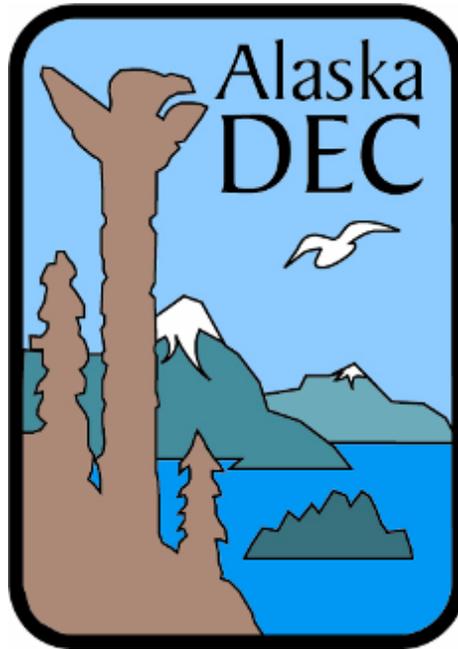


Alaska's 2012 Air Monitoring Network Plan

Chapter 3 - Fairbanks



Prepared by:

State of Alaska Department of Environmental Conservation
Division of Air Quality
Air Monitoring and Quality Assurance Section
619 E. Ship Creek Ave. Suite 249
Anchorage, AK 99501

Table of Contents

3	<i>FAIRBANKS MONITORING SITES</i>	1
3.1	General Information	1
3.2	OLD POST OFFICE SITE - FAIRBANKS	3
3.2.1	Site Information.....	3
3.2.2	Sources	3
3.2.3	Monitors	4
3.2.4	Siting	4
3.2.5	Traffic.....	4
3.3	STATE OFFICE BUILDING - FAIRBANKS	6
3.3.1	Site Information.....	6
3.3.2	Sources	6
3.3.3	Monitors	7
3.3.4	Siting	7
3.3.5	Traffic.....	7
3.4	NCORE – FAIRBANKS	9
3.4.1	Site Information.....	9
3.4.2	Sources	9
3.4.3	Monitors	9
3.4.1	Siting	10
3.4.2	Traffic.....	10
3.5	TAC (PEGER ROAD) SITE - FAIRBANKS	13
3.5.1	Site Information.....	13
3.5.2	Sources	13
3.5.3	Monitors	13
3.5.4	Siting	14
3.5.5	Traffic.....	14
3.6	NORTH POLE ELEMENTARY SITE – NORTH POLE	16
3.6.1	Site Information.....	16
3.6.2	Sources	17
3.6.3	Monitors	17
3.6.4	Siting	17
3.6.5	Traffic.....	17

List of Figures

<i>Table 3.1:1 SLAMS and SPM sites in the Fairbanks North Star Borough.....</i>	<i>1</i>
<i>Figure 3.1:1 Map of the Fairbanks and North Pole Area. Red dots indicate the locations of the monitoring sites.....</i>	<i>2</i>
<i>Figure 3.2:1 Map and satellite image of the Old Post Office monitoring site. The red circles indicate the site location.....</i>	<i>3</i>
<i>Figure 3.3:1 Map and satellite image of the State Office Building. The red dot and circle indicate the site location.....</i>	<i>6</i>
<i>Figure 3.3.2: Pictures of the State Office Building</i>	<i>8</i>
<i>Figure 3.4:1 Map and new shelter of the NCore monitoring site. The red dot indicates the site location.....</i>	<i>9</i>
<i>Figure 3.4:2 Pictures of the NCore monitoring site.....</i>	<i>12</i>
<i>Figure 3.3:1 Map of the TAC (Peger Road) monitoring site. The red dot indicates site location.....</i>	<i>13</i>
<i>Figure 3.5:2: Pictures of the TAC (Peger Rd.) site.....</i>	<i>15</i>
<i>Figure 3.6:1 Map of the North Pole monitoring site. The red square indicates site location.....</i>	<i>16</i>
<i>Figure 4.8.2: Pictures of the North Pole Site</i>	<i>18</i>

List of Tables

<i>Table 3.1:1 SLAMS and SPM sites in the Fairbanks North Star Borough.....</i>	<i>1</i>
---	----------

3 FAIRBANKS MONITORING SITES

3.1 General Information

Fairbanks is the second largest city in Alaska (population¹ 31,535), located within the Fairbanks North Star Borough (FNSB; population 97,581). Fairbanks is situated on the banks of the Chena River in the upper Tanana Valley. Interior Alaska experiences seasonal temperature extremes. The average temperatures range from -2°F to -19°F in the winter and from 53°F to 72°F in the summer. Temperatures have been recorded as low as -78°F in mid-winter, and as high as 93°F in summer. Average annual precipitation is 11.3 inches. Ice fog is common during the winter. Fairbanks experiences 21 hours of direct daylight between May 10th and Aug. 2nd each summer, and less than 4 hours of daylight between Nov. 18th and Jan. 24th each winter.

Fairbanks was designated non-attainment for carbon monoxide (CO) on November 15, 1990. The community developed a rigorous Inspection and Maintenance (I&M) program to reduce tail pipe emissions from automobiles and the EPA required automobile manufacturers to reduce environmental pollution, both of which have helped improve area air quality in the Fairbanks North Star Borough. Not having had any CO exceedances for several years, Fairbanks requested re-designation and was placed in CO “maintenance” status on July 23, 2004. Appendix A lists the definitions of each designation.

