

Alaska's 2013 Air Monitoring Network Plan

Chapter 3

Fairbanks North Star Borough

Air Quality Division

Air Monitoring
&
Quality Assurance
Program

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3 FAIRBANKS NORTH STAR BOROUGH MONITORING SITE DESCRIPTIONS

3.1 *General Information*

Fairbanks, population¹ 31,535, is the second largest city in Alaska and is located within the Fairbanks North Star Borough (FNSB) that has a population of 97,581. Fairbanks is situated on the banks of the Chena River in the upper Tanana Valley of Interior Alaska. 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 August 2nd each summer, and less than four hours of daylight between November 18th and January 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 six 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 and the Fairbanks non-attainment area. Figure 3-1:1 is a map showing the entire Fairbanks and North Pole area. The red dots indicate the locations of the six monitoring sites. Fairbanks is bordered by hills to the north and west, with the flats opening up to the south and east.

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

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 Building	Fairbanks	02-090-0010	SLAMS/STN	Oct, 1998	neighborhood
North Pole Elementary	North Pole	02-090-0033	SPM	Nov, 2008	neighborhood
NCore	Fairbanks	02-090-0034	SPM	Oct, 2009	neighborhood
North Pole Fire	North Pole	not available	SPM	Mar, 2012	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



Pole Elementary

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 elevation of 140 meters (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.

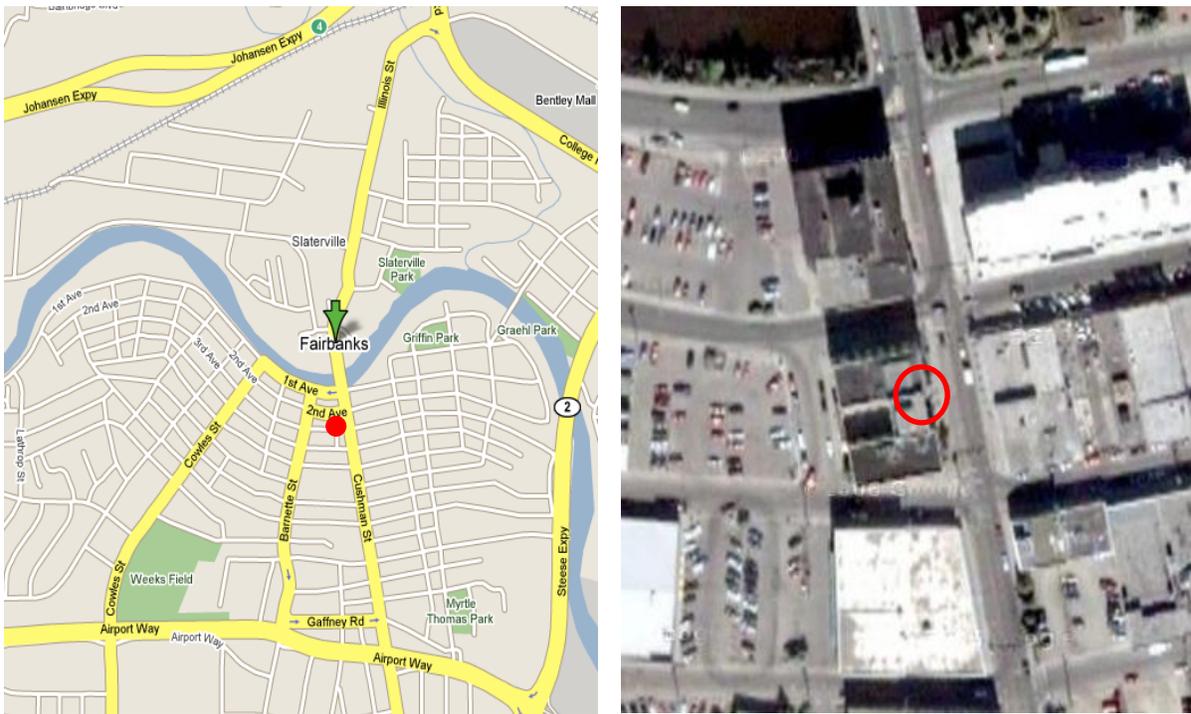


Figure 3.2:1 Map and satellite image of the Old Post Office monitoring site. The red circles indicate the site location.

