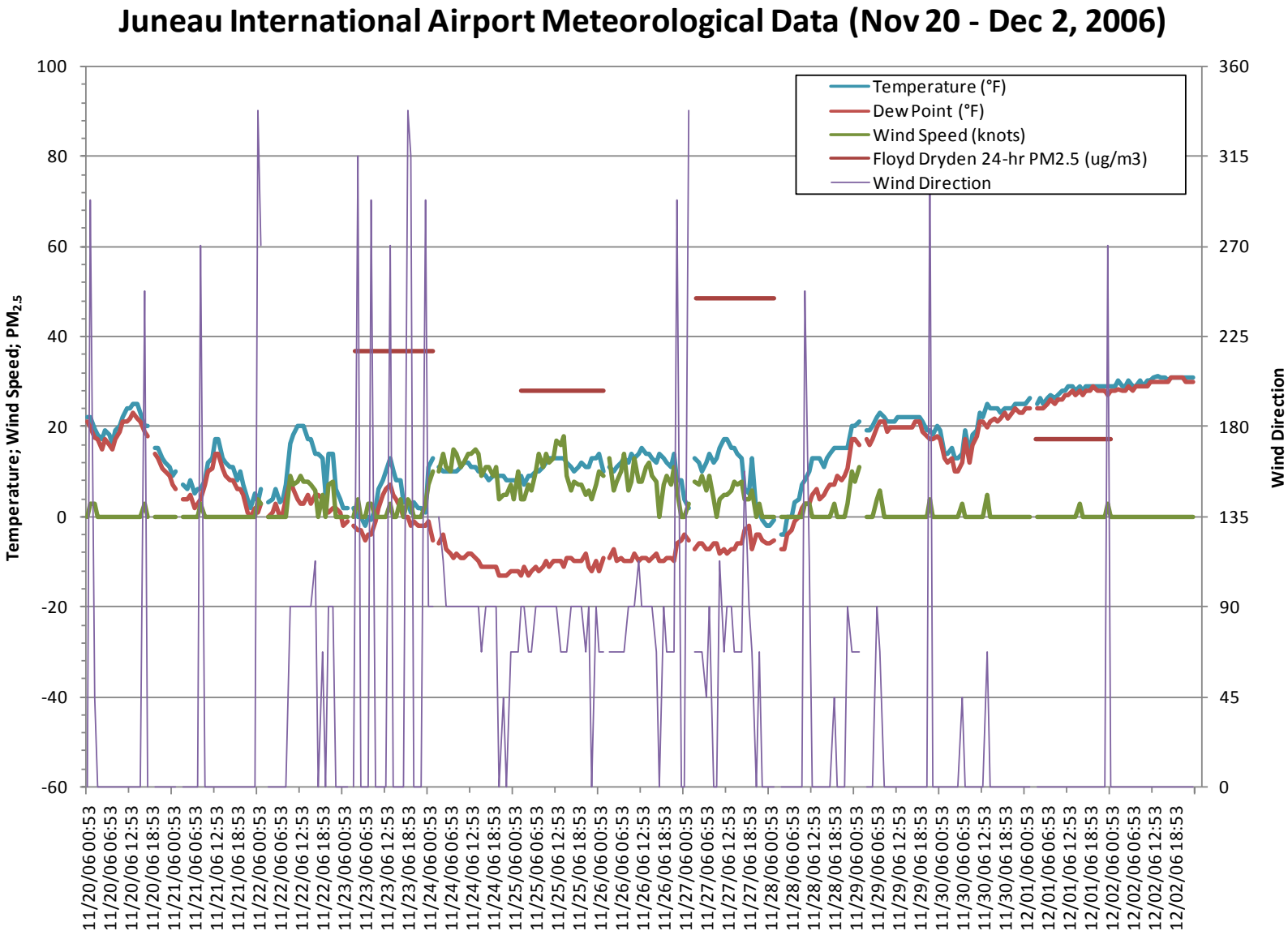
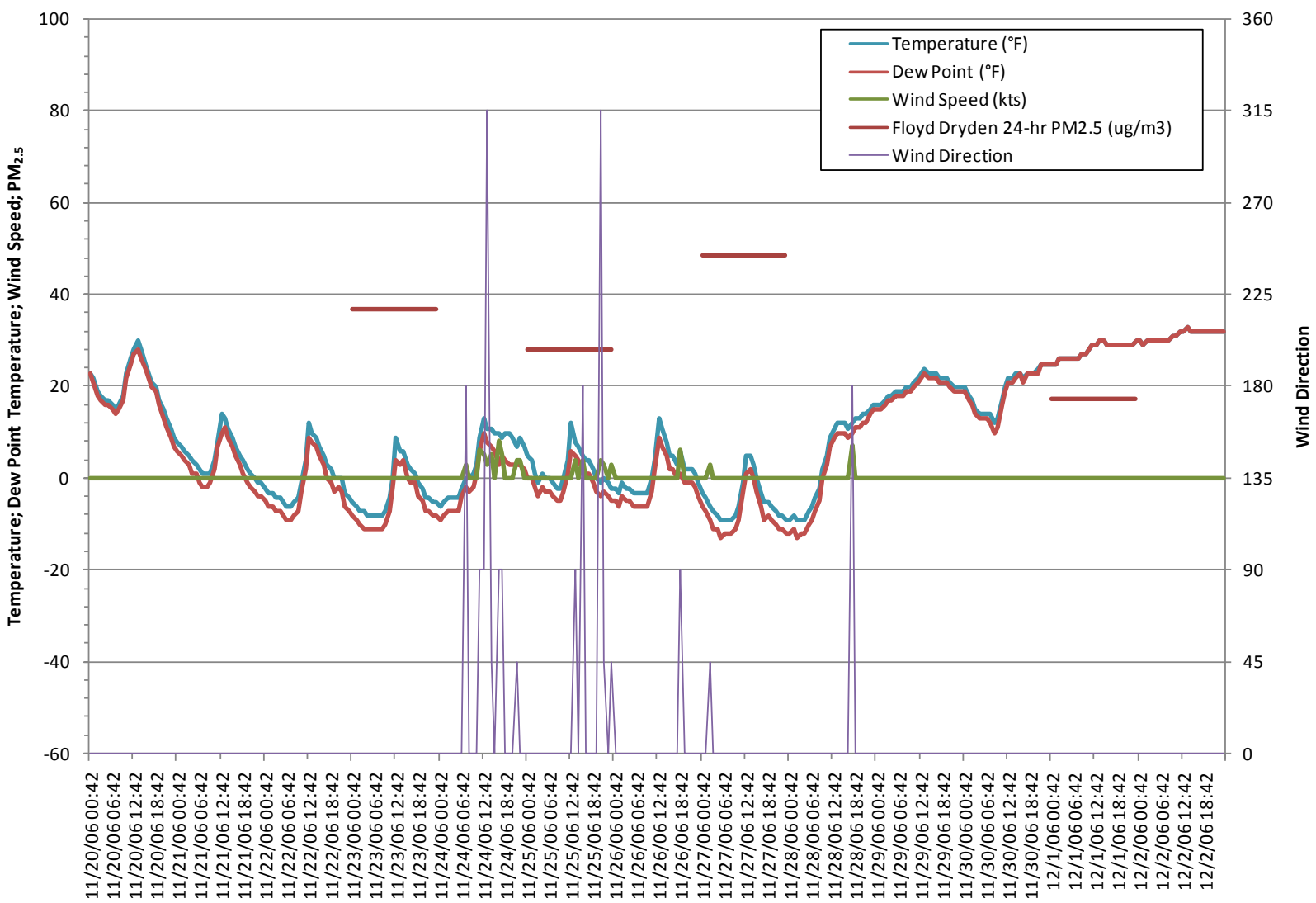


Figure 13
Meteorological Data from the Juneau WFO and $PM_{2.5}$ Data for the November 23 & 27, 2006 Exceedances



Event 3: December 4–6, 2007 – The longest high $PM_{2.5}$ event captured during the past three winters occurred in early December 2007. The 24-hour average $PM_{2.5}$ concentration in the Mendenhall Valley rapidly rose from 7 $\mu g/m^3$ on December 3 to 39.6 $\mu g/m^3$ on December 4, and then it increased further to 46.2 $\mu g/m^3$ on December 5 and remained high at 45.9 $\mu g/m^3$ on December 6, before dropping to 4.7 $\mu g/m^3$ by December 11.

Meteorological conditions leading up to the episode were similar to the other events in 2005 and 2006, in that there were east-northeasterly winds around 10-15 mph at all four meteorological sites for the two days prior to the spike in the $PM_{2.5}$ concentration. The only difference is that Auke Bay also showed only one hour of southwesterly winds, which could have allowed an exchange of air between Auke Bay and the Mendenhall Valley. That hour occurred on the day prior to when the exceedance was recorded. In conjunction with the winds, temperatures decreased from around 25°F on December 2 to within a few degrees above and below 0°F between the four meteorological stations by the morning of December 4. The combination of the subsiding winds and the decreasing temperatures during the night of December 3 resulted in an increase in residential heat use and the formation of a strong, low-level temperature inversion, causing emissions to be trapped near the surface and $PM_{2.5}$ concentrations to quickly rise on December 4. As a result, the $PM_{2.5}$ standard was exceeded. However, unlike the other episodes, winds remained calm in all locations for the next three days and the only factor that caused the pollution to disperse was a gradual rise in temperatures, which eventually broke down the temperature inversion and allowed the atmosphere to mix vertically.

Figure 14 summarizes the meteorological data at the Airport and $PM_{2.5}$ values from Floyd Dryden. Figure 15 provides a similar summary from the Juneau Forecast Office, located in the Mendenhall Valley, during the same time period. Figure 16 shows data for the Auke Bay – UAS Campus site, also during the same period.

Summary – Analysis of the monitoring data shows that transport of emissions from populated areas within Juneau into the Mendenhall Valley did not occur prior to or during episodes when the ambient $PM_{2.5}$ standard was exceeded. The reasons for this finding vary. Generally, it was found that prior to each episode winds were predominantly from the east-northeast, a direction that prevented any transport of emissions into the Valley. It was also found that winds within the Mendenhall Valley were either calm or generally flowed toward the Airport during high $PM_{2.5}$ days, indicating that pollutant transport from areas outside of the Valley could not have occurred. Furthermore, during one episode, it was found that winds at the Airport remained above 5 knots, while those in the Valley were calm, indicating that air flow in the Gastineau Channel can be completely independent from air flow in the Valley.