The FNSB Air Program operates and manages five monitoring stations: one State and Local Air Monitoring Site (SLAMS) for CO, one SLAMS site for PM_{2.5}, one Speciation Trend Network (STN) site, and three Special Purpose Monitoring (SPM) sites for PM_{2.5}. The FNSB SLAMS, STN, and SPM sites are identified below in Table 3-1:1. Appendix B lists siting criteria for each type of monitoring site.

The Fairbanks and North Pole monitoring sites are located within the Northern Alaska Air Quality Control Region. Figure 3-1:1 is a map showing the entire Fairbanks and North Pole area. The red dots indicate the locations of the five monitoring sites. Fairbanks is bordered by hills to the north and west, with the flats opening up to the south and east.

Table 3.1:1 SLAMS and SPM sites in the Fairbanks North Star Borough

<u>PM_{2.5}</u>					
<u>Site Name</u>	<u>Location</u>	<u>AQS ID</u>	<u>Designation</u>	<u>Install Date</u>	<u>Scale</u>
State Office	Fairbanks	02-090-0010	SLAMS/STN	Oct, 1998	neighborhood
TAC (Peger Rd)	Fairbanks	n/a	SPM	Nov, 2007	neighborhood
North Pole	North Pole	n/a	SPM	Nov, 2008	neighborhood
NCore	Fairbanks	n/a	SPM	Oct, 2009	neighborhood
<u>CO</u>					
<u>Site Name</u>	<u>Location</u>	<u>AQS ID</u>	<u>Designation</u>	<u>Install Date</u>	<u>Scale</u>
Old Post Office	Fairbanks	02-090-0002	SLAMS	Jan, 1972	micro

¹ Population data obtained from 2010 US Census (April 1, 2011).



Figure 3.1:1 Map of the Fairbanks and North Pole Area. Red dots indicate the locations of the monitoring sites.

3.2 OLD POST OFFICE SITE - FAIRBANKS

250 Cushman Street
Parameters: CO

AQS ID 02-090-0002
Established: January 1, 1972

3.2.1 Site Information

The site is located in the Old Post Office building at 250 Cushman Street at latitude 64° 50' 43" north (64.845278), longitude 147° 43' 16" west (-147.721111), and 140 meter (460 feet) above sea level. Figure 3.2:1 shows a street map of downtown Fairbanks and satellite image of the area. The site is located in the middle of the central business district. The Old Post Office is a micro-scale, population-oriented site located in downtown Fairbanks.

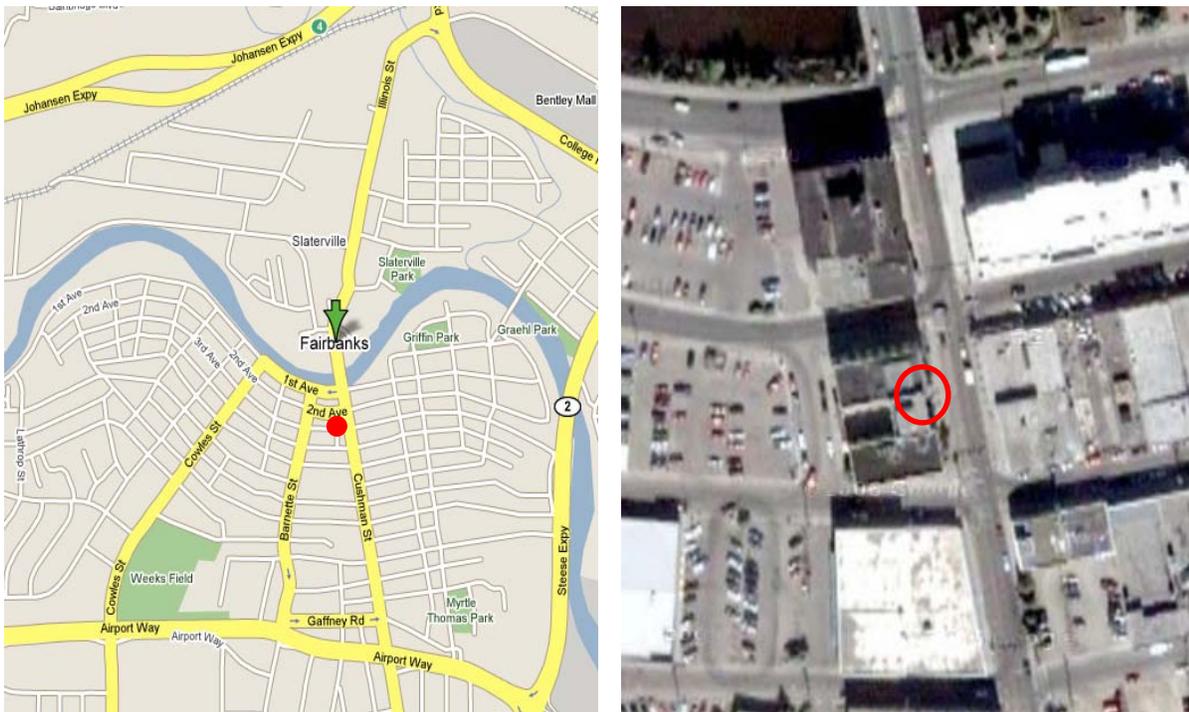


Figure 3.2:1 Map and satellite image of the Old Post Office monitoring site. The red circles indicate the site location.