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 UAF (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 through 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 counts ranging from 1,013 to 9,227 vehicles. The nearest traffic count site shown on the Department of Transport 2009 Traffic Map is on Cushman between 1st and 2nd Avenues with an annual average daily traffic count of 8,309 vehicles.²

² State Department of Transportation and Public Facilities, 2009 traffic maps,

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 roof of 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 elevation is 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.

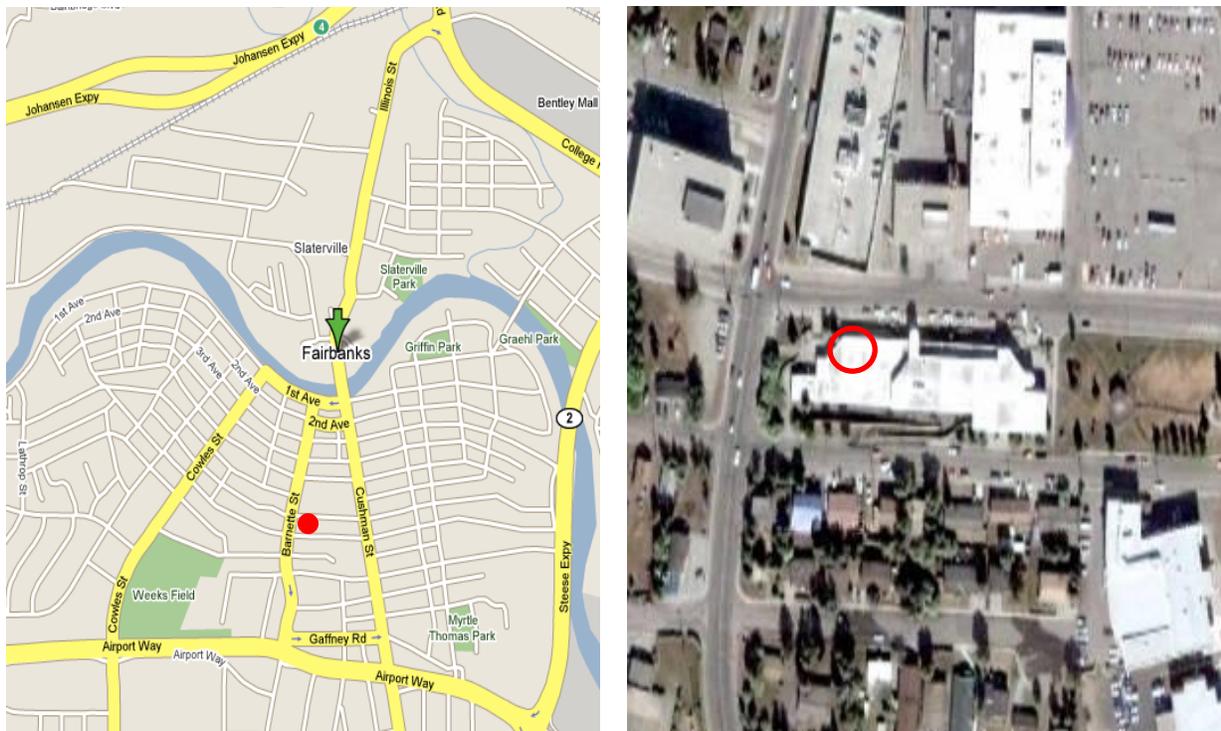


Figure 3.3:1 Map and satellite image of the State Office Building. The red dot and circle indicate the site location.

3.3.2 Sources

The dominant source of PM_{2.5} for this site changes from season to season. During the long winter months the primary sources of PM_{2.5} are home heating, vehicle exhaust, and wood smoke. During the summer months, the main source is 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 BAM 1020X FEM was installed to provide information in real time for calculating 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,
- Surface meteorology for wind speed/direction.