Figure 14
Meteorological Data from the Juneau International Airport and $PM_{2.5}$ Data for the December 4-6, 2007 Exceedances

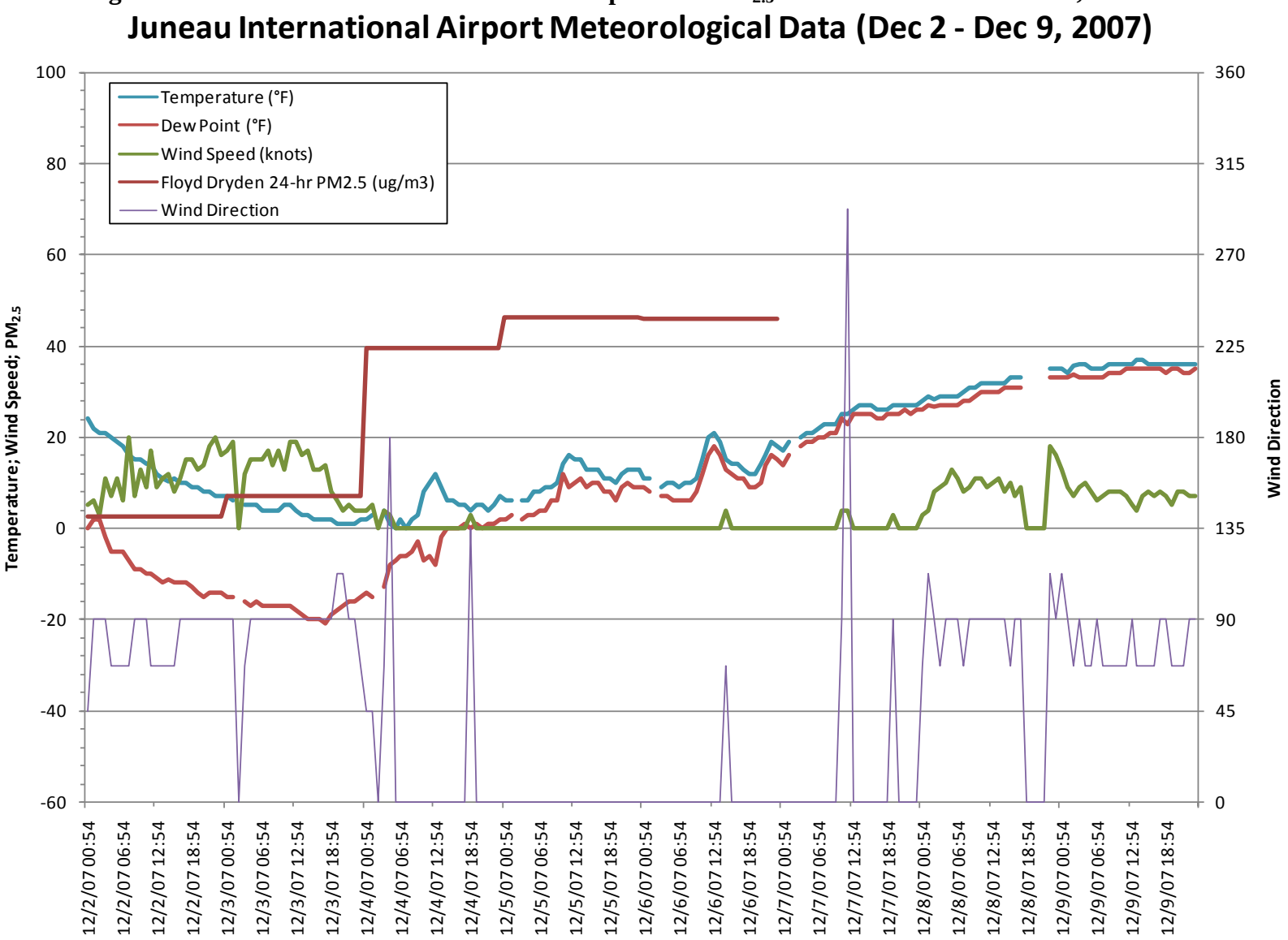


Figure 15
Meteorological Data from the Juneau WFO and $PM_{2.5}$ Data for the December 4-6, 2007 Exceedances

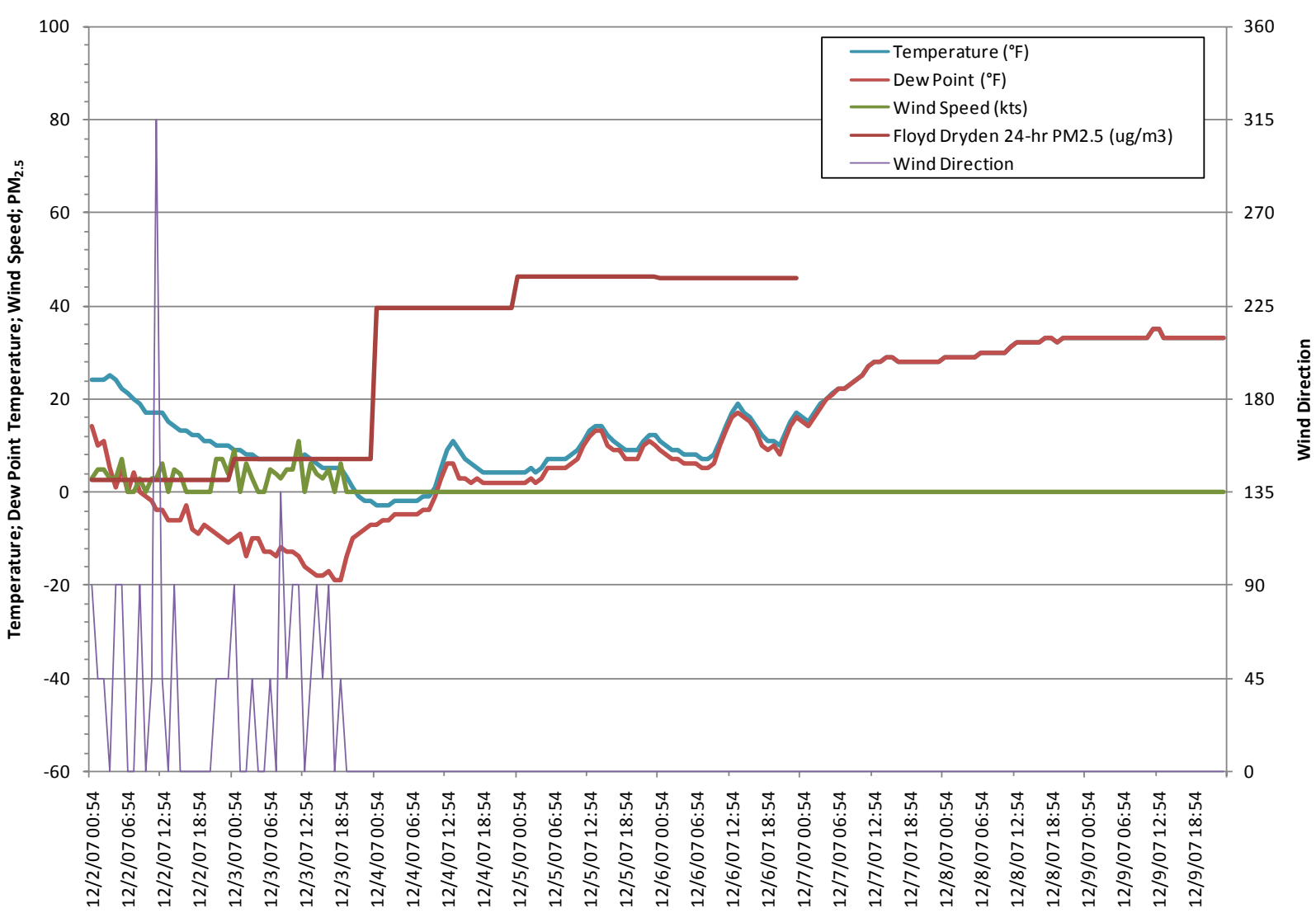
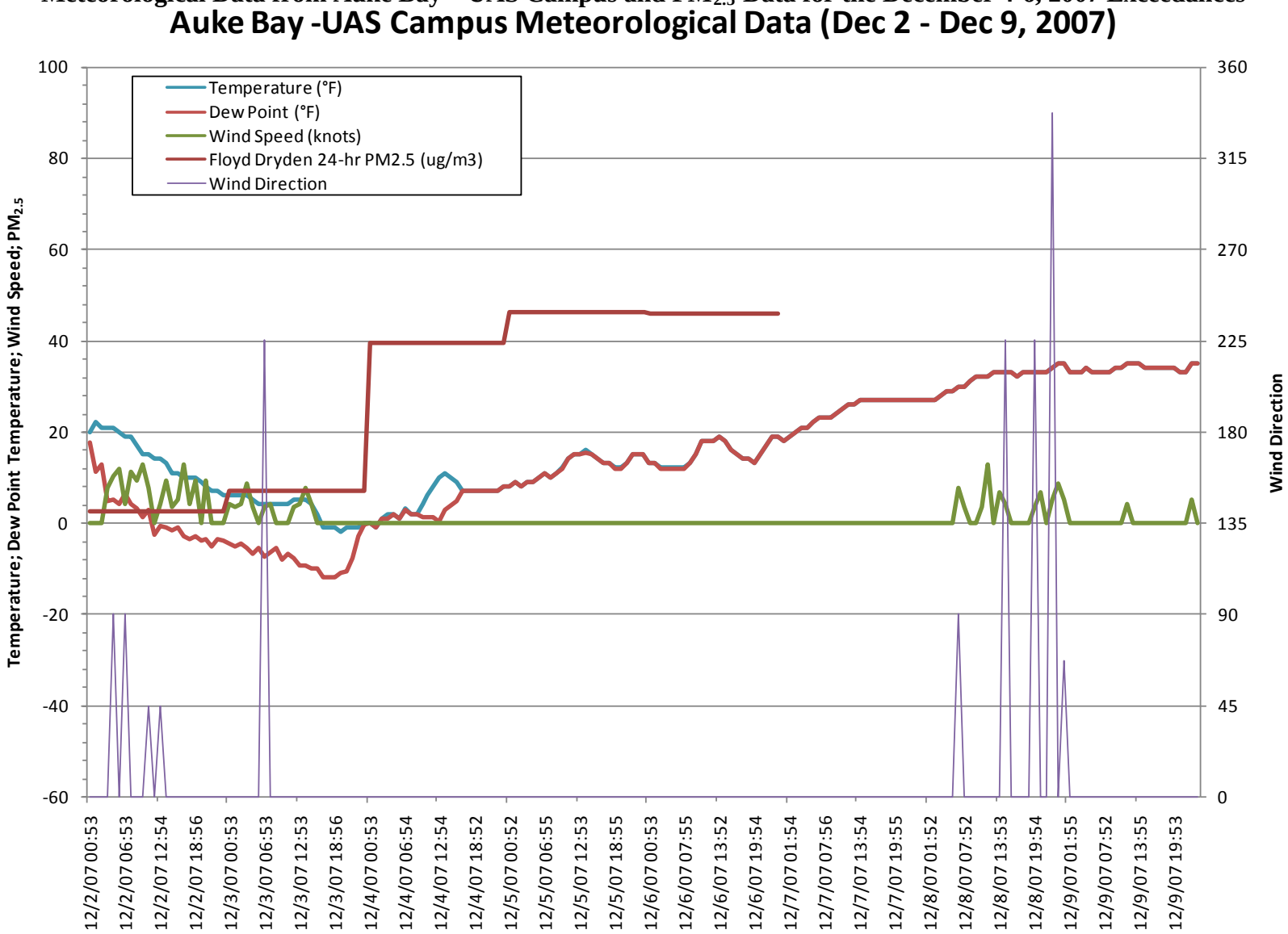