3.2.2 Sources

The dominant source of CO emissions for this site is automobile exhaust. Within 200 meters of the site, land use is predominantly business (generally medical practices and small offices) with some small single family dwellings. Many older downtown houses have chimneys and may be using woodstoves in the winter for supplemental heat. The Alaska Railroad industrial area (north) and the Aurora Energy coal fired power plant (west) are both located within one mile of the site. Coal-fired power plants operated by the University of Alaska (to the west) and Fort Wainwright Army Post (to the east) are located within five miles. Fairbanks is regularly impacted by wildland fire smoke in the summer months.

3.2.3 Monitors

The Old Post Office site is currently equipped with:

- CO (SLAMS) – A single Thermo Electron 48C CO monitor operates seasonally (October – March) with an inlet approximately 3 meters above the ground.

3.2.4 Siting

The Old Post Office is located between 2nd and 3rd Avenues on the west side of Cushman Street. The probe passes through the eastern exterior wall and extends out one meter at a height of two meters above the ground. The inlet is three meters from the nearest traffic lane on Cushman Street, and ten meters (32 feet) from the intersection at 2nd Avenue. There are no parking lots in the vicinity of the probe, but there is parallel parking on both 2nd and 3rd Avenues.

3.2.5 Traffic

This site is located at one of the busiest intersections in downtown Fairbanks. Traffic within one mile of the site shows annual average daily traffic (AADT) counts ranging from 1,013 to 9,227 vehicles per day. The nearest traffic count site shown on the Department of Transport 2009 Traffic Map is on Cushman between 1st and 2nd Avenues with an AADT of 8,309 vehicles per day.²

² State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Northern/Downtown_2009.pdf

Figure 3.2:3 Pictures of the Old Post Office Site



3.3 STATE OFFICE BUILDING - FAIRBANKS

675 Seventh Avenue
Parameters: PM_{2.5}

AQS IDs 02-090-0010
Established: January 1, 1972

3.3.1 Site Information

The site is located on the State Office Building at 675 7th Avenue. The latitude is 64° 50' 27" north (64.840833), longitude is 147° 43' 23" west (-147.723056), and 140 meters (460 feet) above sea level. Figure 3.3:1 shows a street map of the downtown Fairbanks area and satellite image of the area. The site is located in the middle of the central business district. This is a neighborhood-scale, population-oriented PM_{2.5} site.

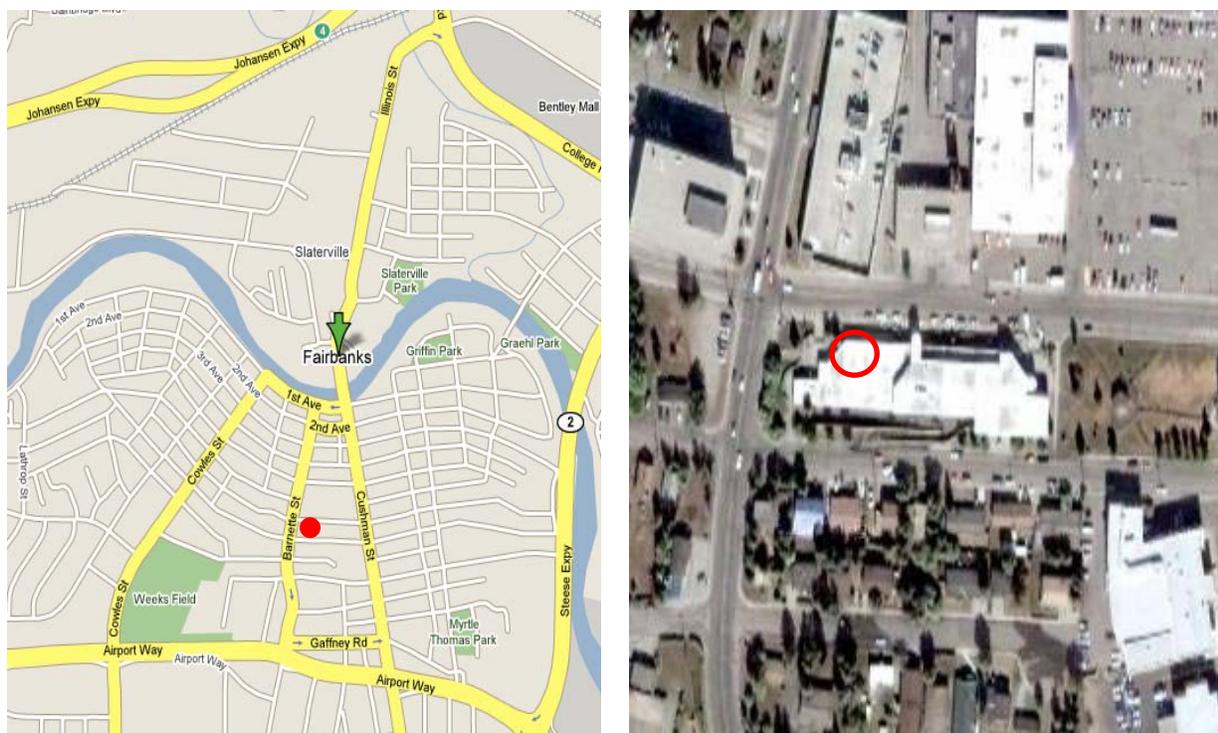


Figure 3.3:1 Map and satellite image of the State Office Building. The red dot and circle indicate the site location.

