Alaska Department of Environmental Conservation

Amendments to:
State Air Quality Control Plan

Vol. III: Appendix III.D.5.03

{Appendix to Volume II. Analysis of Problems, Control Actions; Section III. Area-wide Pollutant Control Program; D. Particulate Matter; 5. Fairbanks North Star Borough PM2.5 Control Plan }

Public Review Draft

November 14, 2014

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Governor

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Appendix III.D.5.03

Non-Attainment Area Boundary

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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:

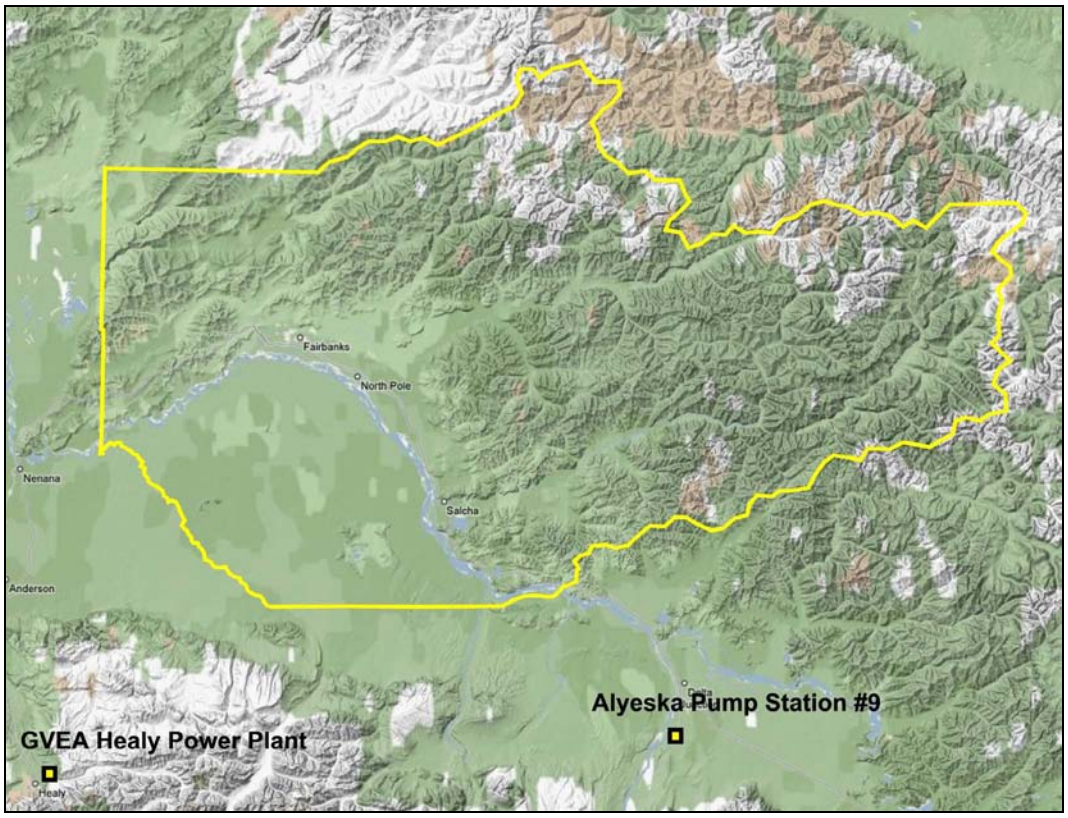
- Alyeska TransAlaska Pipeline Pump Station #9 – Located near Delta Junction, 105 miles from Fairbanks; and

- 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 µg/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

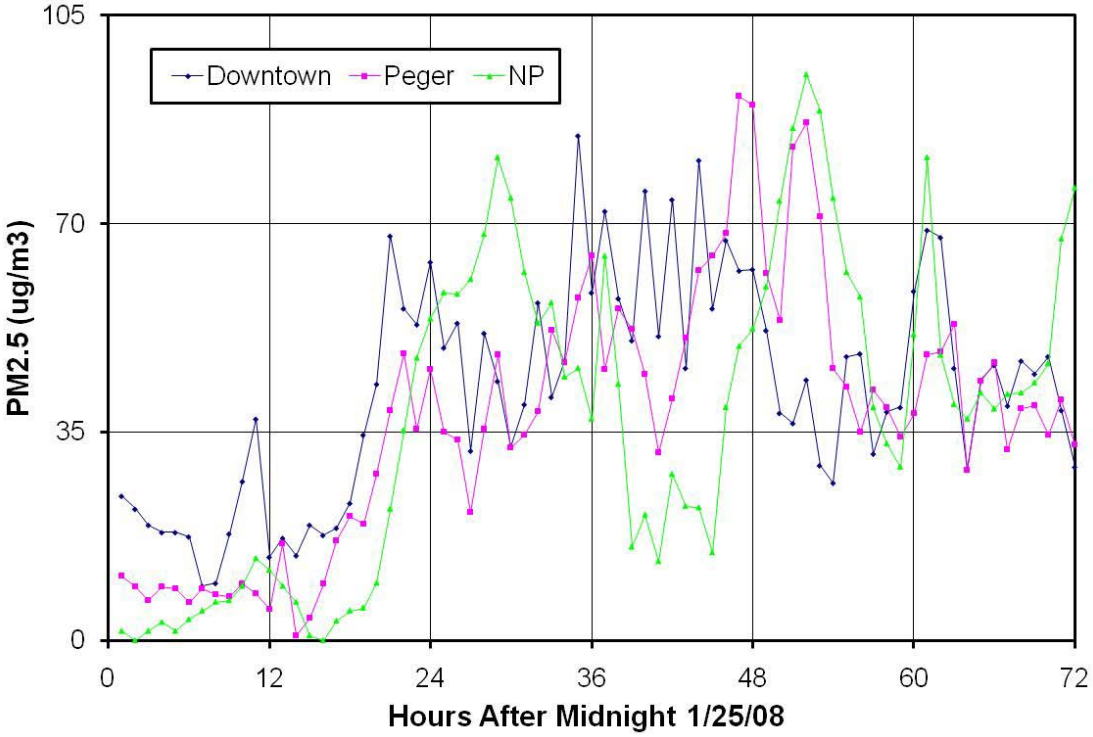
* Based on Downtown minus the mean of the north & south values.

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.