Figure 16
Meteorological Data from Auke Bay – UAS Campus and $PM_{2.5}$ Data for the December 4-6, 2007 Exceedances



Factor 7: Geography and Topography

There are three primary areas of interest in Juneau in terms of impact on the $PM_{2.5}$ monitors. The interplay of local mountains, valleys, and water bodies define these three geographical areas. The Downtown and Douglas areas are distinct from the Lemon Creek Valley, which in turn is distinct from the Mendenhall Valley. Figure 17 shows that Downtown is separated from the Lemon Creek Valley by a mountain range that includes the 3,576 foot Mt. Juneau.

Figure 17
Topography Separating Lemon Creek from Downtown and Douglas

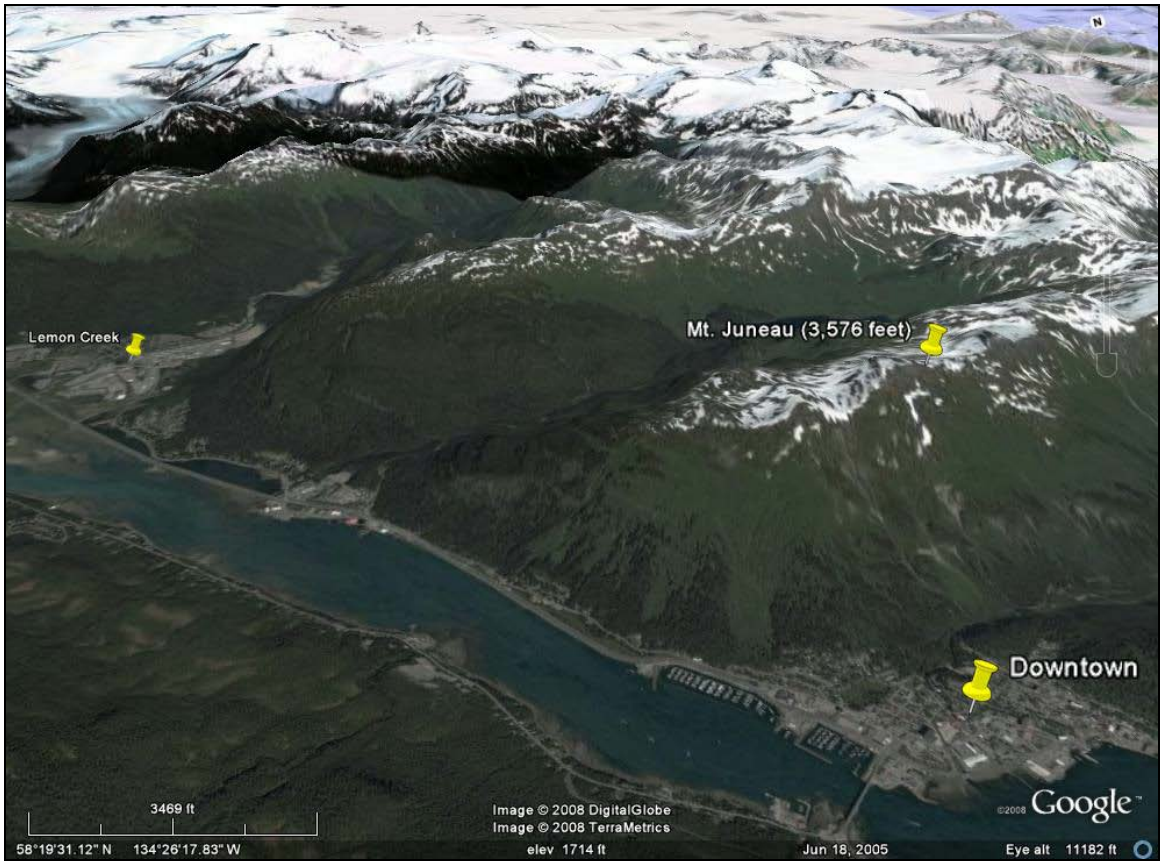
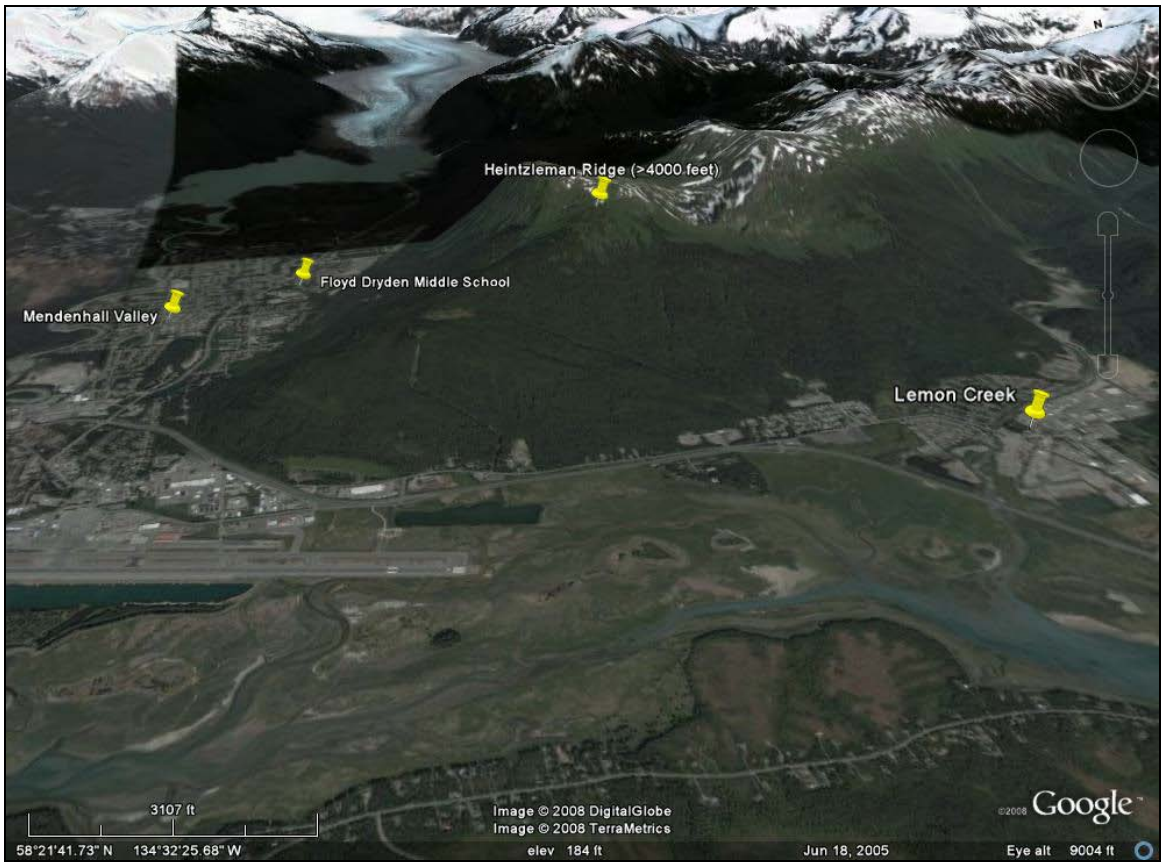


Figure 18 shows that Heintzleman Ridge, which includes Thunder Mountain and tops out at over 4,000 feet, separates Lemon Creek Valley from the Mendenhall Valley.

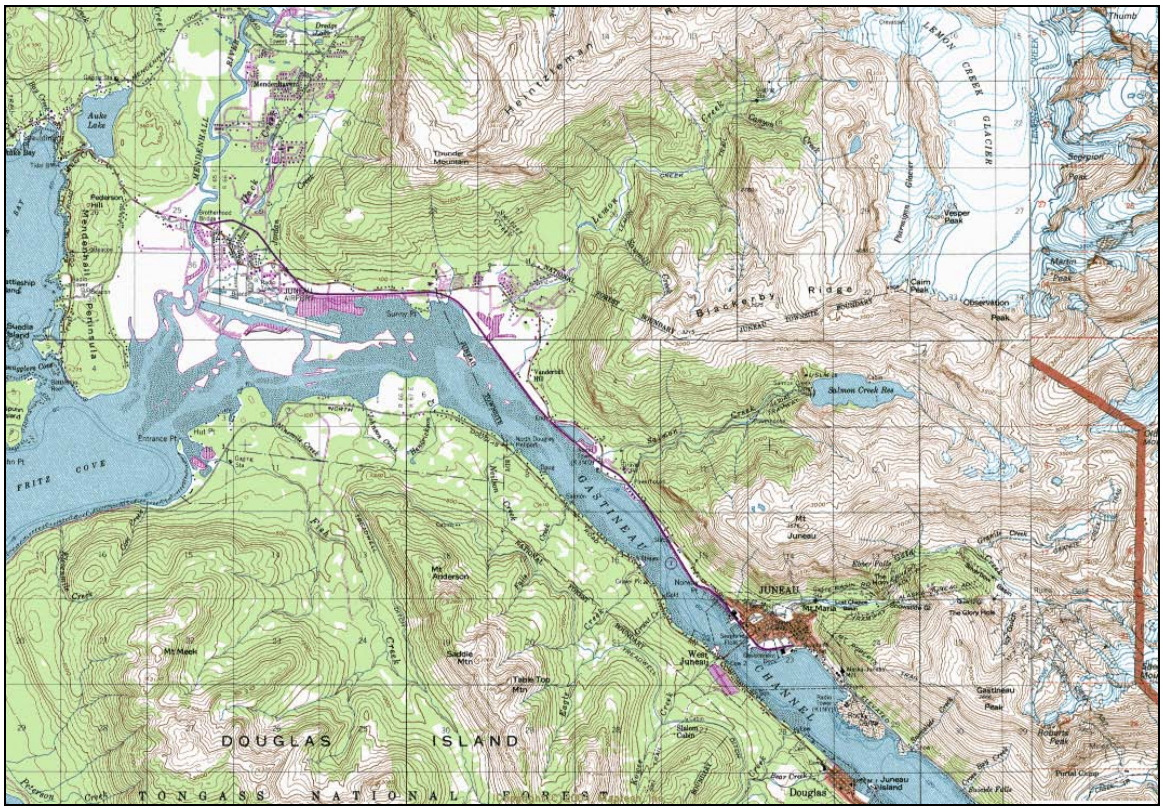
Figure 18
Topography Separating Lemon Creek from Mendenhall Valley



The Downtown and Douglas communities cling to the mountainsides on the tailings of historical mining operations. By contrast, populated areas in the Lemon Creek and Mendenhall Valley exist in valleys carved by glaciers now retreating into the ice field. Figure 19 presents a topographic map that illustrates the terrain surrounding each of these three areas.