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. The nearest traffic count site on 7th Avenue shows an annual average daily traffic count of 1,248 vehicles and the traffic count site on Barnette Street near 7th Avenue shows an annual average daily traffic count of 3,868 vehicles³. 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,

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 of 64° 50' 44.6" north (64.845690), longitude of 147° 43' 38.2" west (-147.727413), and elevation of 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 PM_{2.5} for this site changes from 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 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.
- PM₁₀ / PM_{2.5} / PM_{Coarse} (SPM) – Dual Met-One Inc., BAM 1020X FEM continuous monitors which include one continuous sampler for PM₁₀ and one continuous sampler for PM_{2.5}. PM_{Coarse} is calculated by subtracting the PM_{2.5} value from the PM₁₀ value. DEC uses the data

to calculate an Air Quality Index for forecasting local air quality conditions and for reporting to the EPA Air Quality System (AQS) data base.

- Carbon Monoxide (CO) – Thermo Scientific Model 48i-TLE continuous CO monitor
- Sulfur Dioxide (SO₂) - Thermo Scientific Model 43i-TLE continuous SO₂ monitor
- PM_{2.5} (STN) – A single Met-One Super SASS Speciation Monitor
- Ozone (O₃) - Teledyne Model 403E continuous O₃ monitor
- Ammonia (NH₃) - Thermo Scientific Model 17i continuous NH₃ monitor
- Surface meteorology for wind speed/direction, ambient temperature, and barometric pressure

Data collection began November 2, 2011.

In December 2010, the NCORE 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-June 2012. The additional monitors include:

- 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 June)
- 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-June)

3.4.1 Siting

DEC 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.

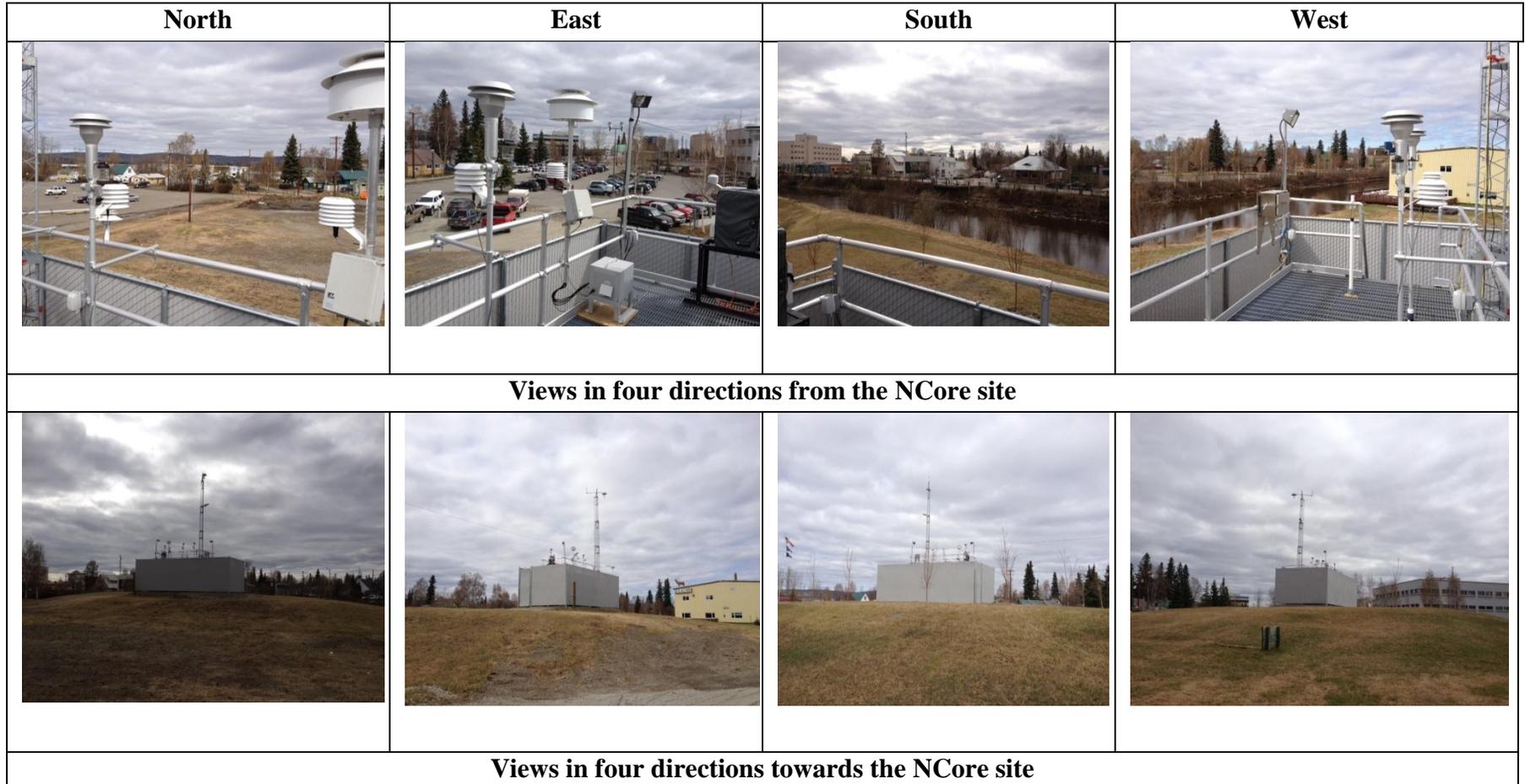
The site is located approximately 35 meters north of the Chena River near the Fairbanks North Star Borough Building. There is a small patch of birch trees 6 to 10 meter tall that sit approximately 32 meters to the east of the site. The heights of the trees exceed the height of the monitor inlets. There 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 annual average daily traffic counts ranging from 1,031 to 9,227 vehicles with the closest counting site on First Avenue (directly across the river) at 3,559 vehicles⁴. There are parking lots in the vicinity of both adjacent buildings.