3.3.2 Sources

The dominant source of fine particulate matter (PM_{2.5}) for this site changes season to season. During the long winter months the primary sources of fine particulates are; home heating, vehicle exhaust, and wood smoke. During the summer months, the main source is from wildland fire smoke.

3.3.3 Monitors

The State Office Building site is currently equipped with:

- PM_{2.5} (SLAMS) – Two Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 samplers. One sampler runs on a 1-in-3 day sampling schedule with the second operating as a collocated monitor once every 6th day.
- PM_{2.5} (SPM) – A single Met-One Beta Attenuation Monitor (BAM 1020) was installed to provide information in real time for evaluating the Air Quality Index.
- PM_{2.5} (STN) – A single Met-One Super SASS Speciation Monitor. This multi filter sampler is set to sample on a 1-in-3 day sampling schedule.
- PM_{2.5} (STN) – A single URG 3000N Speciation Monitor. This single filter sampler is set to sample on a 1-in-3 day sampling schedule.

Two of the monitors provide speciation data for fine particulate are shown with a STN designation, an acronym for Speciation Trend Network.

3.3.4 Siting

The equipment is located on the west end of the State Office Building's first story roof. The inlets for all samplers are approximately six meters above the ground. There is unrestricted airflow around the samplers. The building has a partial second floor that is approximately 3.75 meters higher than the roof the samplers sit upon. The nearest second floor wall is approximately thirty meters west of the samplers. There is a birch tree approximately ten meters south of the samplers; its height exceeds that of the inlets.

3.3.5 Traffic

This site is located in downtown Fairbanks with numerous roads within one mile of the site. Area roads have daily traffic counts ranging from 1,013 to 9,227 vehicles per day. The nearest traffic count site on 7th Avenue shows an AADT of 1,248 and the traffic count site on Barnette Street near 7th Avenue shows an AADT of 3,868 vehicles per day³. There are no parking lots in the vicinity of the probe, but there is parallel street parking on 7th Ave.

³ State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Northern/Downtown_2009.pdf

Figure 3.3.2: Pictures of the State Office Building

North	East	South	West
			
<p>Views in four directions from the State Office Building</p>			
		<p>Not available, equipment in close proximity to edge of the roof</p>	
<p>Views in four directions towards the State Office Building Site</p>			

3.4 NCORE – FAIRBANKS

809 Pioneer Road

Parameters: Multi-Pollutant Site

(PM_{10-2.5}, PM_C, SO₂, NO_Y, NO, NH₃, CO, O₃, and Met)

AQS ID: 02-090-0034

Established: October 29, 2009

3.4.1 Site Information

The site is located near the Fairbanks North Star Borough building on Pioneer Road at latitude 64° 50' 44.6" north (64.845690), longitude 147° 43' 38.2" west (-147.727413), and 472 feet (144 meters) above sea level. Figure 3.4:1 shows a street map and the satellite image of the local area. This is a neighborhood-scale, population-oriented site.



Figure 3.4:1 Map and new shelter of the NCore monitoring site. The red dot indicates the site location.

3.4.2 Sources

The dominant source of fine particulate matter (PM_{2.5}) for this site changes season to season. The source contribution to winter time PM_{2.5} is still being studied. Wood smoke from home heating is currently considered one of the major sources. During the summer months, the main source is from wildland fire smoke.

3.4.3 Monitors

The NCore monitoring site is currently equipped with:

- PM_{2.5} (SPM) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler on a 1-in-3 day alternating sampling schedule.
- PM_{10-2.5} (SPM) – A pair of Met-One Beta Attenuation Monitor (BAM 1020) was installed to provide PM_{2.5} and calculated PM coarse (PM_C) data in near real-time for evaluating the Air Quality Index

- Surface meteorology for wind speed/direction (WS/WD), ambient temperature (T) and barometric pressure.

In December 2010, the NCore site monitoring site was expanded with the purchase and installation of a new temperature-controlled shelter. The shelter was designed for operation in sub-Arctic conditions with higher rated insulation and an Arctic entry. Additional trace-level gas monitors are being installed and scheduled to be operational by mid-September 2011. The additional monitors include:

- carbon monoxide (CO) – Thermo Scientific Model 48i-TLE continuous CO monitor (data collection began August 5, 2011)
- sulfur dioxide (SO₂) - Thermo Scientific Model 43i-TLE continuous SO₂ monitor (data collection began August 5, 2011)
- nitrogen oxide (NO) - Thermo Scientific Model 42i-TLE continuous NO monitor (delayed due to instrument problems requiring factory repairs, scheduled for start-up in mid-September)
- total reactive nitrogen (NO_y) - Thermo Scientific Model 42i-Y continuous NO_y monitor (delayed due to instrument problems requiring factory repairs, scheduled for start-up in mid-September)
- ammonia (NH₃) - Thermo Scientific Model 17i continuous NH₃ monitor (delayed due to instrument problems requiring factory repairs, scheduled for start-up in mid-September)
- ozone (O₃) - Teledyne Model 403E continuous O₃ monitor (data collection began August 5, 2011)
- relative humidity (RH) (scheduled start-up, mid-September)
- PM_{2.5} (STN) – A single Met-One Super SASS Speciation Monitor (scheduled start-up, mid-September)

3.4.1 Siting

ADEC decided to locate the NCore multi-pollutant monitoring site in Fairbanks because Fairbanks is dealing with the most significant air quality impacts in the state. Details of the technical site selection process are provided in Appendix G.