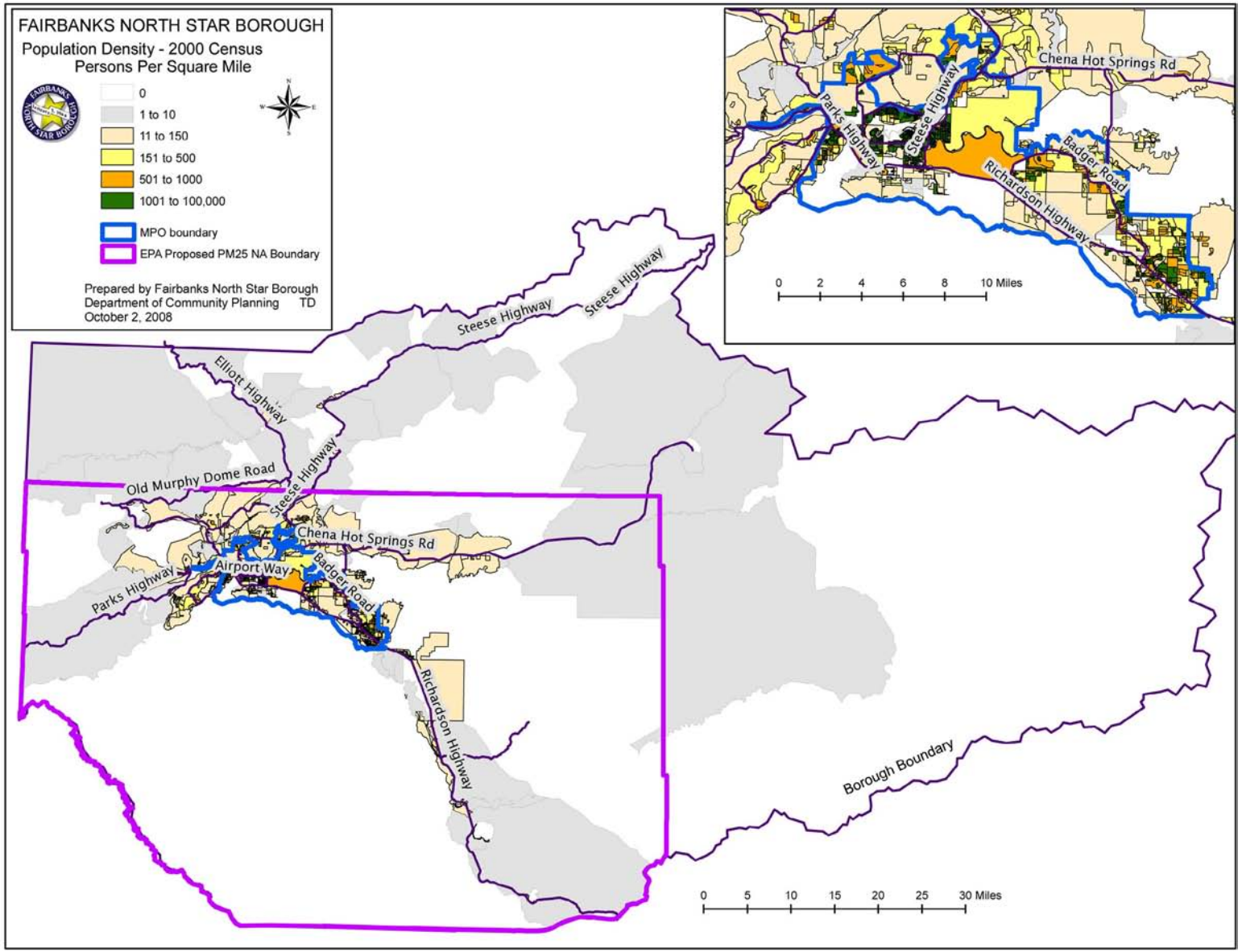
Factor 4: Traffic and Commuting Patterns

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 µg/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