The rugged terrain influences local temperatures and the distribution of precipitation and wind, creating considerable variation in weather within relatively short distances. The space between the mainland and Douglas Island mountains is narrow, squeezing rain from moisture-laden clouds from the ocean. Downtown and Douglas receive nearly 93 inches of rain annually. The Juneau Airport, only eight miles away at the mouth of the Mendenhall Valley, has a much wider space between mainland and Douglas Island mountains, and experiences 53 inches annually. Periods of severe cold usually start with strong northerly winds, and are often caused by a flow of cold air from northwestern Canada through nearby mountain passes and over the Juneau ice field. These winds are generally brief but strong and gusty and are known locally as Taku Winds. Again, due to the varied topography, these winds are often experienced in downtown Juneau, Douglas,

Figure 19
Topographic Map of the Densely Populated Areas of Juneau



and other local areas, but are generally not felt in the Mendenhall Valley according to the National Climate Data Center.

Summary – The three principal populated areas of Juneau (i.e., Downtown and Douglas, Lemon Creek, and the Mendenhall Valley) are geographically distinct from each other. Mountain ranges in excess of 3,000 feet and waterways isolate each area. The differences in terrain create large variations in local weather.

Factor 8: Jurisdictional Boundaries

Juneau is currently designated nonattainment for PM_{10}. The Mendenhall Valley is the designated nonattainment area. The unique geography of the Valley is understood by residents to isolate and concentrate pollutants emitted within that airshed. The City and Borough of Juneau has implemented local ordinances that are focused on controlling sources that are known to contribute to higher concentrations in the Valley. Expanding the existing PM_{10} boundaries to require a larger area of $PM_{2.5}$ control without data showing elevated $PM_{2.5}$ concentrations is not justified. The public within the expanded area will not understand. It contradicts local knowledge about which sources are impacting the Mendenhall Valley. The boundary expansion essentially undercuts support

for implementing existing controls and makes future controls infeasible. This will complicate planning efforts to demonstrate attainment, or more specifically, jeopardizes current and future controls protecting public health.

Summary – Increasing the size of the existing PM_{10} boundary to require a larger area of $PM_{2.5}$ control without data demonstrating elevated concentrations within the expanded area will undercut public support for existing control measures.

Factor 9: Level of Control of Emissions Sources

On September 8, 2008, the City and Borough of Juneau (CBJ) approved an ordinance amending the existing woodburning ordinance to declare burn bans at thresholds preceding exceedances of the ambient 24-hour $PM_{2.5}$ standard at 30 ug/m^3 instead of more lenient threshold of 75 ug/m^3 for $PM_{10.}$ A copy of the new Ordinance—Serial No. 2008-28, "An Ordinance Amending the Woodsmoke Control Program Regarding Solid Fuel Devices"—is provided in Attachment B. The ordinance is now effective. As woodburning has been the primary pollution source of concern in the Mendenhall Valley, this enforceable control program directly targets the emissions contributing to elevated levels of $PM_{2.5}$.

Summary – Juneau recently amended its woodburning ordinance to institute burn bans when concentrations approach the threshold of the 24-hour ambient $PM_{2.5}$ standard instead of the ambient PM_{10} standard. The community has taken the action required to ensure continued attainment of the ambient $PM_{2.5}$ standard. The ordinance is now effective.

Overall Summary and Recommendations

The local information used in the nine-factor analysis presented above contradicts much of the evidence EPA used to expand the boundary proposed by the State for the $PM_{2.5}$ nonattainment area in Juneau. Key differences between EPA's and the State's positions are summarized below.

1. Emissions Data

   EPA – Focused on the relative contribution of emissions between Juneau and adjacent counties with populated areas located several mountain ranges and 50+ miles away from the populated areas of Juneau and concluded "Further analysis is required to understand if emissions from adjacent counties may contribute to the $PM_{2.5}$ violations in the Mendenhall Valley."

   State – Provided source-specific emissions information for Juneau showing that nonroad sources are responsible for the bulk of $PM_{2.5}$ emitted and the only point sources with the potential to emit $PM_{2.5}$ precursor emissions during winter months are

standby generators located outside of the Mendenhall Valley in Auke Bay and Lemon Creek.

2. Air Quality Data

   EPA – Presented design values for 2004–2006 and 2005–2007 in Juneau and concluded no monitoring data were available for adjacent counties.

   State – Raised concerns about the validity of the design value calculations that suggest Juneau may not be out of attainment for $PM_{2.5}$ and requested that EPA revisit those calculations. Monitoring data for 1999–2003 were presented for Lemon Creek showing that the resulting design value did not exceed the 24-hour $PM_{2.5}$ standard. A comparison between $PM_{2.5}$ and PM_{10} monitoring data for the Mendenhall Valley showed there is essentially no fugitive dust contribution during winter months and combustion is the dominant source of particulate.

3. Population Density and Degree of Urbanization

   EPA – Presented population density information for Juneau and adjacent counties and determined that the information supports excluding other counties from the proposed nonattainment boundary. With regard to Juneau the following conclusion was presented: "Population based emissions are likely to be very limited from areas of Juneau Borough other than the cities of Juneau and Douglas."

   State – Provided detailed charts documenting the location of populated areas within Juneau. The charts showed that three areas account for the bulk of Juneau's population: Mendenhall Valley/North Douglas, Lemon Creek/North Douglas, and Downtown Juneau/Douglas. This information showed that Juneau has distinct population centers that are different from those presented by EPA.

4. Traffic Commuting Patterns

   EPA – Provided estimates of travel (i.e., VMT), number of commuters driving to another county, and related percentages of commutes into Juneau and adjacent counties. Using these data, the following conclusion was reached: "All the preceding factors indicate that the surrounding boroughs are not contributors to the $PM_{2.5}$ violations in the Juneau monitor but that a larger part of the Juneau Borough than what the state has suggested may be appropriate."

   State – Noted that Juneau is isolated from other counties and that access is only by ship or plane. Statistics from the Alaska Marine Highway System documented that scheduled ferry service transported fewer than 100 vehicles per day on average into and out of Juneau, and that during the winter this value could be reduced by more than 50%. The data contradicted EPA's finding that the boundary proposed by the State should be expanded.

5. Growth Rates and Patterns

EPA – Presented statistics showing that while population growth in Juneau was stable between the years 2000–2005, travel had increased by 62% between the years 1996–2005. These data supported the following conclusion: "It can be expected that vehicular emissions of direct $PM_{2.5}$ and NOx may be higher than it was a few years ago."

State – Noted that EPA's estimate of travel was off by a factor of 1,000 and provided traffic counts demonstrating that travel had not increased between the years 1996–2005 but, in fact, had decreased. Population data presented for the same time period showed that growth is almost nonexistent and supported this finding. These data supported a finding that vehicle emissions were declining not increasing as claimed by EPA.

6. Meteorology

EPA – Used data from the Yakutat State Airport, located over 200 miles away, to characterize meteorology in Juneau and noted that it was not representative of conditions in Juneau.

State – Presented meteorological data from four separate sites in Juneau that demonstrated that transport of emissions from populated areas into the Mendenhall Valley did not occur prior to or during episodes when the ambient $PM_{2.5}$ standard was exceeded.

7. Geography and Topography

EPA – Presented topographical information for the City of Juneau.

State – Presented topographical information showing that the three principal populated areas within Juneau (i.e., downtown/Douglas, Lemon Creek and Mendenhall Valley) are geographically distinct from each other. Mountain ranges in excess of 3,000 feet and waterways isolate each area.

8. Jurisdictional Boundaries

EPA – Noted that contrary to the State's recommendation, EPA's analysis demonstrated that a larger boundary would be required to include all sources that could potentially contribute to the violations in the Mendenhall Valley monitor.

State – Noted there are no data supporting the expansion of the existing PM_{10} boundaries to require a larger area of $PM_{2.5}$ control. Concern was expressed that the proposed expansion would contradict local knowledge about which sources are impacting the Mendenhall Valley, undercut support for existing control measures, and complicate planning efforts to maintain the ambient standards.

9. Level of Control of Emission Sources

EPA – Noted that emission estimates presented for Juneau were based on control strategies implemented prior to 2005 and that the area is successfully maintaining the ambient PM_{10} standard.

State – Presented a copy of a recently amended ordinance to institute burn bans when concentrations approach the threshold of the ambient $PM_{2.5}$ standard.

In summary, EPA has presented no data demonstrating a need to expand the State's proposed $PM_{2.5}$ nonattainment boundary. A combination of population density and topographical data shows there are several distinct airsheds within Juneau. The meteorology data show there was no transport from any of those airsheds into the Mendenhall Valley prior to or during high concentration episodes. Vehicle travel into Juneau from outside areas during the winter is essentially nonexistent and traffic count data demonstrate that travel within Juneau declined over the past decade. The available monitoring data show that concentrations within the Mendenhall Valley are largely the result of combustion emissions during the winter and that design values for Lemon Creek did not exceed the 24-hour $PM_{2.5}$ standard. To address the concern about elevated $PM_{2.5}$ concentrations recorded within the Mendenhall Valley, a new ordinance was implemented to call for burn bans when concentrations approached the standard. Finally, an analysis of monitoring data recorded in the Mendenhall Valley suggests that the 2005–2007 design value does not exceed the 24-hour $PM_{2.5}$ standard.