⁴ State Department of Transportation and Public Facilities, 2009 traffic maps

Figure 3.4:2 Pictures of the NCore monitoring site.



3.5 NORTH POLE ELEMENTARY SITE

250 Snowman Lane

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

AQS ID: 02-090-0033
Established: Dec. 20, 2008

3.5.1 Site Information

The site is located at the North Pole Elementary School on the east side of the parking lot at a latitude of 64° 45' 8.41" north (64.752336), longitude of 147° 20' 49.95" west (-147.347208), and elevation of 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.

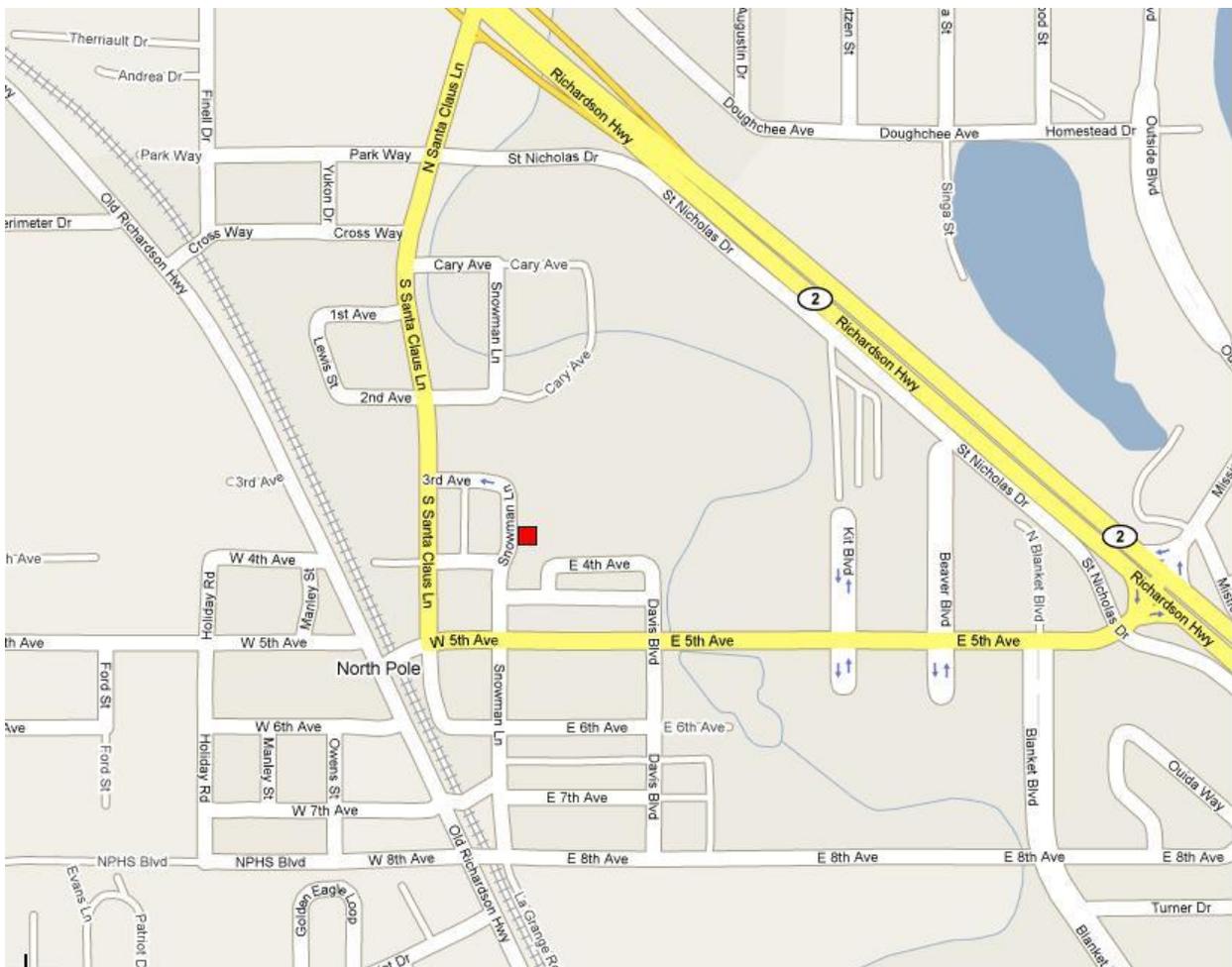


Figure 3.6:1 Map of the North Pole Elementary monitoring site. The red square indicates site location.

3.5.2 Sources

The dominant source of PM_{2.5} for this site changes from 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 wildland fire smoke. The goals of the FNSB Winter Monitoring Project conducted during the winters of 2008-09, 2009-10, and 2010-11 are to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in North Pole.

3.5.3 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 Met-One BAM 1020X FEM was installed to provide information in real time for calculating 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.
- Wind Speed/Wind Direction/Ambient Temperature - MetOne Sonic Anemometer Model 50.5H and a Met-One BX 592-2 temperature sensor.