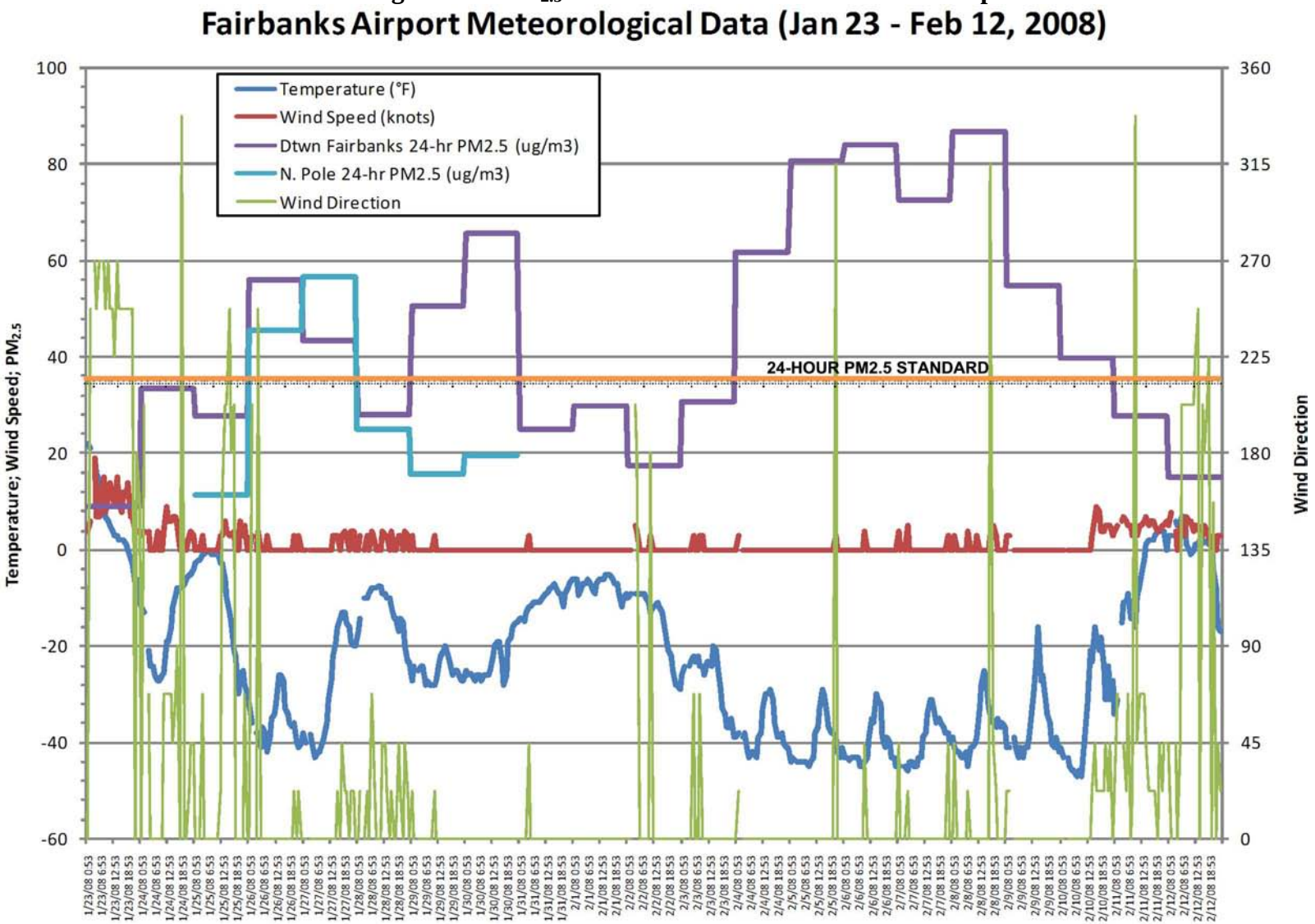


Figure 6
Meteorological and $PM_{2.5}$ data for Fort Wainwright Army Air Field

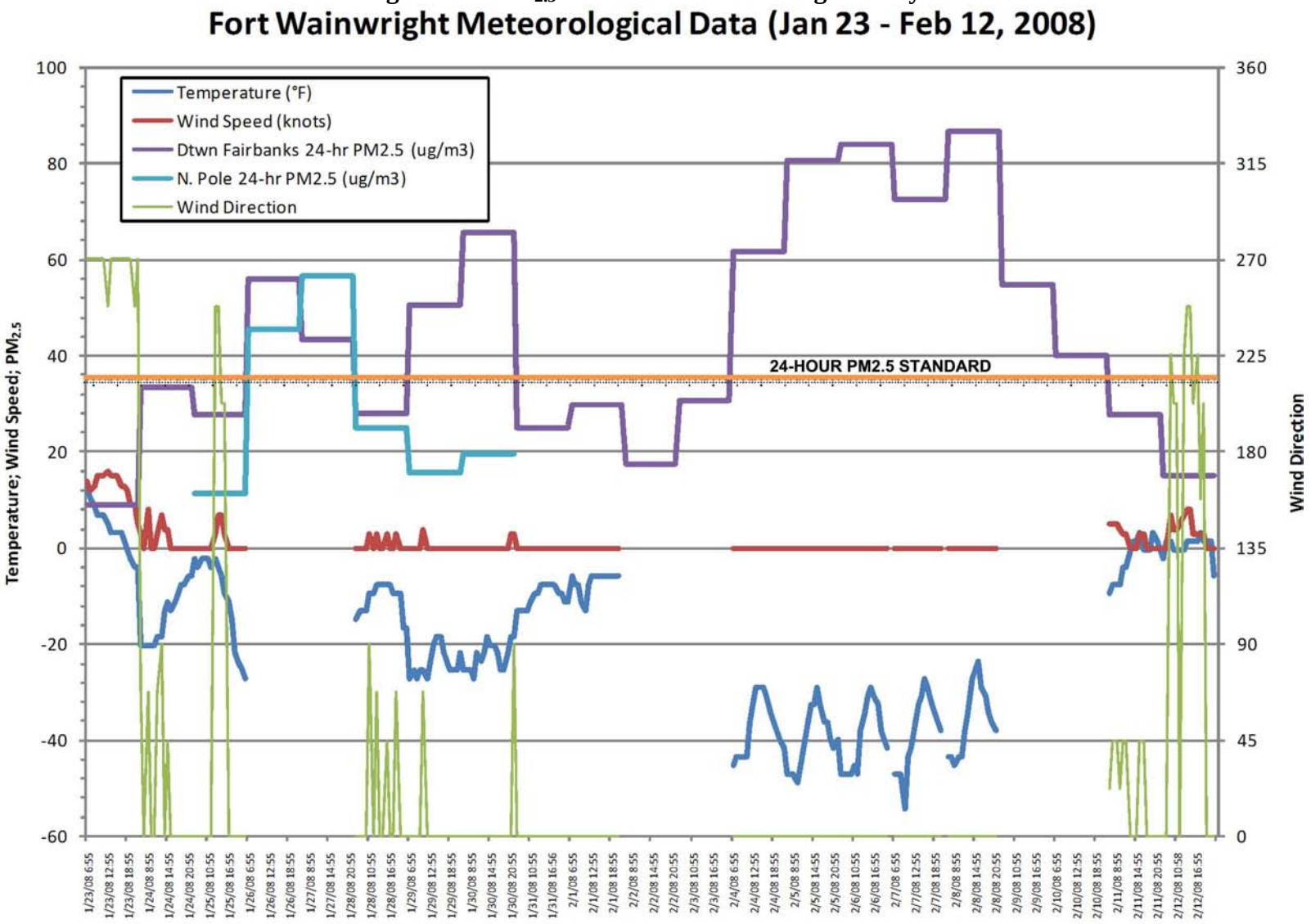


Figure 7
Meteorological and $PM_{2.5}$ data for Eielson Air Force Base

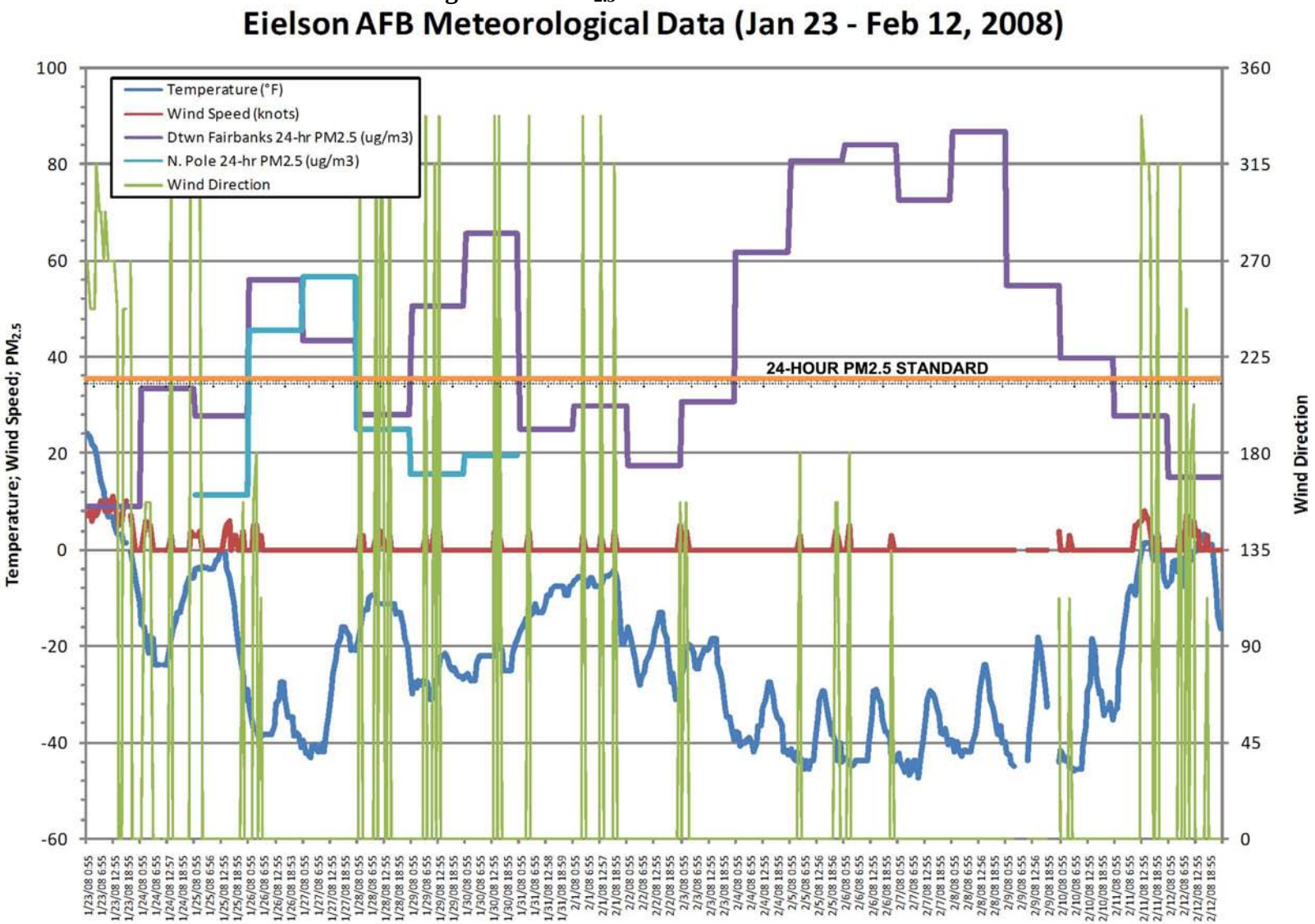
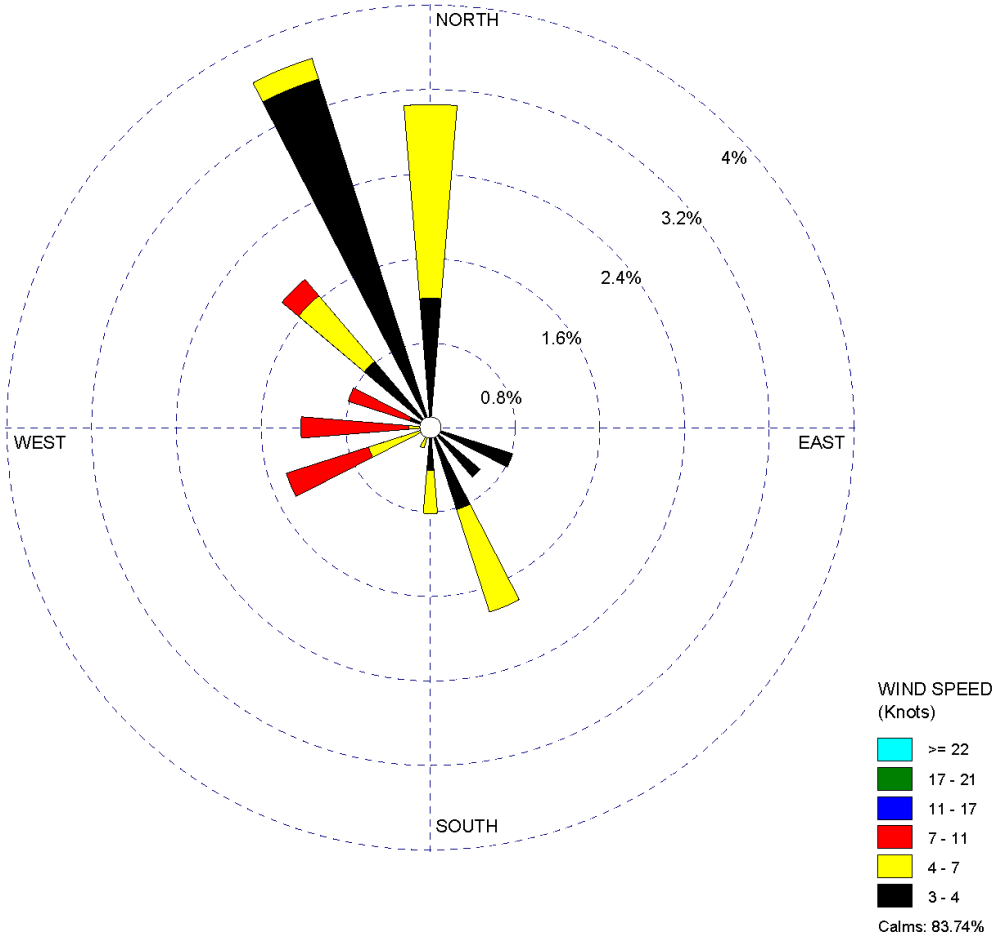