The State requests that EPA revisit the design value calculation to determine if, in fact, there is a $PM_{2.5}$ nonattainment area in Juneau. Second, the State requests EPA consider all 2008 data and recalculate the design value for the 2006-2008 period to insure that the area is clearly nonattainment. Finally, if it is determined that there is justification for a nonattainment area, the State recommends that EPA adopt the existing PM_{10} nonattainment area for the Mendenhall Valley.

Attachment A

Emission Category	City & Borough of Juneau 2005 Emissions, TPY						
	VOC	**NOX**	**SO2**	**PM10_PRI**	**PM25_PRI**	**NH3**	**CO**
Point	68	1275	744	162	NA	NA	176
Area	420	74	7	104	64	0	448
Mobile - Onroad	817	716	17	19	15	27	8794
Mobile - Nonroad	266	156	16	2791	673	0	2504
Total Emissions	**1571**	**2221**	**784**	**3076**	**752**	**27**	**11922**

City & Borough of Juneau - Proposed Nonattainment Area

Facility	2005 Emissions, TPY				
	VOC	**NOX**	**SO2**	**PM10_PRI**	**CO**
Alaska Electric Light & Power Auke Bay Standby Generation Station	0	3	1	0	0
Alaska Electric Light & Power Lemon Creek Standby Generation Station	0	9	2	1	4
Total Emissions	0	12	3	1	4

City & Borough of Juneau - All Reported Facilities

Facility	2005 Emissions, TPY				
	VOC	**NOX**	**SO2**	**PM10_PRI**	**CO**
Alaska Electric Light & Power Auke Bay Standby Generation Station	0	3	1	0	0
Alaska Electric Light & Power Lemon Creek Standby Generation Station	0	9	2	1	4
Coeur Alaska Inc. Kensington Mine Project	3	49	3	3	12
Kennecott Greens Creek Mining Company Kennecott Greens Creek Mine	65	1214	738	158	160
Total Emissions	68	1275	744	162	176

City & Borough of Juneau - Area Sources							
Source Classification Code	**2005 Emissions, TPY**						
	VOC	**NOX**	**SO2**	**PM10_PRI**	**PM25_PRI**	**NH3**	**CO**
2103006000 Stationary Source Fuel Combustion Commercial/Institutional Natural Gas Total: Boilers and IC Engines	0	0	0	0	0	0	0
2104004000 Stationary Source Fuel Combustion Residential Distillate Oil Total: All Combustor Types	2	61	2	1	1	0	17
2104005000 Stationary Source Fuel Combustion Residential Residual Oil Total: All Combustor Types	0	1	2	0	0	0	0
2104006010 Stationary Source Fuel Combustion Residential Natural Gas Residential Furnaces	0	0	0	0	0	0	0
2104007000 Stationary Source Fuel Combustion Residential Liquified Petroleum Gas (LPG) Total: All Combustor Types	0	5	1	0	0	0	1
2104008000 Stationary Source Fuel Combustion Residential Wood Total: Woodstoves and Fireplaces	266	6	1	61	61	0	410
2306010000 Industrial Processes Petroleum Refining: SIC 29 Asphalt Paving/Roofing Materials Total	0	1	1	41	2	0	4
2401001000 Solvent Utilization Surface Coating Architectural Coatings Total: All Solvent Types	85	0	0	0	0	0	0
2461020000 Solvent Utilization Miscellaneous Non-industrial: Commercial Asphalt Application: All Processes Total: All Solvent Types	0	0	0	0	0	0	0
2501000120 Storage and Transport Petroleum and Petroleum Product Storage All Storage Types: Breathing Loss Gasoline	2	0	0	0	0	0	0
2501060102 Storage and Transport Petroleum and Petroleum Product Storage Gasoline Service Stations Stage 2: Displacement Loss/Controlled	49	0	0	0	0	0	0
2501060103 Storage and Transport Petroleum and Petroleum Product Storage Gasoline Service Stations Stage 2: Spillage	14	0	0	0	0	0	0
2501995120 Storage and Transport Petroleum and Petroleum Product Storage All Storage Types: Working Loss Gasoline	1	0	0	0	0	0	0
2810001000 Miscellaneous Area Sources Other Combustion Forest Wildfires Total	0	0	0	0	0	0	1
2810030000 Miscellaneous Area Sources Other Combustion Structure Fires Total	1	0	0	1	0	0	15
2810035000 Miscellaneous Area Sources Other Combustion Firefighting Training Total	0	0	0	0	0	0	0
Total Area Source Emissions	420	74	7	104	64	0	448

City & Borough of Juneau - OnRoad Mobile Sources							
Source Classification Code	**2005 Emissions, TPY**						
	VOC	NOX	SO2	PM10_PRI	PM25_PRI	NH3	CO
2201001000 Mobile Sources Highway Vehicles - Gasoline Light Duty Gasoline Vehicles (LDGV) Total: All Road Types	351	159	3	3	2	13	3923
2201020000 Mobile Sources Highway Vehicles - Gasoline Light Duty Gasoline Trucks 1 & 2 (M6) = LDGT1 (M5) Total: All Road Types	295	133	2	3	1	9	3254
2201040000 Mobile Sources Highway Vehicles - Gasoline Light Duty Gasoline Trucks 3 & 4 (M6) = LDGT2 (M5) Total: All Road Types	125	61	1	1	1	3	1324
2201070000 Mobile Sources Highway Vehicles - Gasoline Heavy Duty Gasoline Vehicles 2B thru 8B & Buses (HDGV) Total: All Road Types	21	56	1	1	1	1	187
2201080000 Mobile Sources Highway Vehicles - Gasoline Motorcycles (MC) Total: All Road Types	8	2	0	0	0	0	24
2230001000 Mobile Sources Highway Vehicles - Diesel Light Duty Diesel Vehicles (LDDV) Total: All Road Types	1	2	0	0	0	0	2
2230060000 Mobile Sources Highway Vehicles - Diesel Light Duty Diesel Trucks 1 thru 4 (M6) (LDDT) Total: All Road Types	1	1	0	0	0	0	2
2230070000 Mobile Sources Highway Vehicles - Diesel All HDDV including Buses (use subdivisions -071 thru -075 if possible) Total: All Road Types	15	302	10	11	10	1	78
Total Estimated Emissions	817	716	17	19	15	27	8794

City & Borough of Juneau - NonRoad Mobile Emissions							
Source Classification Code	2005 Emissions, TPY						
	VOC	NOX	SO2	PM10_PRI	PM25_PRI	NH3	CO
2260001010 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Recreational Equipment Motorcycles: Off-road	57	0	0	2	2	0	55
2260001020 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Recreational Equipment Snowmobiles	11	0	0	0	0	0	28
2260001030 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Recreational Equipment All Terrain Vehicles	72	0	0	3	2	0	68
2260001060 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Recreational Equipment Specialty Vehicles/Carts	0	0	0	0	0	0	6
2260002006 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Tampers/Rammers	1	0	0	0	0	0	2
2260002009 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Plate Compactors	0	0	0	0	0	0	0
2260002021 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Paving Equipment	0	0	0	0	0	0	0
2260002027 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Signal Boards/Light Plants	0	0	0	0	0	0	0
2260002039 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Concrete/Industrial Saws	1	0	0	0	0	0	4
2260002054 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Construction and Mining Equipment Crushing/Processing Equipment	0	0	0	0	0	0	0
2260003030 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Industrial Equipment Sweepers/Scrubbers	0	0	0	0	0	0	0
2260003040 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Industrial Equipment Other General Industrial Equipment	0	0	0	0	0	0	0
2260004015 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Rotary Tillers < 6 HP (Residential)	0	0	0	0	0	0	0
2260004016 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Rotary Tillers < 6 HP (Commercial)	0	0	0	0	0	0	0
2260004020 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Chain Saws < 6 HP (Residential)	2	0	0	0	0	0	5
2260004021 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Chain Saws < 6 HP (Commercial)	1	0	0	0	0	0	3
2260004025 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Trimmers/Edgers/Brush Cutters (Residential)	3	0	0	0	0	0	7
2260004026 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Trimmers/Edgers/Brush Cutters (Commercial)	0	0	0	0	0	0	2
2260004030 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Leafblowers/Vacuums (Residential)	2	0	0	0	0	0	5
2260004031 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Leafblowers/Vacuums (Commercial)	1	0	0	0	0	0	2
2260004035 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Snowblowers (Residential)	2	0	0	0	0	0	4
2260004036 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Snowblowers (Commercial)	0	0	0	0	0	0	1
2260004071 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Lawn and Garden Equipment Turf Equipment (Commercial)	0	0	0	0	0	0	0
2260005035 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Agricultural Equipment Sprayers	0	0	0	0	0	0	0
2260006005 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Commercial Equipment Generator Sets	0	0	0	0	0	0	0
2260006010 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Commercial Equipment Pumps	1	0	0	0	0	0	3
2260006015 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Commercial Equipment Air Compressors	0	0	0	0	0	0	0
2260006035 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Mobile Sources : Off-highway Vehicle Gasoline, 2-Stroke: Commercial Equipment Mobile Sources : Off-highway Vehicle Gasoline, 2-Stroke: Commercial Equipment : Hydro-power Units	0	0	0	0	0	0	0
2260007005 Mobile Sources Off-highway Vehicle Gasoline, 2-Stroke Logging Equipment Chain Saws > 6 HP	0	0	0	0	0	0	0
2265001010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Recreational Equipment Motorcycles: Off-road	2	0	0	0	0	0	24
2265001030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Recreational Equipment All Terrain Vehicles	19	2	0	0	0	0	227
2265001050 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Recreational Equipment Golf Carts	1	0	0	0	0	0	60