The site is located approximately 35 meters north of the Chena River near the Fairbanks North Star Borough Building. There is a small patch of birch trees 6-10 meter tall that sit approximately 32 meters to the east of the site. The heights of the trees exceed the height of the monitor inlets. There is a 12 meter tall building approximately 75 meters to the southeast of the site and a 7 meter tall building approximately 50 meters to the west.

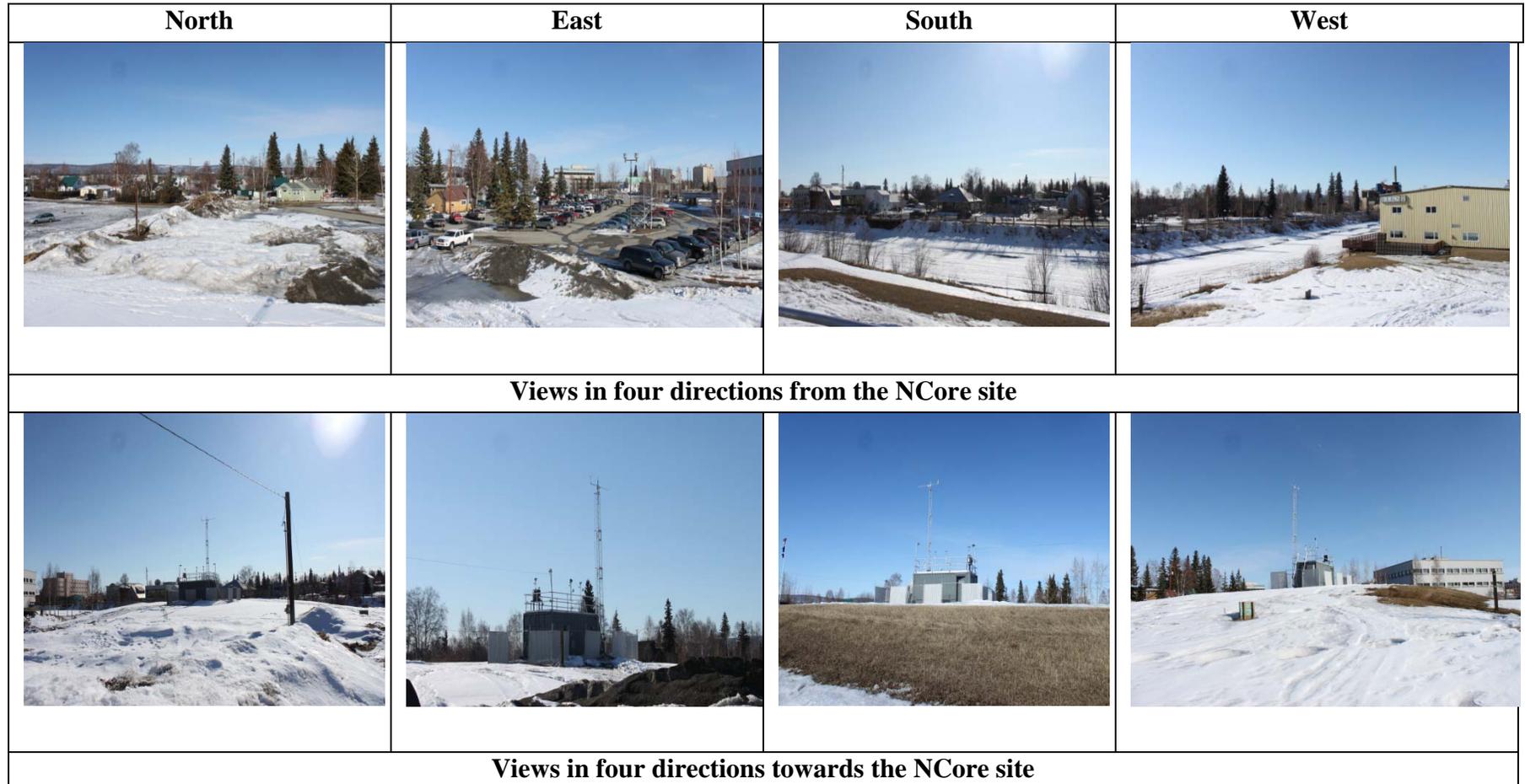
3.4.2 Traffic

This site is located in downtown Fairbanks with numerous roads within one mile of the site. The downtown Fairbanks area has AADT counts ranging from 1,031 to 9,227 vehicles per day with

the closest counting site on First Avenue (directly across the river) at 3,559 vehicles per day⁴. There are parking lots in the vicinity of both adjacent buildings.

⁴ State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Northern/Downtown_2009.pdf .

