Alaska's 2012 Air Monitoring Network Plan

Appendices and Glossary

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APPENDIX A:

Designations

Non-attainment: any area that does not meet, or that contributes to poor ambient air quality in a nearby area that does not meet, the national primary or secondary ambient air quality standard for any pollutant on the national ambient air quality standards list.

Attainment: any area that meets the national primary or secondary ambient air quality standard for the pollutant.

Unclassifiable: any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

Maintenance: any area that is going through the transition from being designated a non-attainment area to attainment.

Note: Further information regarding designation can be found at:

http://epa.gov/air/oaqps/greenbk/define.html
http://www.epa.gov/air/caa/

APPENDIX B:

Siting Criteria

The Federal Environmental Protection Agency (EPA) Region 10 requested that the Alaska Department of Environmental Conservation (DEC) staff provide a table which demonstrates that each monitoring site complies with siting criteria identified in 40 CFR Part 58 Appendix E. Included are two tables: one for CO sites and one for PM sites. Certain sites have been found to have had their monitoring scale incorrectly designated. A discussion of the monitoring scale changes follows each table.

Carbon Monoxide Sites

Carbon monoxide (CO) inlet probes should be at least 1 meter away, both vertically and horizontally, from any supporting structure or wall. For microscale sites the probe height must be between 2.5 and 3.5 meters, whereas for other scale sites the probe must be between 3 and 15 meters high.

A probe must have unrestricted airflow for at least 270 degrees, or 180 degrees if it is located on the side of a building. Obstructions must be a minimum distance away equal to twice the distance by which the height of the obstruction exceeds the height of the probe. Trees should not be present between the dominant CO source or roadway and the inlet probe.

The following is a list with definitions on monitoring site scaling;

Microscale—defines the concentrations in air volumes associated with area dimensions ranging from several meters up to about 100 meters.

Middle Scale—defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer.

Neighborhood Scale—defines concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers range.

Urban Scale—defines the overall, citywide conditions with dimensions on the order of 4 to 50 kilometers. This scale would usually require more than one site for definition.

The following table (Table B-1) lists all CO monitoring sites in Anchorage and Fairbanks (including SPM) and how they fit the siting criteria from Appendix E of 40 CFR Part 58.

Table B-1 CO monitoring sites in Anchorage and Fairbanks.

Site Name	Monitoring Scale	Probe Distance from Wall (meters)	Height (meters)	Unrestricted Air Flow	Spacing from Roadway (meters)	Trees
Garden	Neighborhood	1	3	180 degrees unobstructed	7	Yes
Turnagain	Neighborhood	1	3	180 degrees unobstructed	12 from 500 VPD roadway	Yes
DHHS	Neighborhood	1	3	270 degrees unobstructed	28	None
Parkgate	Neighborhood	1	2.5	180 degrees unobstructed	22	None
Old Post Office	Microscale	1	3	180 degrees unobstructed	3	None

In the 2000 network assessment the Garden Site was stated to be "micro" scale based on the probes vicinity to the roadway. After further review of Appendix E and Appendix D of EPA 40 CFR 58, EPA-450/3-75-077, and further discussion within DEC, we are now classifying this site as "neighborhood" scale.

Particulate Matter (PM_{10} and $PM_{2.5}$) Sites

For microscale sites particulate matter inlets must be between 2 and 7 meters from ground level. For other siting scales the probe must be between 2 and 15 meters high.

A sampler must have at least 2 meters separation from walls, parapets, penthouses, etc… A sampler must have unrestricted airflow for at least 270 degrees, or 180 degrees for street canyon sites. Obstructions must be a minimum distance away from the sampler with the separation equal to twice the distance by which the height of the obstruction exceeds the height of the sampler inlet.

Microscale sampler inlets must be located between 5 and 15 meters from the nearest traffic lane for traffic corridor sites, and between 2 and 10 meters for street canyon sites. The minimum separation distance between the probe and nearest traffic lane for middle, neighborhood, or urban scale sites depends upon the number of vehicles per day (VPD) that use the roadway according to a rather complicated table in Appendix E of 40 CFR Part 58. TableB-2 lists all PM monitoring sites in Alaska (including SPM) and how they fit the siting criteria from Appendix E of 40 CFR Part 58.