Figure 8
Wind Rose for the Surface Meteorological Station at the Eielson AFB

WIND ROSE PLOT:
FAIRBANKS/EIELSON AFB

DISPLAY:
Wind Speed
Direction (blowing from)

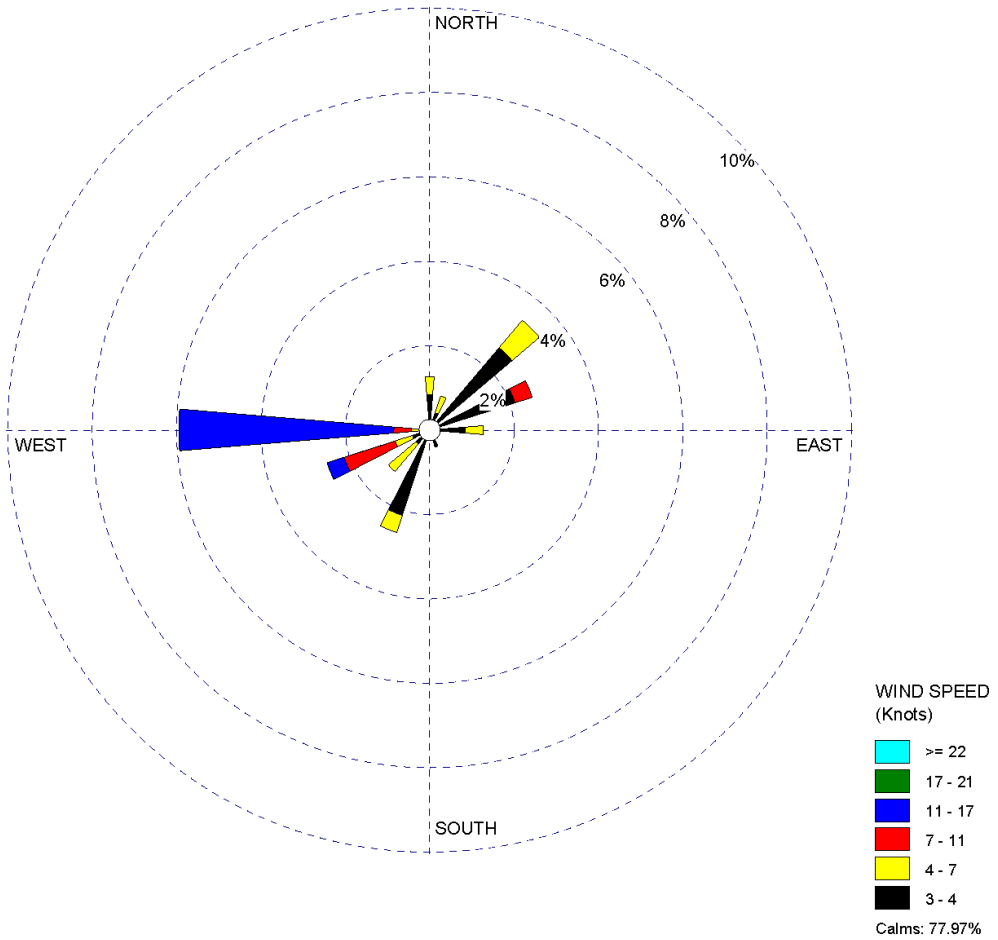


COMMENTS:	DATA PERIOD:	COMPANY NAME:	
- Surface data - Calm = WS<3 knots	**2008** **Jan 23 - Feb 12** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **83.74%**	TOTAL COUNT: **492 hrs.**	
	AVG. WIND SPEED: **0.83 Knots**	DATE: **10/15/2008**	PROJECT NO.:

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)