Figure 3.4:2 Pictures of the NCore monitoring site.



3.5 TAC (PEGER ROAD) SITE - FAIRBANKS

3175 Peger Road
Parameters: PM_{2.5}

AQS ID: n/a
Established: Nov. 1, 2007

3.5.1 Site Information

The site is located at the Transit Administrative Center (TAC) on Peger Road at latitude 64° 49' 08" north (64.818889), longitude 147° 46' 27" west (-147.774167), and 133 meters (436 feet) above sea level. Figure 3-5 shows a street map of the local area. This is a neighborhood-scale, population-oriented site.

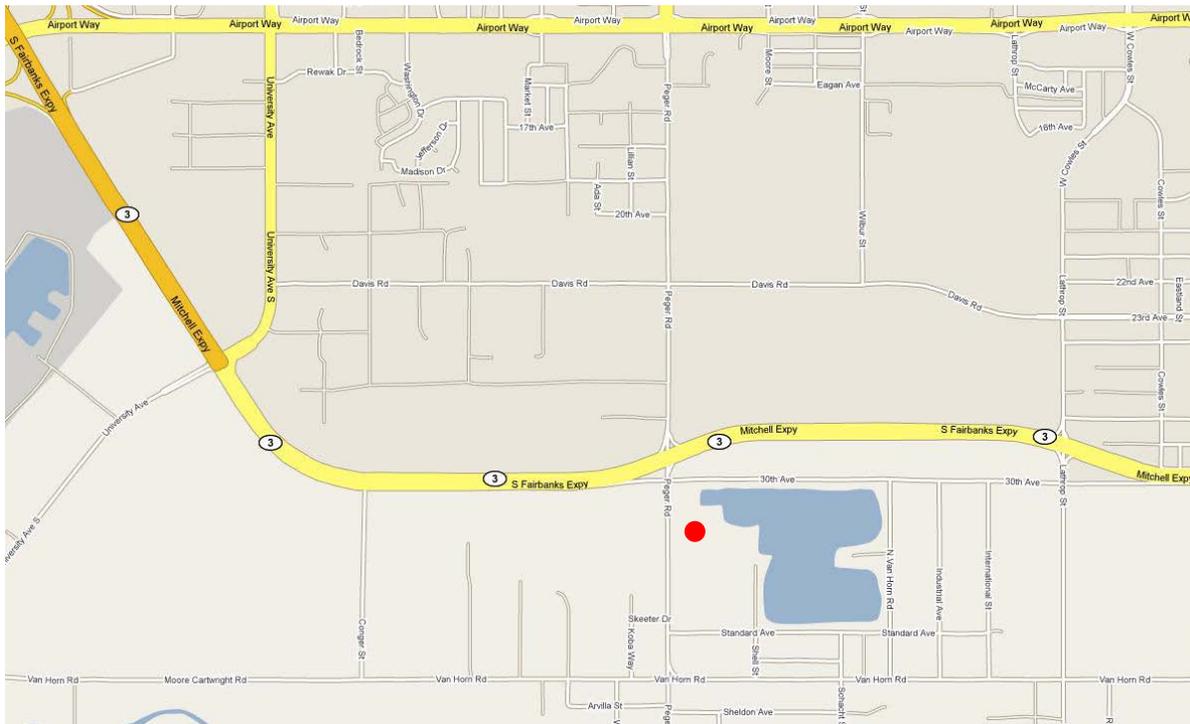


Figure 3.3:1 Map of the TAC (Peger Road) monitoring site. The red dot indicates site location.

3.5.2 Sources

The source of constituent pollutants of PM_{2.5} in Fairbanks is unclear. The FNSB Winter Monitoring Project conducted during the winters of 2008-09, 2009-10, and 2010-11 is to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in Fairbanks.

3.5.3 Monitors

The TAC site is currently equipped with:

- PM_{2.5} (SPM wintertime only) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler on a 1-in-3 day alternating sampling schedule.
- PM_{2.5} (SPM) – A single Met-One Beta Attenuation Monitor (BAM 1020) was installed to provide information in real time for evaluating the Air Quality Index.
- PM_{2.5} (SPM wintertime only) – A single Met-One Super SASS Speciation Monitor. This multi filter sampler is set to sample on a 1-in-3 day sampling schedule.
- Elemental Carbon (SPM wintertime only) – a Magee Scientific Aethalometer with BGI 2.5 µm sharp cut cyclone samples continuously.
- Wind speed/wind direction – One R. M. Young Model 05305VM (Windbird) combined wind vane anemometer. The wind direction and wind speed data is continuously recorded.