City & Borough of Juneau - NonRoad Mobile Emissions							
Source Classification Code	2005 Emissions, TPY						
	VOC	NOX	SO2	PM10_PRI	PM25_PRI	NH3	CO
2265001060 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Recreational Equipment Specialty Vehicles/Carts	0	0	0	0	0	0	5
2265002003 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Pavers	0	0	0	0	0	0	2
2265002006 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Tampers/Rammers	0	0	0	0	0	0	0
2265002009 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Plate Compactors	0	0	0	0	0	0	3
2265002015 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Rollers	0	0	0	0	0	0	3
2265002021 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Paving Equipment	0	0	0	0	0	0	6
2265002024 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Surfacing Equipment	0	0	0	0	0	0	3
2265002027 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Signal Boards/Light Plants	0	0	0	0	0	0	0
2265002030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Trenchers	0	0	0	0	0	0	5
2265002033 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Bore/Drill Rigs	0	0	0	0	0	0	1
2265002039 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Concrete/Industrial Saws	0	0	0	0	0	0	12
2265002042 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Cement and Mortar Mixers	0	0	0	0	0	0	5
2265002045 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Cranes	0	0	0	0	0	0	0
2265002054 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Crushing/Processing Equipment	0	0	0	0	0	0	1
2265002057 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Rough Terrain Forklifts	0	0	0	0	0	0	0
2265002060 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Rubber Tire Loaders	0	0	0	0	0	0	1
2265002066 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Tractors/Loaders/Backhoes	0	0	0	0	0	0	4
2265002072 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Skid Steer Loaders	0	0	0	0	0	0	2
2265002078 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Dumpers/Tenders	0	0	0	0	0	0	1
2265002081 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Construction and Mining Equipment Other Construction Equipment	0	0	0	0	0	0	0
2265003010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Aerial Lifts	0	0	0	0	0	0	1
2265003020 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Forklifts	0	0	0	0	0	0	2
2265003030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Sweepers/Scrubbers	0	0	0	0	0	0	1
2265003040 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Other General Industrial Equipment	0	0	0	0	0	0	2
2265003050 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Other Material Handling Equipment	0	0	0	0	0	0	0
2265003060 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment AC\Refrigeration	0	0	0	0	0	0	0
2265003070 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Terminal Tractors	0	0	0	0	0	0	0
2265004010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Lawn Mowers (Residential)	6	1	0	0	0	0	95
2265004011 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Lawn Mowers (Commercial)	0	0	0	0	0	0	7
2265004015 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Rotary Tillers < 6 HP (Residential)	1	0	0	0	0	0	8
2265004016 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Rotary Tillers < 6 HP (Commercial)	0	0	0	0	0	0	3
2265004025 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Trimmers/Edgers/Brush Cutters (Residential)	0	0	0	0	0	0	1
2265004026 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Trimmers/Edgers/Brush Cutters (Commercial)	0	0	0	0	0	0	0
2265004030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Leafblowers/Vacuums (Residential)	0	0	0	0	0	0	1
2265004031 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Leafblowers/Vacuums (Commercial)	0	0	0	0	0	0	7

City & Borough of Juneau - NonRoad Mobile Emissions							
Source Classification Code	2005 Emissions, TPY						
	VOC	NOX	SO2	PM10_PRI	PM25_PRI	NH3	CO
2265004035 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Snowblowers (Residential)	0	0	0	0	0	0	10
2265004036 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Snowblowers (Commercial)	0	0	0	0	0	0	2
2265004040 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Rear Engine Riding Mowers (Residential)	0	0	0	0	0	0	23
2265004041 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Rear Engine Riding Mowers (Commercial)	0	0	0	0	0	0	1
2265004046 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Front Mowers (Commercial)	0	0	0	0	0	0	1
2265004051 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Shredders < 6 HP (Commercial)	0	0	0	0	0	0	0
2265004055 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Lawn and Garden Tractors (Residential)	6	2	0	0	0	0	306
2265004056 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Lawn and Garden Tractors (Commercial)	0	0	0	0	0	0	13
2265004066 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Chippers/Stump Grinders (Commercial)	0	0	0	0	0	0	2
2265004071 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Turf Equipment (Commercial)	1	0	0	0	0	0	38
2265004075 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Other Lawn and Garden Equipment (Residential)	0	0	0	0	0	0	10
2265004076 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Lawn and Garden Equipment Other Lawn and Garden Equipment (Commercial)	0	0	0	0	0	0	1
2265005010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment 2-Wheel Tractors	0	0	0	0	0	0	0
2265005015 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Agricultural Tractors	0	0	0	0	0	0	0
2265005020 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Combines	0	0	0	0	0	0	0
2265005025 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Balers	0	0	0	0	0	0	0
2265005030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Agricultural Mowers	0	0	0	0	0	0	0
2265005035 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Sprayers	0	0	0	0	0	0	0
2265005040 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Tillers > 6 HP	0	0	0	0	0	0	0
2265005045 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Swathers	0	0	0	0	0	0	0
2265005055 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Other Agricultural Equipment	0	0	0	0	0	0	0
2265005060 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Agricultural Equipment Irrigation Sets	0	0	0	0	0	0	0
2265006005 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Commercial Equipment Generator Sets	5	1	0	0	0	0	192
2265006010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Commercial Equipment Pumps	2	0	0	0	0	0	45
2265006015 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Commercial Equipment Air Compressors	1	0	0	0	0	0	22
2265006025 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Commercial Equipment Welders	1	0	0	0	0	0	57
2265006030 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Commercial Equipment Pressure Washers	3	1	0	0	0	0	85
2265006035 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Mobile Sources : Off-highway Vehicle Gasoline, 4-Stroke: Commercial Equipment Mobile Sources : Off-highway Vehicle Gasoline, 4-Stroke: Commercial Equipment : Hydro-power Units	0	0	0	0	0	0	4
2265007010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Logging Equipment Shredders > 6 HP	0	0	0	0	0	0	0
2265007015 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Logging Equipment Forest Eqp - Feller/Bunch/Skidder	0	0	0	0	0	0	0
2265010010 Mobile Sources Off-highway Vehicle Gasoline, 4-Stroke Industrial Equipment Other Oil Field Equipment	0	0	0	0	0	0	15
2267001060 Mobile Sources LPG Recreational Equipment Specialty Vehicles/Carts	0	0	0	0	0	0	0

City & Borough of Juneau - NonRoad Mobile Emissions							
Source Classification Code	2005 Emissions, TPY						
	VOC	NOX	SO2	PM10_PRI	PM25_PRI	NH3	CO
2267002003 Mobile Sources LPG Construction and Mining Equipment Pavers	0	0	0	0	0	0	0
2267002015 Mobile Sources LPG Construction and Mining Equipment Rollers	0	0	0	0	0	0	0
2267002021 Mobile Sources LPG Construction and Mining Equipment Paving Equipment	0	0	0	0	0	0	0
2267002024 Mobile Sources LPG Construction and Mining Equipment Surfacing Equipment	0	0	0	0	0	0	0
2267002030 Mobile Sources LPG Construction and Mining Equipment Trenchers	0	0	0	0	0	0	0
2267002033 Mobile Sources LPG Construction and Mining Equipment Bore/Drill Rigs	0	0	0	0	0	0	0
2267002039 Mobile Sources LPG Construction and Mining Equipment Concrete/Industrial Saws	0	0	0	0	0	0	0
2267002045 Mobile Sources LPG Construction and Mining Equipment Cranes	0	0	0	0	0	0	0
2267002054 Mobile Sources LPG Construction and Mining Equipment Crushing/Processing Equipment	0	0	0	0	0	0	0
2267002057 Mobile Sources LPG Construction and Mining Equipment Rough Terrain Forklifts	0	0	0	0	0	0	0
2267002060 Mobile Sources LPG Construction and Mining Equipment Rubber Tire Loaders	0	0	0	0	0	0	0
2267002066 Mobile Sources LPG Construction and Mining Equipment Tractors/Loaders/Backhoes	0	0	0	0	0	0	0
2267002072 Mobile Sources LPG Construction and Mining Equipment Skid Steer Loaders	0	0	0	0	0	0	0
2267002081 Mobile Sources LPG Construction and Mining Equipment Other Construction Equipment	0	0	0	0	0	0	0
2267003010 Mobile Sources LPG Industrial Equipment Aerial Lifts	0	0	0	0	0	0	0
2267003020 Mobile Sources LPG Industrial Equipment Forklifts	1	3	0	0	0	0	16
2267003030 Mobile Sources LPG Industrial Equipment Sweepers/Scrubbers	0	0	0	0	0	0	0
2267003040 Mobile Sources LPG Industrial Equipment Other General Industrial Equipment	0	0	0	0	0	0	0
2267003050 Mobile Sources LPG Industrial Equipment Other Material Handling Equipment	0	0	0	0	0	0	0
2267003070 Mobile Sources LPG Industrial Equipment Terminal Tractors	0	0	0	0	0	0	0
2267004066 Mobile Sources LPG Lawn and Garden Equipment Chippers/Stump Grinders (Commercial)	0	0	0	0	0	0	0
2267005055 Mobile Sources LPG Agricultural Equipment Other Agricultural Equipment	0	0	0	0	0	0	0
2267005060 Mobile Sources LPG Agricultural Equipment Irrigation Sets	0	0	0	0	0	0	0
2267006005 Mobile Sources LPG Commercial Equipment Generator Sets	0	1	0	0	0	0	2
2267006010 Mobile Sources LPG Commercial Equipment Pumps	0	0	0	0	0	0	0
2267006015 Mobile Sources LPG Commercial Equipment Air Compressors	0	0	0	0	0	0	1
2267006025 Mobile Sources LPG Commercial Equipment Welders	0	0	0	0	0	0	1
2267006030 Mobile Sources LPG Commercial Equipment Pressure Washers	0	0	0	0	0	0	0
2267006035 Mobile Sources LPG Mobile Sources : LPG: Commercial Equipment Mobile Sources : LPG: Commercial Equipment : Hydro-power Units	0	0	0	0	0	0	0
2268002081 Mobile Sources CNG Construction and Mining Equipment Other Construction Equipment	0	0	0	0	0	0	0
2268003020 Mobile Sources CNG Industrial Equipment Forklifts	0	0	0	0	0	0	1
2268003030 Mobile Sources CNG Industrial Equipment Sweepers/Scrubbers	0	0	0	0	0	0	0
2268003040 Mobile Sources CNG Industrial Equipment Other General Industrial Equipment	0	0	0	0	0	0	0
2268003060 Mobile Sources CNG Industrial Equipment AC\Refrigeration	0	0	0	0	0	0	0