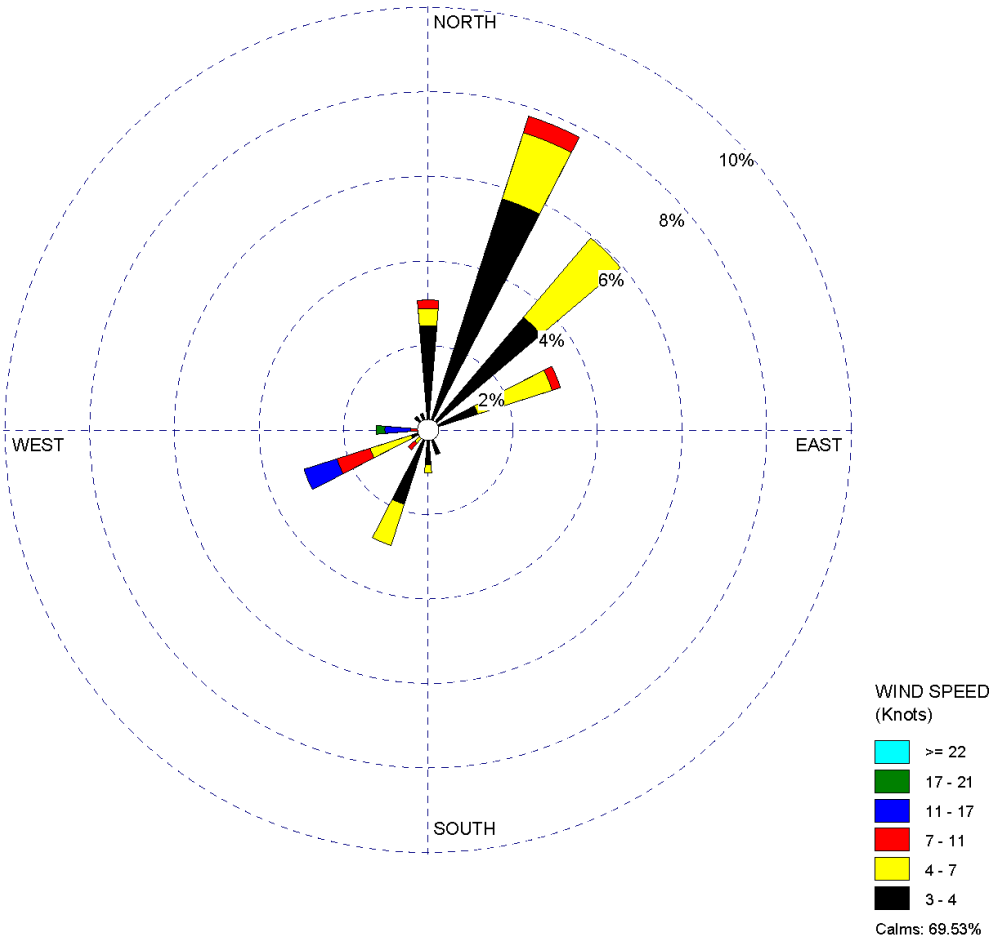


COMMENTS:	DATA PERIOD:	COMPANY NAME:	
- Surface data - Calm = WS<3 knots	**2008** **Jan 23 - Feb 12** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **77.97%**	TOTAL COUNT: **236 hrs.**	
	AVG. WIND SPEED: **1.53 Knots**	DATE: **10/15/2008**	PROJECT NO.:

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

WIND ROSE PLOT:
Station #26411 - FAIRBANKS/INT'L ARPT, AK

DISPLAY:
Wind Speed
Direction (blowing from)

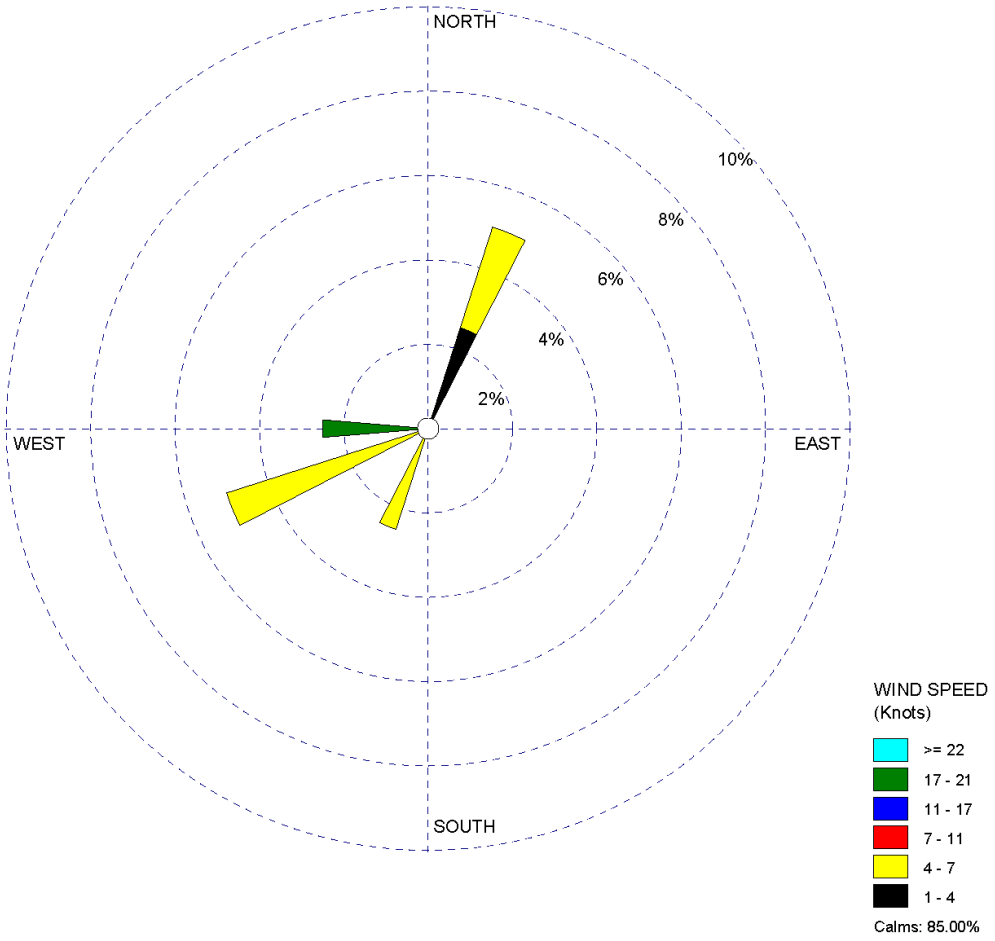


COMMENTS:	DATA PERIOD:	COMPANY NAME:	
- Surface ASOS data - Calm = WS<3 knots	**2008** **Jan 23 - Feb 12** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **69.53%**	TOTAL COUNT: **489 hrs.**	
	AVG. WIND SPEED: **1.53 Knots**	DATE: **10/15/2008**	PROJECT NO.:

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

WIND ROSE PLOT:
Station #26411 - FAIRBANKS/INT'L ARPT, AK

DISPLAY:
Wind Speed
Direction (blowing from)