3.5.4 Siting

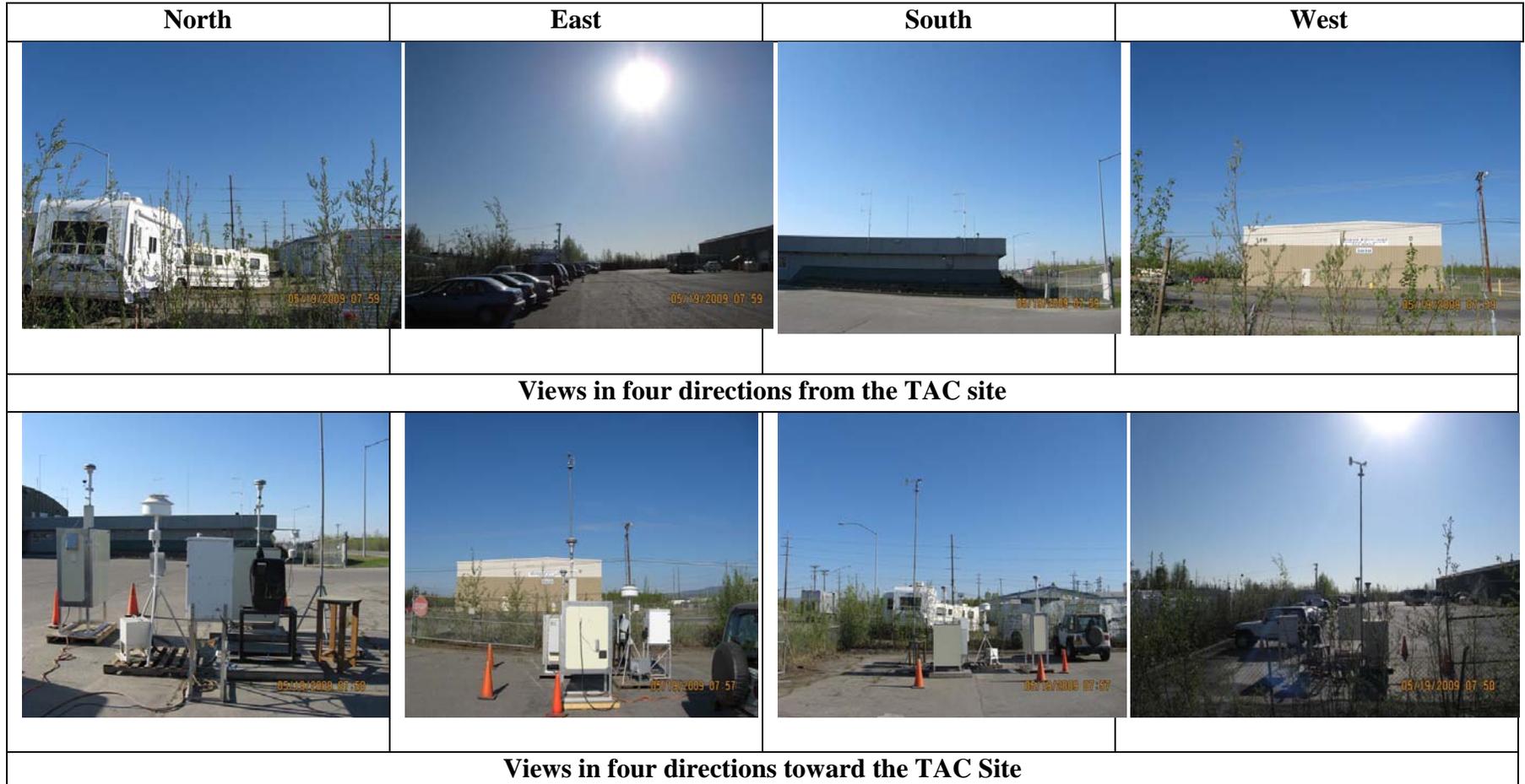
The TAC site is in an industrial area, approximately 222 meters (730 feet) from the Peger Road/Mitchell Expressway intersection. One of the PM_{2.5} Partisol samplers is located approximately 82 meters (270 feet) to the east of the rest of the monitoring equipment and acts as a non-road baseline to compare with the roadway site.

3.5.5 Traffic

This location is in an industrial area near the Mitchell Expressway, the AADT counts along the Mitchell Expressway near Peger Road ranges from 12,485 to 13,285 vehicles per day. The nearest traffic count site on Peger Road shows an AADT of 7,573 vehicles per day.⁵ The industrial area includes multiple parking lots with a variety of light and heavy-duty trucks plus other heavy-duty industrial vehicles.

⁵ State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Northern/Fairbanks_2009.pdf.

Figure 3.5:2: Pictures of the TAC (Peger Rd.) site.



3.6 NORTH POLE ELEMENTARY SITE – NORTH POLE

250 Snowman Lane

Parameters: PM_{2.5}, WS/WD, Temp, Chemical Speciation,
Black Carbon

AQS ID: n/a

Established: Dec. 20, 2008

3.6.1 Site Information

The site is located at the North Pole Elementary School on the east side of the parking lot at 64° 45' 8.41" north (64.752336), 147° 20' 49.95" west (-147.347208), and 146 meters (479 feet) above sea level. Figure 4.8:1 shows a street map of the local area. This is a neighborhood-scale, population-oriented site.