City & Borough of Juneau - NonRoad Mobile Emissions							
Source Classification Code	**2005 Emissions, TPY**						
	VOC	NOX	SO2	PM10_PRI	PM25_PRI	NH3	CO
2268003070 Mobile Sources CNG Industrial Equipment Terminal Tractors	0	0	0	0	0	0	0
2268005055 Mobile Sources CNG Agricultural Equipment Other Agricultural Equipment	0	0	0	0	0	0	0
2268005060 Mobile Sources CNG Agricultural Equipment Irrigation Sets	0	0	0	0	0	0	0
2268006005 Mobile Sources CNG Commercial Equipment Generator Sets	0	0	0	0	0	0	1
2268006010 Mobile Sources CNG Commercial Equipment Pumps	0	0	0	0	0	0	0
2268006015 Mobile Sources CNG Commercial Equipment Air Compressors	0	0	0	0	0	0	0
2268006020 Mobile Sources CNG Commercial Equipment Gas Compressors	0	0	0	0	0	0	3
2268006035 Mobile Sources CNG Mobile Sources : CNG: Commercial Equipment Mobile Sources : CNG: Commercial Equipment : Hydro-power Units	0	0	0	0	0	0	0
2268010010 Mobile Sources CNG Industrial Equipment Other Oil Field Equipment	0	0	0	0	0	0	1
2270001060 Mobile Sources Off-highway Vehicle Diesel Recreational Equipment Specialty Vehicles/Carts	0	0	0	0	0	0	0
2270002003 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Pavers	0	1	0	0	0	0	0
2270002006 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Tampers/Rammers	0	0	0	0	0	0	0
2270002009 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Plate Compactors	0	0	0	0	0	0	0
2270002015 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Rollers	0	2	0	0	0	0	1
2270002018 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Scrapers	0	2	0	0	0	0	1
2270002021 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Paving Equipment	0	0	0	0	0	0	0
2270002024 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Surfacing Equipment	0	0	0	0	0	0	0
2270002027 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Signal Boards/Light Plants	0	0	0	0	0	0	0
2270002030 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Trenchers	0	1	0	0	0	0	1
2270002033 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Bore/Drill Rigs	0	1	0	0	0	0	0
2270002036 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Excavators	1	7	1	0	0	0	2
2270002039 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Concrete/Industrial Saws	0	0	0	0	0	0	0
2270002042 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Cement and Mortar Mixers	0	0	0	0	0	0	0
2270002045 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Cranes	0	2	0	0	0	0	0
2270002048 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Graders	0	2	0	0	0	0	1
2270002051 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Off-highway Trucks	0	7	1	0	0	0	2
2270002054 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Crushing/Processing Equipment	0	0	0	0	0	0	0
2270002057 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Rough Terrain Forklifts	0	2	0	0	0	0	1
2270002060 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Rubber Tire Loaders	1	8	1	1	1	0	4
2270002066 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Tractors/Loaders/Backhoes	1	5	1	1	1	0	5
2270002069 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Crawler Tractor/Dozers	1	7	1	1	1	0	3
2270002072 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Skid Steer Loaders	1	3	0	1	1	0	4
2270002075 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Off-highway Tractors	0	1	0	0	0	0	0
2270002078 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Dumpers/Tenders	0	0	0	0	0	0	0

City & Borough of Juneau - NonRoad Mobile Emissions							
Source Classification Code	2005 Emissions, TPY						
	VOC	NOX	SO2	PM10_PRI	PM25_PRI	NH3	CO
2270002081 Mobile Sources Off-highway Vehicle Diesel Construction and Mining Equipment Other Construction Equipment	0	1	0	0	0	0	0
2270003010 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Aerial Lifts	0	0	0	0	0	0	0
2270003020 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Forklifts	0	0	0	0	0	0	0
2270003030 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Sweepers/Scrubbers	0	0	0	0	0	0	0
2270003040 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Other General Industrial Equipment	0	0	0	0	0	0	0
2270003050 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Other Material Handling Equipment	0	0	0	0	0	0	0
2270003060 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment AC\Refrigeration	0	4	1	0	0	0	2
2270003070 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Terminal Tractors	0	0	0	0	0	0	0
2270004031 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Leafblowers/Vacuums (Commercial)	0	0	0	0	0	0	0
2270004036 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Snowblowers (Commercial)	0	0	0	0	0	0	0
2270004046 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Front Mowers (Commercial)	0	0	0	0	0	0	0
2270004056 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Lawn and Garden Tractors (Commercial)	0	0	0	0	0	0	0
2270004066 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Chippers/Stump Grinders (Commercial)	0	0	0	0	0	0	0
2270004071 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Turf Equipment (Commercial)	0	0	0	0	0	0	0
2270004076 Mobile Sources Off-highway Vehicle Diesel Lawn and Garden Equipment Other Lawn and Garden Equipment (Commercial)	0	0	0	0	0	0	0
2270005010 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment 2-Wheel Tractors	0	0	0	0	0	0	0
2270005015 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Agricultural Tractors	0	0	0	0	0	0	0
2270005020 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Combines	0	0	0	0	0	0	0
2270005025 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Balers	0	0	0	0	0	0	0
2270005030 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Agricultural Mowers	0	0	0	0	0	0	0
2270005035 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Sprayers	0	0	0	0	0	0	0
2270005040 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Tillers > 6 HP	0	0	0	0	0	0	0
2270005045 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Swathers	0	0	0	0	0	0	0
2270005055 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Other Agricultural Equipment	0	0	0	0	0	0	0
2270005060 Mobile Sources Off-highway Vehicle Diesel Agricultural Equipment Irrigation Sets	0	0	0	0	0	0	0
2270006005 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Generator Sets	0	3	0	0	0	0	1
2270006010 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Pumps	0	1	0	0	0	0	0
2270006015 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Air Compressors	0	2	0	0	0	0	1
2270006020 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Gas Compressors	0	0	0	0	0	0	0
2270006025 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Welders	0	1	0	0	0	0	1
2270006030 Mobile Sources Off-highway Vehicle Diesel Commercial Equipment Pressure Washers	0	0	0	0	0	0	0
2270006035 Mobile Sources Off-highway Vehicle Diesel Mobile Sources : Off-highway Vehicle Diesel: Commercial Equipment Mobile Sources : Off-highway Vehicle Diesel: Commercial Equipment : Hydro-power Units	0	0	0	0	0	0	0
2270007010 Mobile Sources Off-highway Vehicle Diesel Logging Equipment Shredders > 6 HP	0	0	0	0	0	0	0

City & Borough of Juneau - NonRoad Mobile Emissions							
Source Classification Code	**2005 Emissions, TPY**						
	VOC	NOX	SO2	PM10_PRI	PM25_PRI	NH3	CO
2270007015 Mobile Sources Off-highway Vehicle Diesel Logging Equipment Forest Eqp - Feller/Bunch/Skidder	0	0	0	0	0	0	0
2270009010 Mobile Sources Off-highway Vehicle Diesel Underground Mining Equipment Other Underground Mining Equipment	0	0	0	0	0	0	0
2270010010 Mobile Sources Off-highway Vehicle Diesel Industrial Equipment Other Oil Field Equipment	0	1	0	0	0	0	0
2280002030 Mobile Sources Marine Vessels, Commercial Diesel Fishing Vessels	0	0	0	0	0	0	0
2280004030 Mobile Sources Marine Vessels, Commercial Gasoline Fishing Vessels	0	0	0	0	0	0	0
2282005010 Mobile Sources Pleasure Craft Gasoline 2-Stroke Outboard	11	0	0	0	0	0	25
2282005015 Mobile Sources Pleasure Craft Gasoline 2-Stroke Personal Water Craft	11	0	0	0	0	0	24
2282010005 Mobile Sources Pleasure Craft Gasoline 4-Stroke Inboard/Sterndrive	1	1	0	0	0	0	15
2282020005 Mobile Sources Pleasure Craft Diesel Inboard/Sterndrive	0	1	0	0	0	0	0
2282020010 Mobile Sources Pleasure Craft Diesel Outboard	0	0	0	0	0	0	0
2285002015 Mobile Sources Railroad Equipment Diesel Railway Maintenance	0	0	0	0	0	0	0
2285004015 Mobile Sources Railroad Equipment Gasoline, 4-Stroke Railway Maintenance	0	0	0	0	0	0	1
2285006015 Mobile Sources Railroad Equipment LPG Railway Maintenance	0	0	0	0	0	0	0
2294000000 Mobile Sources Paved Roads All Paved Roads Total: Fugitives	0	0	0	2548	609	0	0
2296000000 Mobile Sources Unpaved Roads All Unpaved Roads Total: Fugitives	0	0	0	201	30	0	0
2275001000	0	0	0	1	26	0	1
2275020000	23	73	8	26		0	530
2275050000	12	5	1	7		0	336
2275060000	0	0	0	0	0	0	0
Total NonRoad Emissions	266	156	16	2791	673	0	2504

Attachment B

Presented by: The Manager
Introduced: 08/25/2008
Drafted by: J.W. Hartle

ORDINANCE OF THE CITY AND BOROUGH OF JUNEAU, ALASKA

Serial No. 2008-28

An Ordinance Amending the Woodsmoke Control Program Regarding Solid Fuel-Fired Burning Devices.

BE IT ENACTED BY THE ASSEMBLY OF THE CITY AND BOROUGH OF JUNEAU, ALASKA:

Section 1. Classification. This ordinance is of a general and permanent nature and shall become a part of the City and Borough Code.

Section 2. Amendment of Chapter. CBJ 35.40 Solid Fuel-Fired Burning Devices is amended to read:

36.40.010 Findings.

The assembly of the City and Borough finds that there has been a significant and unprecedented increase in the installation and use of solid fuel-fired burning devices in the City and Borough; that the increase in such installations and use in the Mendenhall Valley has been especially great; that such devices generally produce a high level of harmful airborne pollutants; and that the above conditions combined with atmospheric conditions throughout the municipality and other factors causing recurring smoke pollution conditions are detrimental to the health of, and offensive to, the people of Juneau. It is the purpose of this chapter to reduce the increase of airborne pollutants from open burning and from solid fuel-fired heating devices at the times and in the areas of the City and Borough that appear to be most adversely affected by such pollutants.

36.40.020 Smoke hazard area map adopted.

There are adopted as the maps identifying the smoke hazard areas of the City and Borough the maps entitled "Mendenhall Valley Smoke Hazard Area Map, City and Borough of Juneau, Alaska," dated September 30, 1985, and "Lemon Creek Smoke Hazard Area Map," dated December 10, 1985.

36.40.030 Definitions.

The following words, terms and phrases when used in this chapter, shall have the meanings ascribed to them in this section, except where the context clearly indicates a different meaning:

Masonry heater means a heating appliance constructed of concrete or solid masonry which is designed to absorb and store heat from a solid fuel fire built in the firebox by routing the exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox may include flow in a horizontal or downward direction before entering the chimney and which delivers heat by radiation from the masonry surface of the heater, or as otherwise defined in the current version of the International Building Code. Masonry heaters shall comply with one of the following:

1. Masonry heaters shall comply with the requirements of ASTM E 1602; or

2. Masonry heaters shall be listed and labeled in accordance with UL 1482 and installed in accordance with the manufacturer's installation instructions.