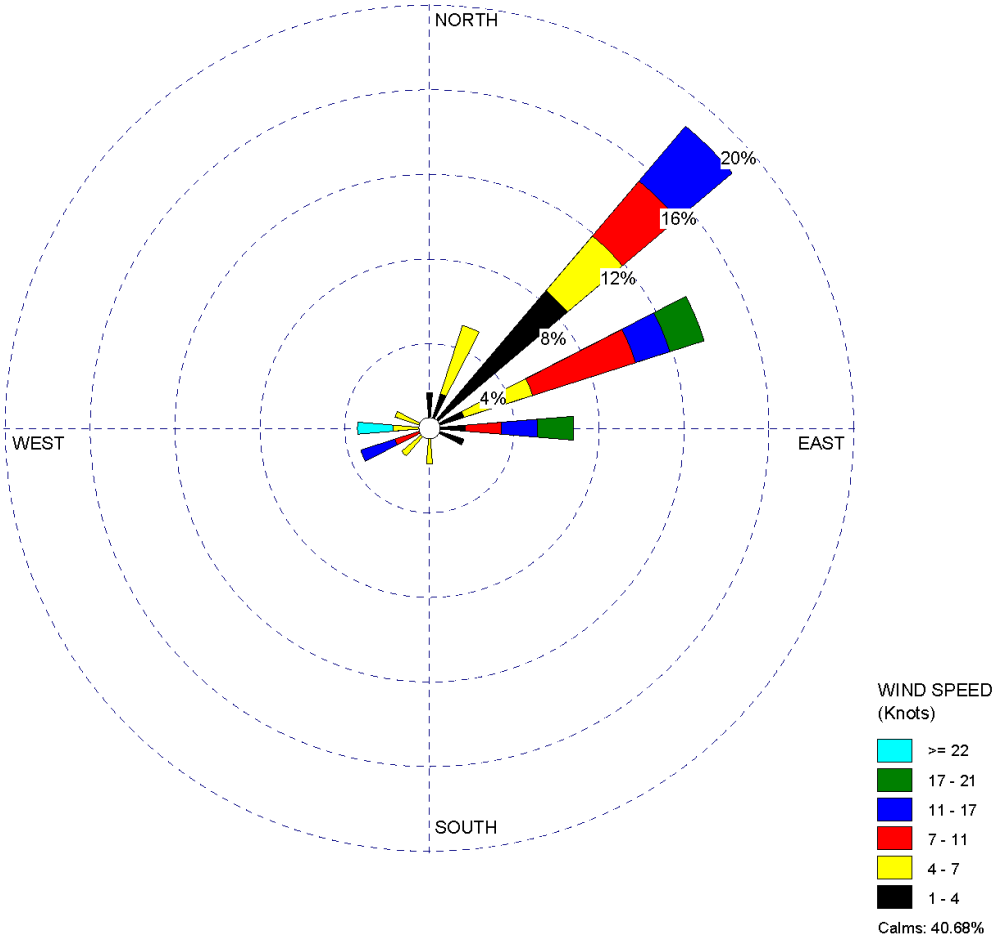


COMMENTS:	DATA PERIOD:	COMPANY NAME:	
- Sounding data - surface level - Calm = WS<3 knots	**2008** **Jan 23 - Feb 12** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **85.00%**	TOTAL COUNT: **40 hrs.**	
	AVG. WIND SPEED: **1.13 Knots**	DATE: **10/13/2008**	PROJECT NO.:

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

WIND ROSE PLOT:
Station #26411 - FAIRBANKS/INT'L ARPT, AK

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
- Sounding data - 200 to 300 meters above ground level - Calm = WS<3 knots	**2008** **Jan 23 - Feb 12** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **40.68%**	TOTAL COUNT: **59 hrs.**	
	AVG. WIND SPEED: **4.94 Knots**	DATE: **10/13/2008**	PROJECT NO.:

Factor 7: Geography and Topography

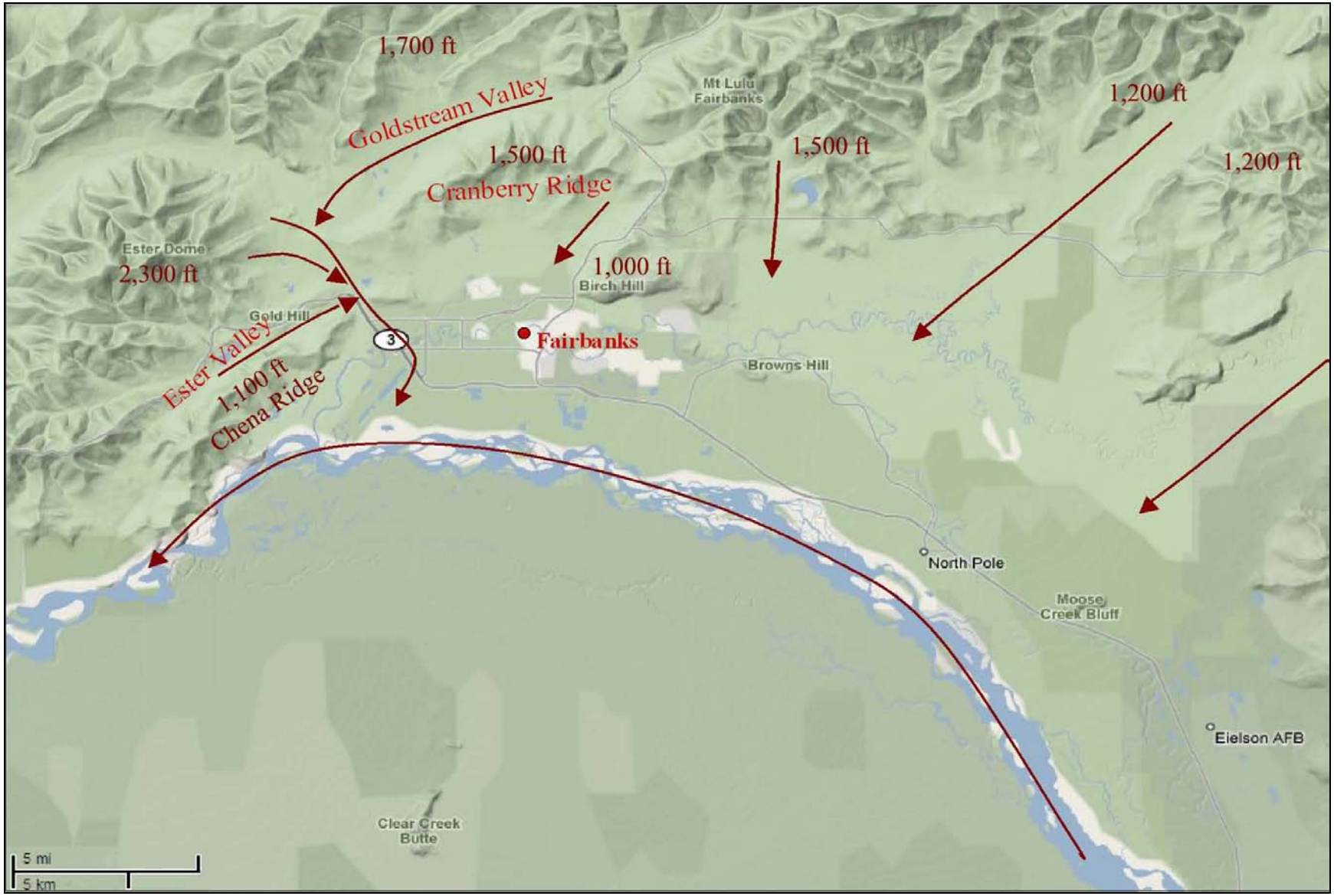
Fairbanks, Alaska is located at an elevation of approximately 440 feet above sea level (ASL) and is bordered on the west, north, and east by mountain ridges, such as Ester Dome and Cranberry Ridge (Figure 13), ranging in height from 1,000 feet to nearly 2,500 feet; on the south, it is bordered by the 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