3.5.4 Siting

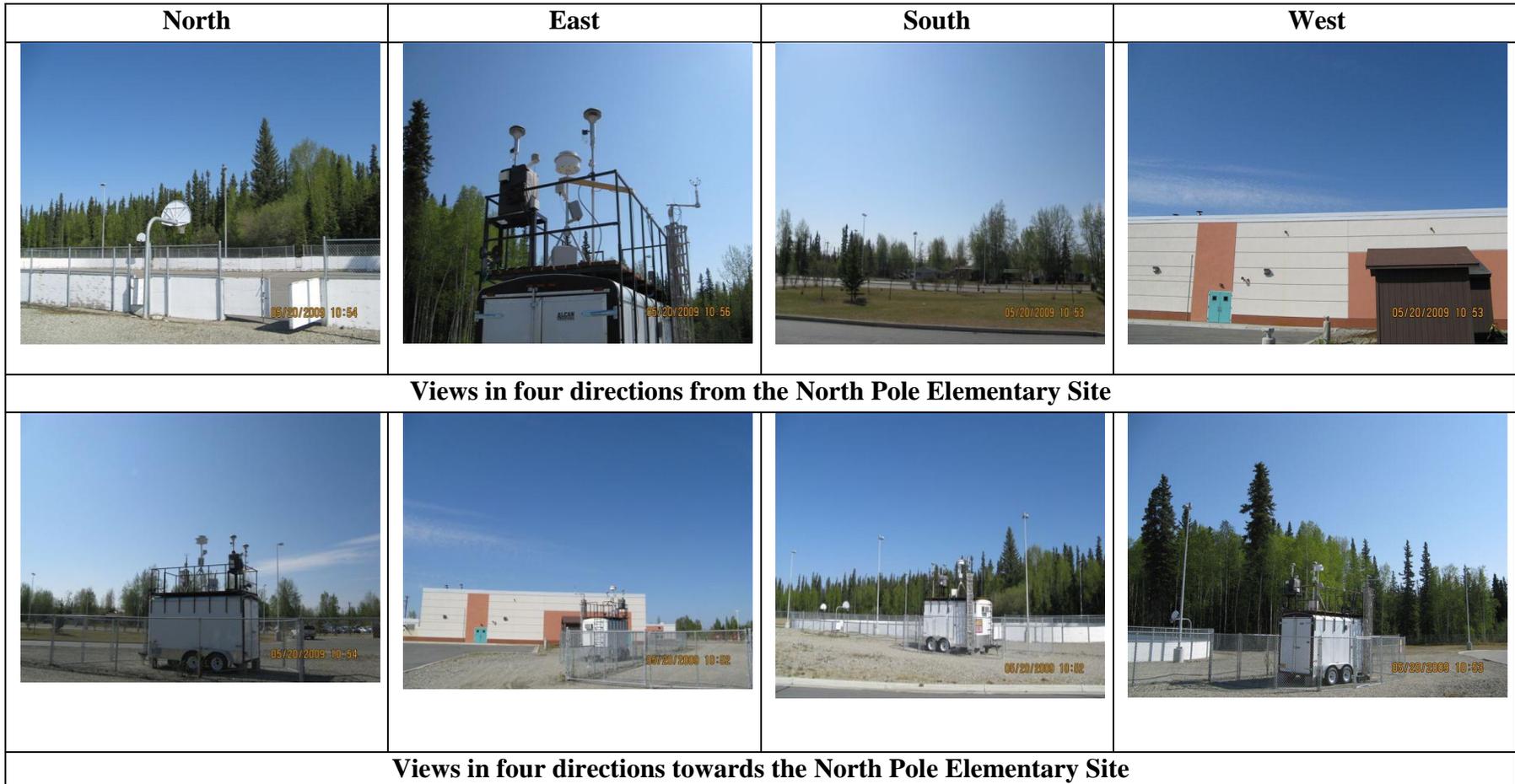
The North Pole Elementary School site is located on the eastside parking lot of North Pole Elementary School on Snowman Lane. The monitoring instrumentation is housed in a self-contained monitoring shelter. The sample inlets extend above the roof of the shelter at approximately 4 meters above ground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

3.5.5 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 a mixture of commercial, industrial, and residential. Annual average daily traffic estimated along the Richardson Highway through North Pole is 10,875 vehicles. Annual average daily traffic along Snowman Lane is unknown but the nearest traffic site along South Santa Claus Lane averages 4,126 vehicles.⁵