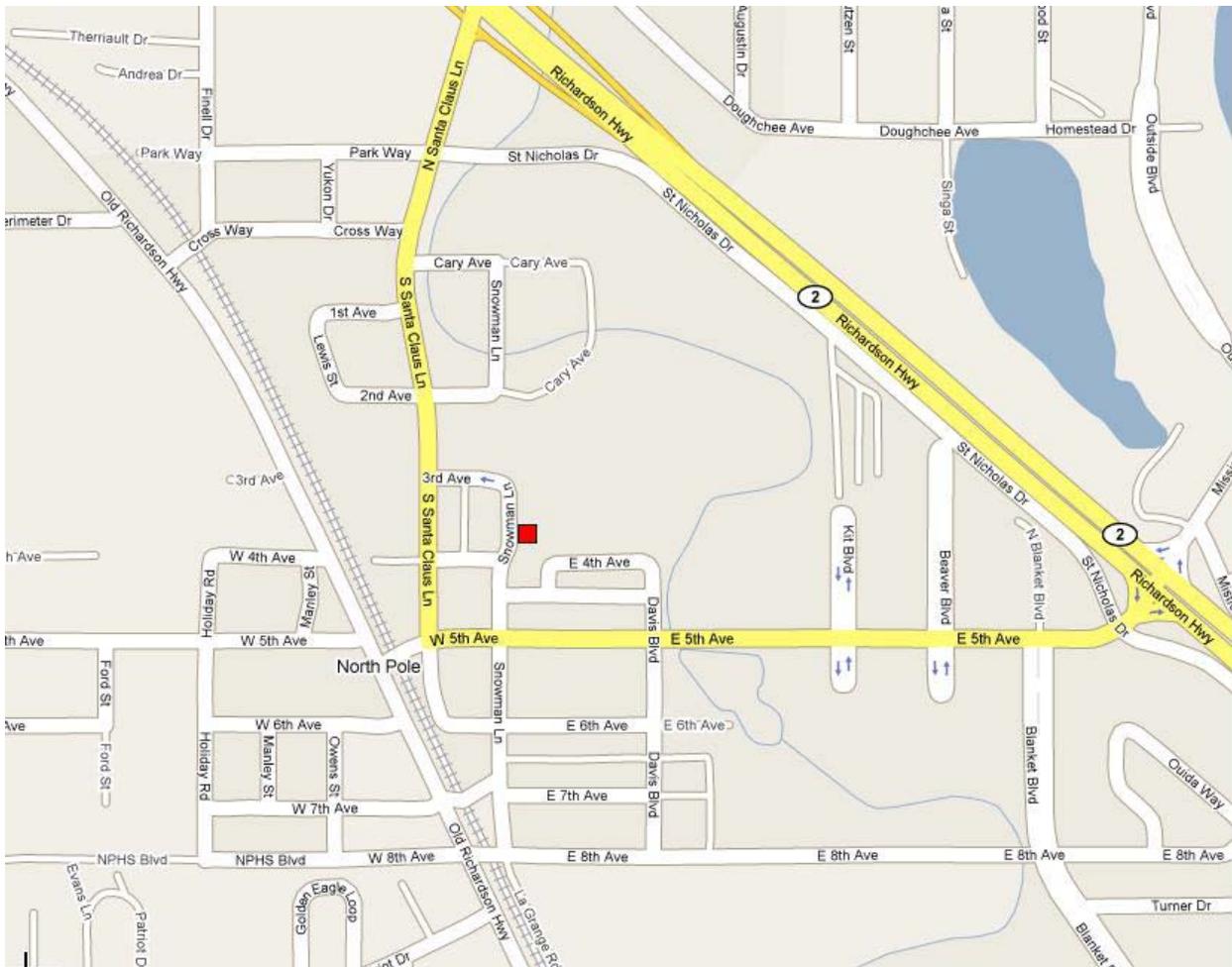


Figure 3.6:1 Map of the North Pole monitoring site. The red square indicates site location.

3.6.2 Sources

The source of constituent pollutants of PM_{2.5} in North Pole is unclear. The FNSB Winter Monitoring Project conducted during the winters of 2008-09, 2009-10, and 2010-11 is to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in North Pole.

3.6.3 Monitors

The North Pole Elementary site is currently equipped with:

- PM_{2.5} (SPM) – One Thermo Electron (formerly Rupprecht & Patashnick) Partisol 2000 sampler on a 1-in-3 day alternating sampling schedule.
- PM_{2.5} (SPM) – A single Thermo Electron TEOM/FDMS 1400a/8500 samples continuously.
- Elemental Carbon (SPM) – a Magee Scientific Aethalometer with BGI 2.5 µm sharp cut cyclone samples continuously.
- PM_{2.5} (SPM wintertime only) – A single Met-One Super SASS Speciation Monitor. This multi filter sampler is set to sample on a 1-in-3 day sampling schedule.
- Wind Speed/Wind Direction - MetOne Sonic Anemometer Model 50.5H

3.6.4 Siting

The North Pole Elementary School site is located on the eastside parking lot of North Pole Elementary School on Snowman Lane. The monitoring instrumentation is housed in a self-contained monitoring shelter. The sample inlets extend above the roof of the shelter at approximately 4 meters above ground level.

3.6.5 Traffic

The site is within approximately 1000 feet (300 meters) of the Richardson Highway. Land use within a 400 meter radius of the site is mixture of commercial, industrial, and residential. Annual average daily traffic estimated along the Richardson Highway through North Pole is 10,875 vehicles per day. The AADT along Snowman Lane is unknown but the nearest traffic site along South Santa Claus Lane is 4,126 vehicles per day.⁶

⁶ State Department of Transportation and Public Facilities, 2009 traffic maps, http://www.dot.state.ak.us/stwdplng/mapping/trafficmaps/2009/Northern/Northpole_2009.pdf

Figure 4.8.2: Pictures of the North Pole Site