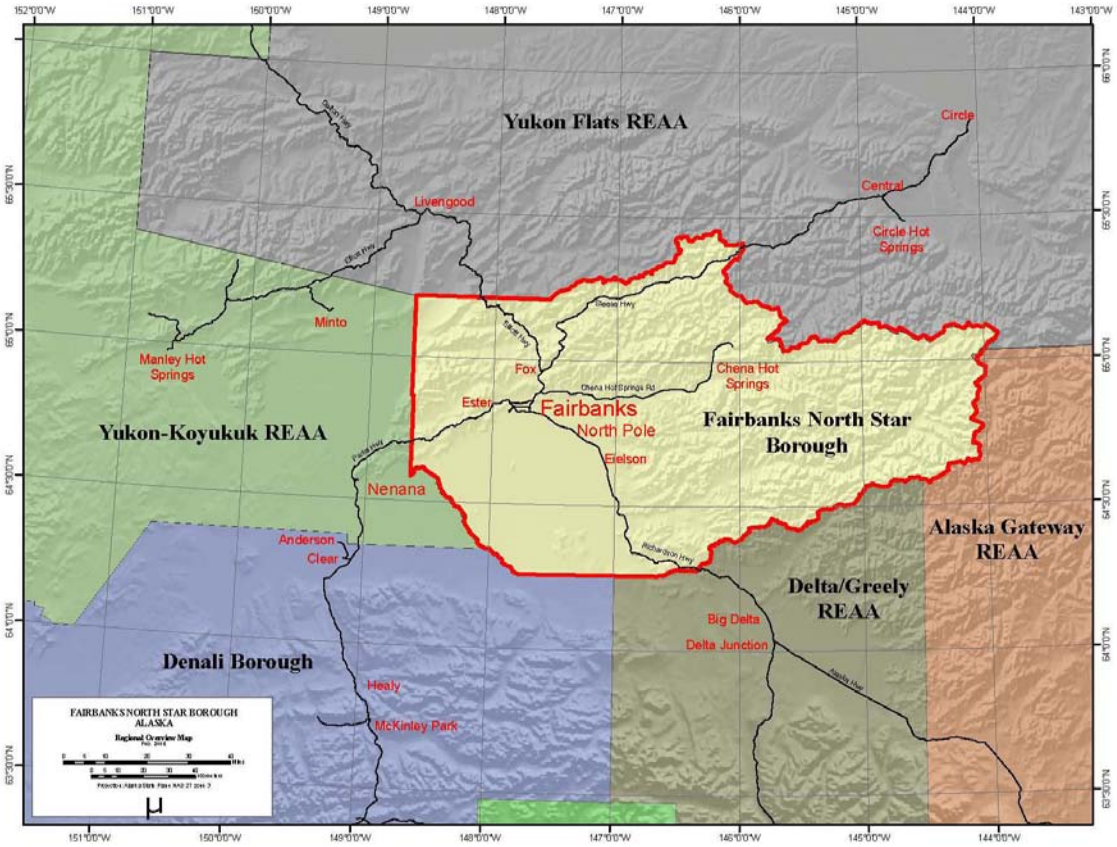


Figure 15
City Boundaries within the Fairbanks North Star Borough

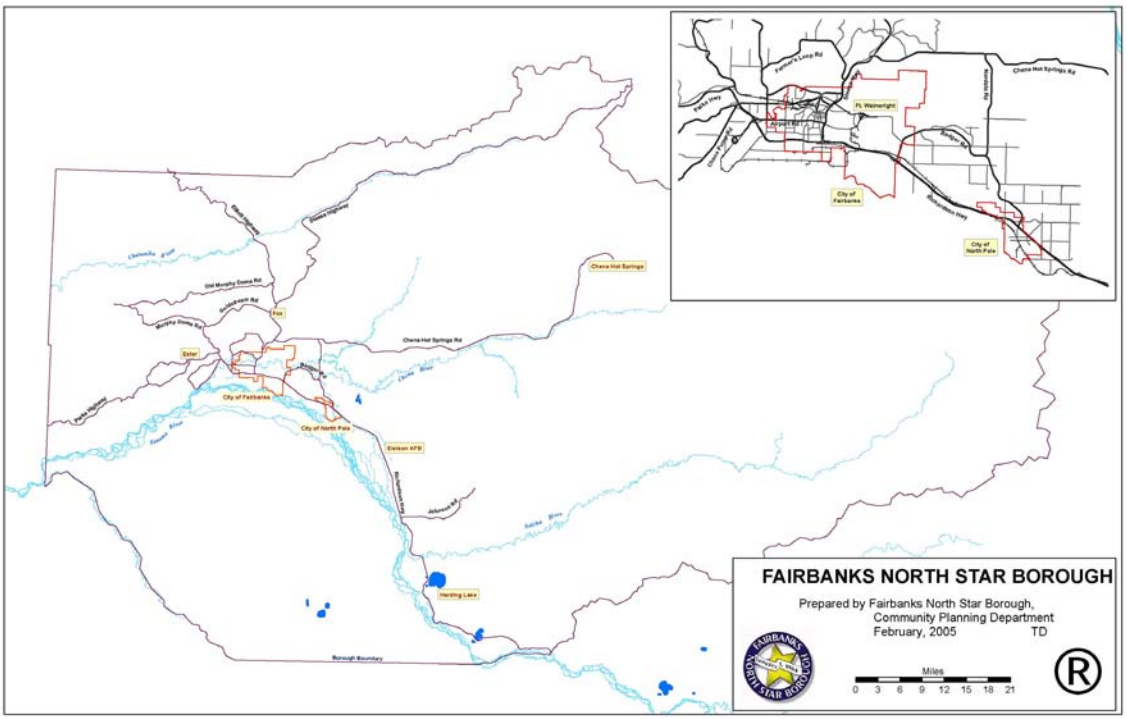
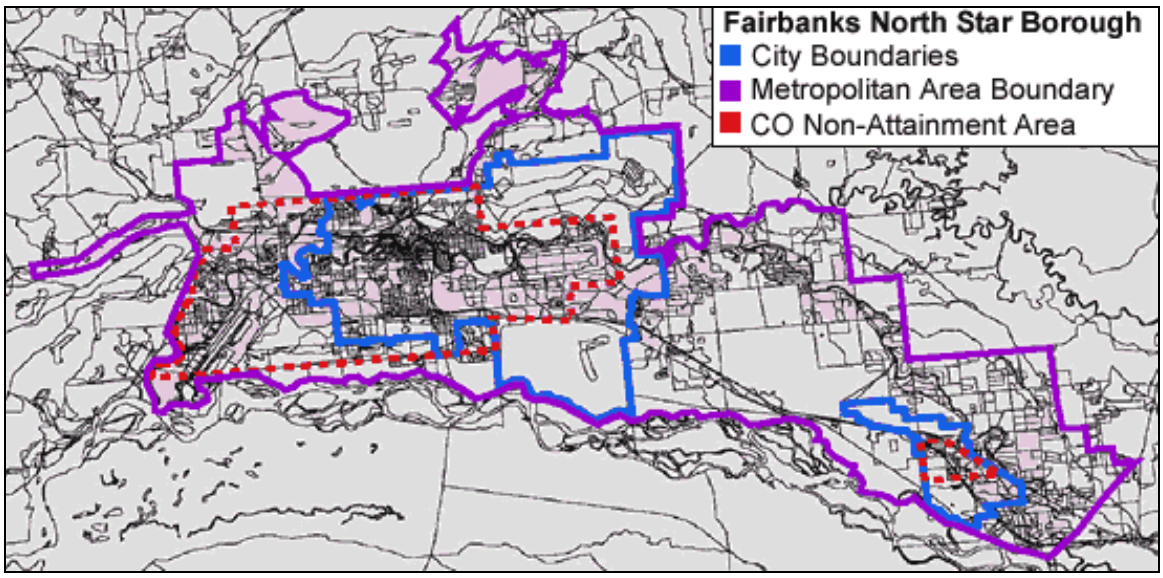