⁵ State Department of Transportation and Public Facilities, 2009 traffic maps,

Figure 4.8.2: Pictures of the North Pole Elementary Site



3.6 NORTH POLE FIRE SITE

3288 Hurst Rd

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

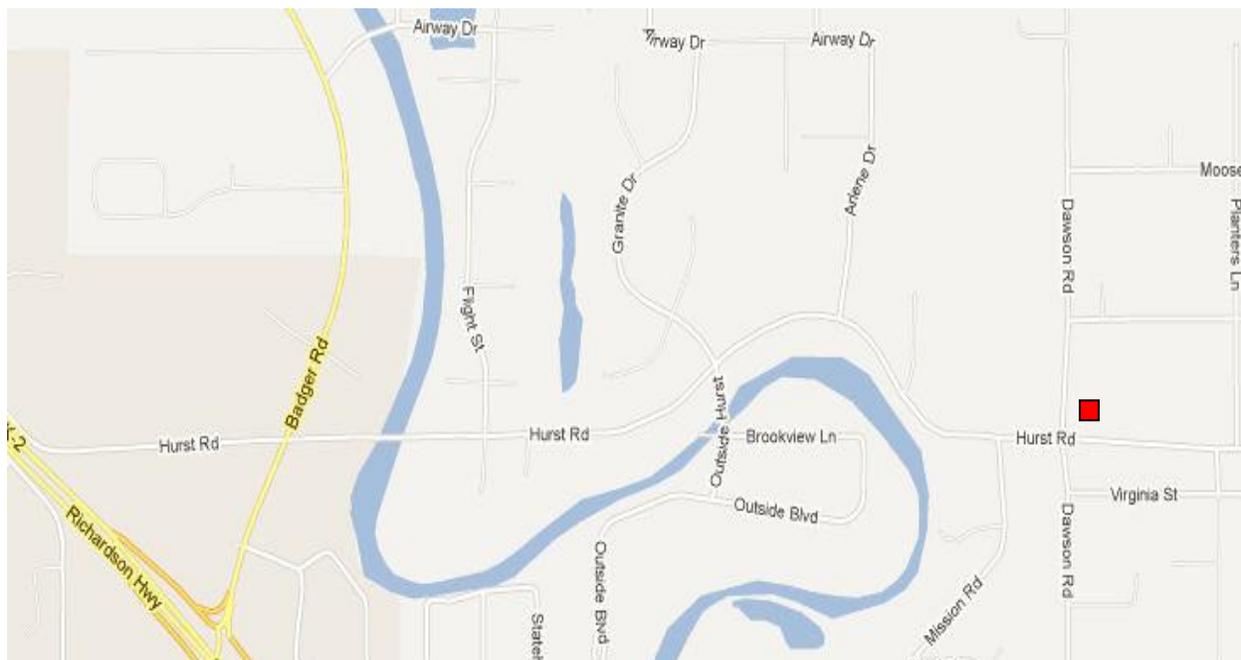
AQS ID: n/a

Established: Mar. 1, 2011

3.6.1 Site Information

The site is located at the North Pole Fire Station #3 on the west side of the Fire Station at a latitude of 64° 45' 46.7" north (64.762973), longitude of -147° 18' 37.0" west (-147.310297), and elevation of 145 meters (475 feet) above sea level. Figure 3.7:1 shows a street map of the local area. This is a neighborhood-scale, population-oriented site. An AQS site code is yet to be established for this location.

Figure 3.7:1 Map of the North Pole Fire #3 monitoring site. The red square indicates site location. (Site map courtesy of Google Maps)



3.6.2 Sources

The dominant source of PM_{2.5} for this site changes from 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 wildland fire smoke. The goals of the FNSB Winter Monitoring Project conducted during the winters of 2008-09, 2009-10, and 2010-11 are to evaluate wintertime pollutant characteristics and develop a strategy to reduce the concentration in North Pole. Preliminary studies suggest that this new site might be more representative of the North Pole neighborhood scale pollutant levels.

3.6.3 Monitors

The North Pole Fire 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 Met-One BAM 1020X FEM was installed to provide information in real time for calculating 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.
- Wind Speed/Wind Direction/Ambient Temperature - MetOne Sonic Anemometer Model 50.5H and a Met-One BX-592-2 Ambient Temperature Sensor.

3.6.4 Siting

The North Pole Fire Station site is located on the west side of North Pole Fire Station #3 at 3288 Hurst Rd. The monitoring instruments are 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 75 feet (23 meters) of Hurst Road. It is also 280 feet (85 meters) from the intersection of Hurst Road and Dawson Road. Land use within a 400 meter radius of the site is mixture of residential and light agricultural. Annual average daily traffic estimated along the Richardson Highway through North Pole is 10,875 vehicles. Annual average daily traffic along Hurst Rd is 3730 is vehicles.⁶

⁶ State Department of Transportation and Public Facilities, 2010 traffic maps

Figure 4.8.2: Pictures of the North Pole Fire Site