Open burning means the burning of a material which results in the products of combustion being emitted directly into the ambient air without passing through a stack or flue, but not including the burning of campfires, barbecues, candles or tobacco.

Particulate matter means any combination of particles transported in the air that are either coarse (between 2.5 micrometers and 10 micrometers) or fine (2.5 micrometers or less). The two types of particulate matter have separate regulatory requirements. These particles can form from solids or liquids and can be a health hazard when inhaled.

Person means an individual, partnership corporation, company or other association.

Solid fuel-fired heating device and device mean a device designed for solid fuel combustion so that usable heat is derived for the interior of a building, and includes solid fuel-fired stoves, fireplaces, solid fuel-fired cooking stoves and combination fuel furnaces or boilers which burn solid fuel, but does not include stoves, fireplaces, furnaces, or boilers designed and used exclusively for the combustion of wood pellets having a maximum length of one inch in any dimension.

36.40.040 Air pollution alerts and emergencies.

(a) For the purposes of this section, the manager shall declare an air pollution emergency to be in effect whenever the ambient concentration of particulate matter within the air pollution zone equals or exceeds thirty micrograms per cubic meter (ug/m^3) averaged over a 24-hour period and will remain at or above 30 ug/m^3 if an emergency is not called. The manager may call an emergency whenever available scientific and meteorological data indicate that the ambient concentration of particulate matter within a smoke hazard area can reasonably be expected to equal or exceed 30 ug/m^3 averaged over a 24-hour period. When, in the opinion of the manager, meteorological and scientific data indicate that the type of particulate measured is not hazardous, the limit may be adjusted. The manager may call an emergency upon a finding that smoke conditions are, or are likely to become, a danger to health or generally objectionable to persons in a smoke hazard area.

(b) Within a smoke hazard area, no person may operate a solid fuel fired heating device, other than a masonry heater, during an air pollution emergency declared by the manager pursuant to subsection (a) of this section.

(c) *Reserved.*

(d) *Reserved.*

(e) Notice of an air pollution emergency is adequate if published in a newspaper of general circulation within the City and Borough, or if given orally at least three times during a six-hour period by at least two radio stations operating within the City and Borough, or if made available to the general public in the form of a recorded telephone message the telephone number for which is published in the telephone directory or newspaper of general circulation within the City and Borough, or if made available to the general public as a posting on the municipal webpage the address for which is published in the telephone directory or newspaper of general circulation within the City and Borough. The prohibition shall be effective from the earlier of the time stated in the notice, 6:00 p.m. of the day the notice is published in a newspaper, the time the last required announcement of the notice is given by radio, or two hours after the time the recorded message is first made available by telephone or webpage.

(f) Notwithstanding the provisions of subsection (b) of this section, solid fuel fired heating devices may be used at any location during a loss of electrical power service to that location. Use of the device may commence no sooner than two hours after the loss of electrical service and shall be terminated as soon as practicable after reestablishment of service.

36.40.050 *Reserved.*

36.40.060 Open burning.

(a) No person may engage in the open burning of any material except as authorized by a valid open burning permit. Open burning permits may be issued by the manager or the manager's designee upon application. No permit may be issued for open burning in the Mendenhall Valley or the Lemon Creek smoke hazard areas during the period of November 1 through March 31. Open burning by commercial businesses is not allowed.

(b) Open burning permits shall be valid only for the times and locations specified in the permit. Permits shall be issued only when weather conditions or smoke conditions are not such as to cause the burning to be, or be likely to become, a danger to the public health or generally objectionable. The manager or the manager's designee may base such determination upon direct observation or upon reports or forecasts from other agencies.

(c) A person may engage in open burning only if the fire is tended to at all times; the fire is not within 50 feet of any building; the prevailing wind direction is away from any structure or roadway; and the open burn is conducted during a period of adequate air movement.

(d) When burning land-clearing debris, slash piles must be loosely stacked to promote maximum combustion efficiency throughout the burn cycle. Noncombustible material must be minimized so as to not cause or create dense smoke. The manager or the manager's designee may, at their discretion, require the use of fans to promote enhanced combustion.

(e) No person may cause or allow open burning which creates a danger to public health or safety or a public or private nuisance. No person may cause or allow the open burning of asphalt, rubber, plastic, tar, wire insulation, petroleum products, automobile parts, petroleum-treated products, treated lumber, oily waste, contaminated oil cleanup materials, or other materials in a way that produces black smoke; or of putrescible garbage, animal carcasses, or petroleum-based materials.

(f) "Open burning" means the burning of a material that results in the products of combustion being emitted directly into the ambient air without passing through a contaminant outlet.

(g) This section 36.40.060 is applicable only to those portions of the City and Borough within the Roaded Service Area No. 9.

36.40.070 Permits.

(a) Upon a showing of justifiable need, the manager may issue a temporary permit authorizing operation of a solid fuel fired heating device in circumstances otherwise prohibited by this code. "Justifiable need" includes occasions when a furnace or central heating system is inoperable other than through the owner's own actions or neglect.

(b) The manager may issue a temporary special burning permit to the municipal fire department for the purpose of training fire fighters, if the fire is restricted to a building or structure or a permanent training facility, and if the material to be burned is not allowed to smolder after the training session has terminated and no public nuisance is created. Special burning permits will not be issued during either an air alert or an air emergency.

36.40.080 Solid fuel combustion and smoke emission standards.

(a) No person shall use a solid fuel-fired heating device for the combustion of any material other than paper, cardboard or untreated wood.

(b) No person may operate a solid fuel-fired heating device in such a manner that visible emissions reduce visibility through the exhaust effluent by 50 percent or greater for more than 15 minutes in any one hour as determined by a test conducted in substantial compliance with the regulations applicable to the visual determination of stationary source emission opacity promulgated at 40 CFR 60, Appendix A, by the United States Environmental Protection Agency; provided, and notwithstanding any contrary provisions in the regulation, opacity observation shall be made at the point of greatest opacity in any portion of the emissions plume without regard to the presence or absence of condensed water vapor.

36.40.090 Penalties.

The first violation of any section of this chapter is an infraction. Each subsequent violation is a Class B misdemeanor.

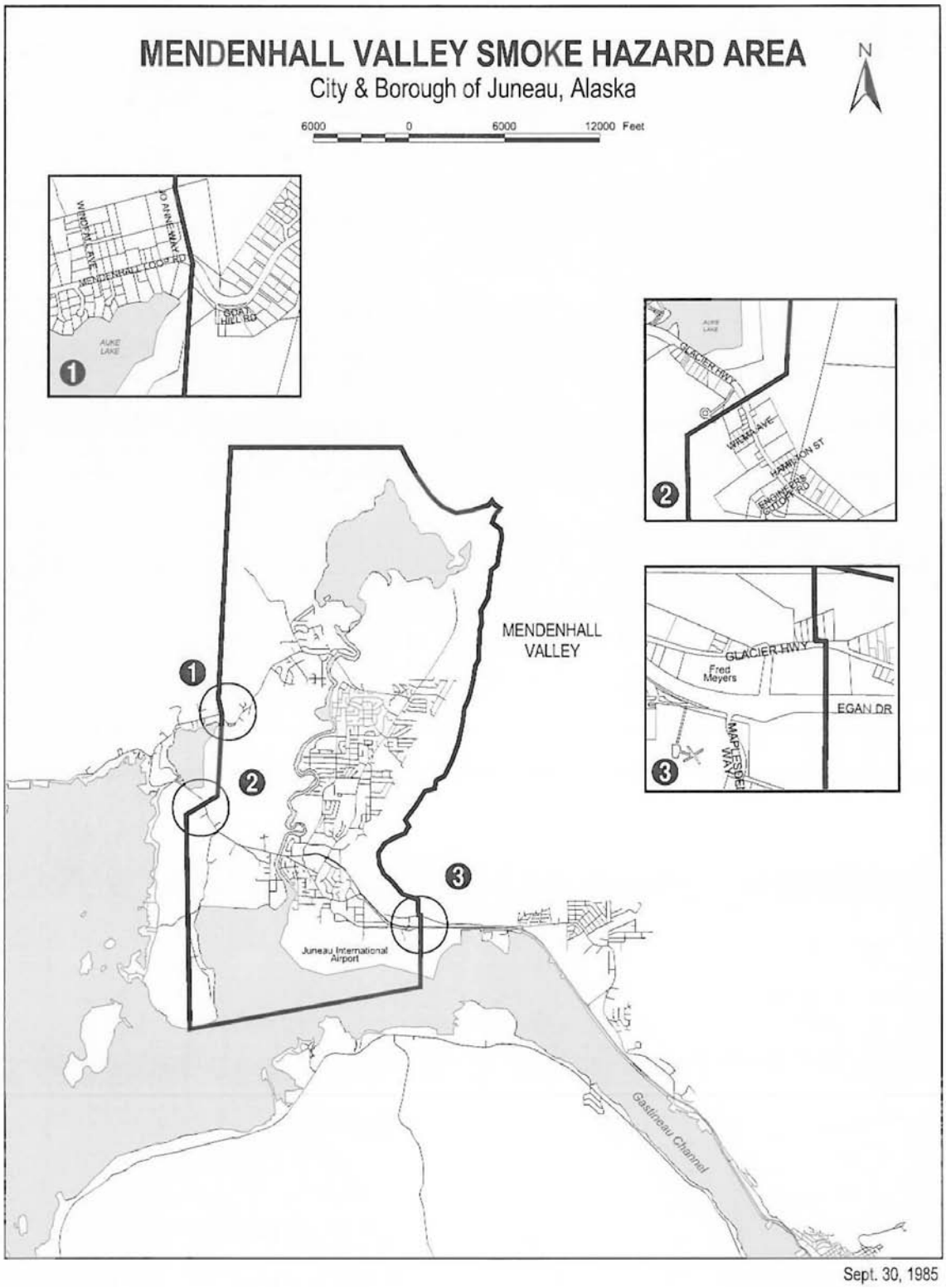
Section 3. Effective Date. This ordinance shall be effective 30 days after its adoption.

Adopted this 8th day of September, 2008.

Bruce Botelho, Mayor

Attest:

Elizabeth J. McEwen, Deputy Clerk


MENDENHALL VALLEY SMOKE HAZARD AREA
City & Borough of Juneau, Alaska
N
6000 0 6000 12000 Feet
MENDENHALL VALLEY
Juneau International Airport
Gastineau Channel
GLACIER HWY
Fred Meyers
EGAN DR
MAPLE ST
WILMA AVE
HAMILTON ST
MENDENHALL LOOP RD
AUKE LAKE
BOAT HILL RD
Sept. 30, 1985