Figure 16
FMATS Boundary



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

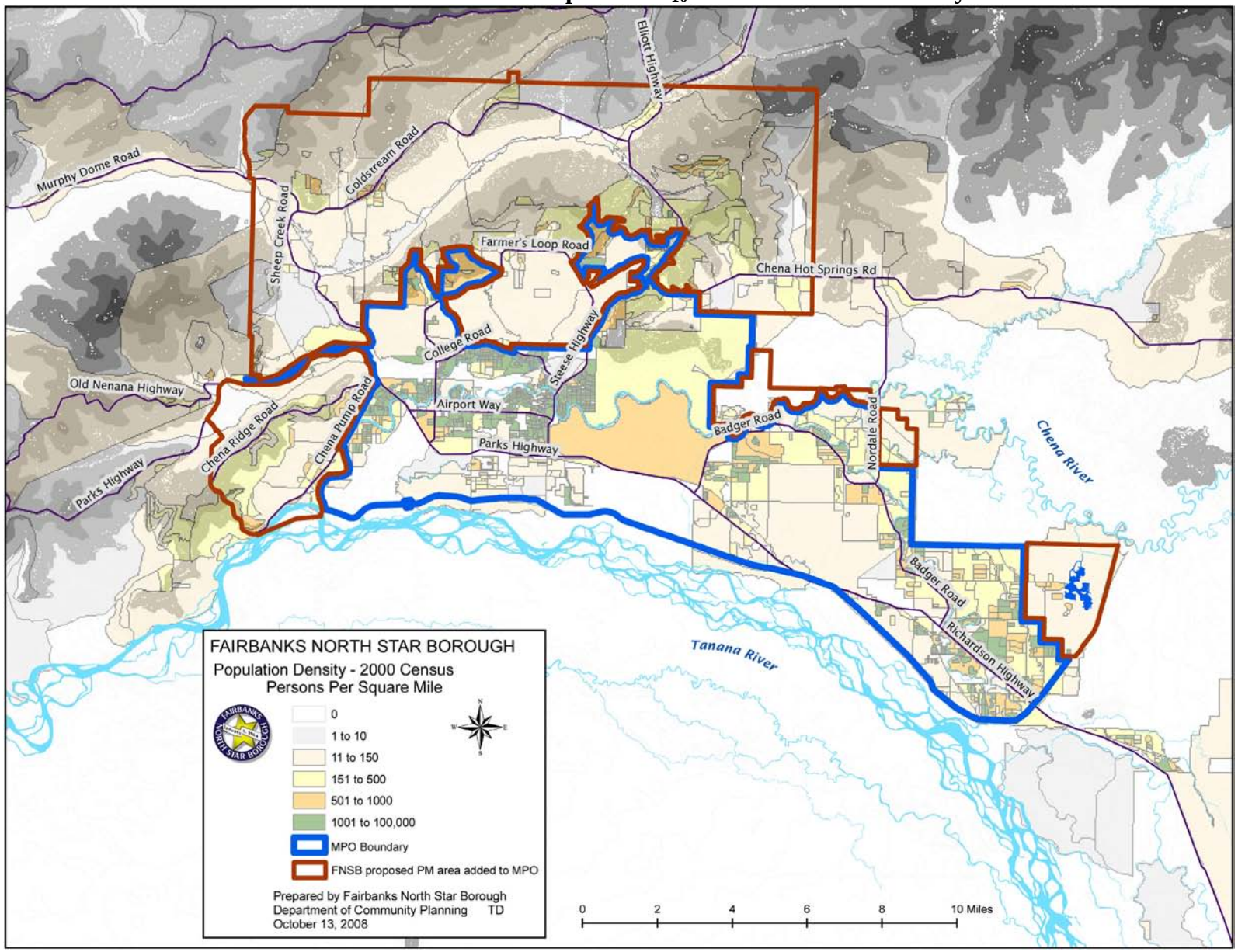
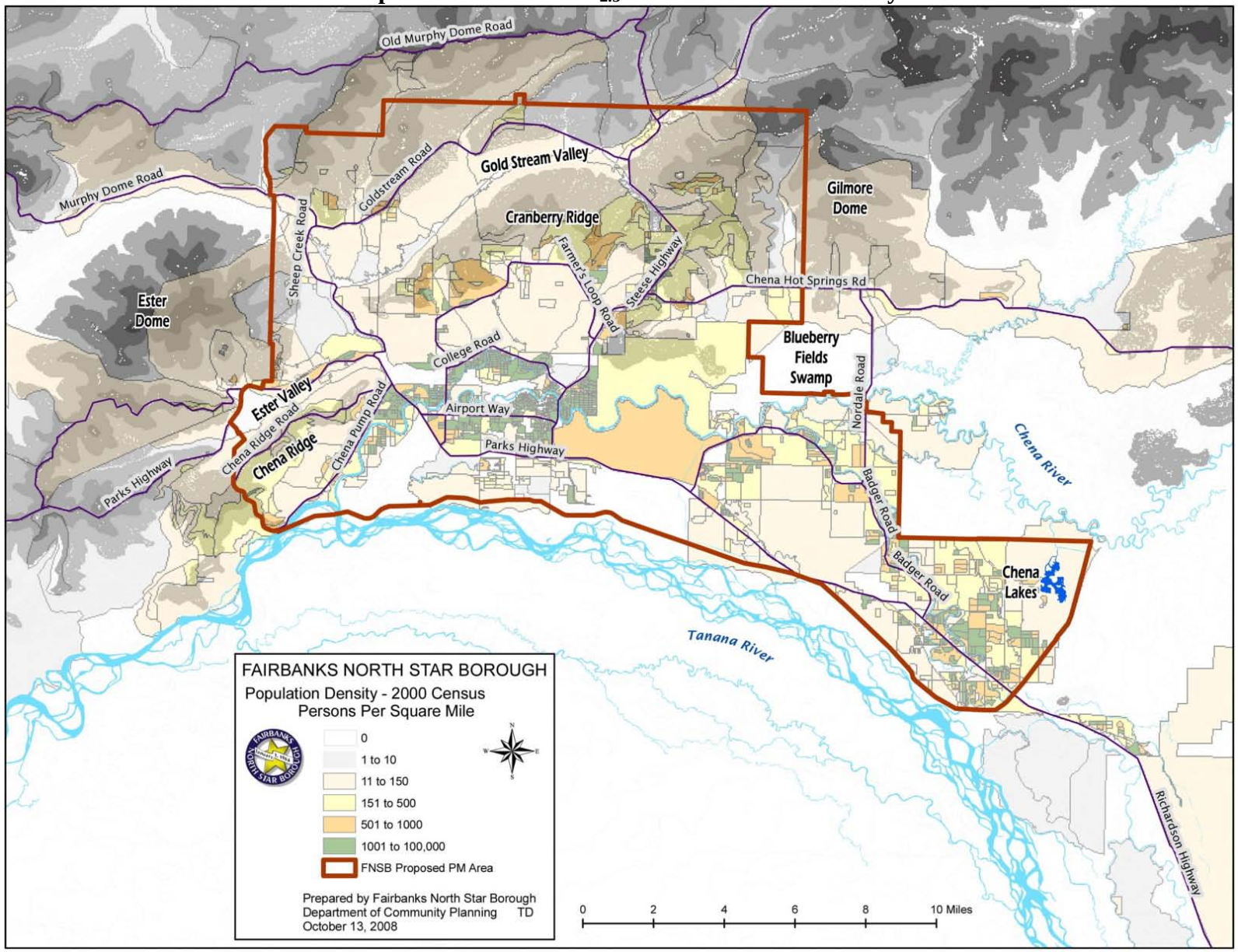


Figure 18
Proposed Fairbanks $PM_{2.5}$ Nonattainment Boundary



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							
	2005 Emissions, TPY						
Source Classification Code	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