Table B-2: PM monitoring sites in Alaska

Site Name	Monitoring Scale	Height (meters)	Spacing from Obstructions (meters)	Spacing from Roadway (meters)	Traffic (VPD)	Trees
Garden	Neighborhood	10	12m to 5m tall penthouse	10	< 5,000	None
Tudor	Microscale	3.3	None	7	46,900	
DHHS	Middle	3	None	28	15,120	None
Parkgate	Neighborhood	6	13m to 4m tall penthouse	44	11,000	None
Harrison Court	Neighborhood	4	> 8	150	Unknown, probably < 5,000	None
Palmer	Neighborhood	4	> 8	18	Unknown, probably < 5,000	None
Wasilla	Neighborhood	4	> 8	20	16,494	None
State Office Building	Neighborhood	6	30m to 3.75m tall penthouse	20	7,400	1 tree at 10m away
TAC (Peger Road)	Neighborhood	2.5	> 60	222	7651	None
North Pole	Neighborhood	4	>20	~ 300 to Richardson Highway	10,400	Several to east > 30m
Floyd Dryden	Neighborhood	6	Furnace flue @ 20m, 4m penthouse @ 15m	65	12,770	12 meter tall @ 25m away

APPENDIX C:

Network Site Summary

State Code	County Code	Site ID	Parameter Code	POC	Method Code	Unit Code	Frequency	Parameter Description	Instrumentation	City Name	Street Address	Notes
02	020	0018	88101	1	117	105	1/6	Pm2.5 - Local Conditions	Partisol 2000	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	
02	020	0018	81102	1	063	001	1/6	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	
02	020	0018	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	
							cont	Ozone	Teledyne AP1 400E	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	Not (yet) reported to AQS
							cont	Pm2.5 - Local Conditions	Met One BAM 1020X	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	Not reported to AQS
							cont	Pm10 – Local Conditions	Met One BAM 1020X	Anchorage	TRINITY CHRISTIAN CHURCH/3000 E 16TH	Not reported to AQS
02	020	0044	81102	2	063	001	1/6	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	
02	020	0044	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	
							cont	Pm10 – Local Conditions	Met One BAM 1020X	Anchorage	3335 E TUDOR RD ANCHORAGE AK 99508	Not reported to AQS
02	020	0048	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	3201 TURNAGAIN STREET	
02	020	0050	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Anchorage	727 L STREET	
02	020	0050	81101	3	170	105	cont	Pm2.5 - Local Conditions	Met One BAM 1020X	Anchorage	727 L STREET	
02	020	0050	85101	1	122	105	cont	Pm10 – Local Conditions	Met One BAM 1020X	Anchorage	727 L STREET	
02	020	1004	85101	1	063	105	1/6	Pm10 - Lc	Anderson Hi-Vol	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	020	1004	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
			81101	3	170	105	cont	Pm2.5 - Local Conditions	Met One BAM 1020X	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
			85101	1	122	105	cont	Pm10 – Local Conditions	Met One BAM 2010X	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	020	1004	81102	1	063	001	1/6	Pm10 Total 0-10um Stp	Anderson Hi-Vol	Eagle River	PARKGATE-EAGLE RIVER, EAGLE RIVER	
02	090	0002	42101	1	054	007	cont	Carbon Monoxide	Thermo 48C	Fairbanks	FEDERAL BLDG/2ND & CUSHMAN	
02	090	0010	88101	1	117	105	1/3	Pm2.5 - Local Conditions	Partisol 2000	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	

State Code	County Code	Site ID	Parameter Code	POC	Method Code	Unit Code	Frequency	Parameter Description	Instrumentation	City Name	Street Address	Notes
02	090	0010	88101	2	117	105	1/6	Pm2.5 - Local Conditions	Partisol 2000	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
02	090	0010	88501	3	731	105	cont	Pm2.5 - Local Conditions	Met One BAM FEM	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
02	090	0010	88502	6	810	105	1/3	Pm2.5 - Local Conditions	Met One SASS	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
							1/3	Pm2.5 - Local Conditions	URG Speciation Monitor	Fairbanks	STATE OFFICE BUILDING/675 7TH AVE	
							1/3	Pm2.5 - Local Conditions	Partisol 2000	Fairbanks	TAC/3175 PEGER RD	Not reported to AQS
							cont	Pm2.5 - Local Conditions	Met One BAM 1020	Fairbanks	TAC/3175 PEGER RD	Not reported to AQS
							1/3	Pm2.5 - Local Conditions	Met One SASS	Fairbanks	TAC/3175 PEGER RD	Not reported to AQS
							cont	Black Carbon	Magee Scientific Aethalometer	Fairbanks	TAC/3175 PEGER RD	Not reported to AQS
							cont.	Wind Speed/ Direction	RM Young 05305 Windbird	Fairbanks	TAC/3175 PEGER RD	Not reported to AQS
								Pm2.5 Total 0-10um Lo	Met One BAM 1020X	Fairbanks	809 PIONEER ROAD (NCORE)	Not reported to AQS
								Pm10 Total 0-10um lo	Met One BAM 1020X	Fairbanks	809 PIONEER ROAD (NCORE)	Not reported to AQS
							1/3	Pm2.5 - Local Conditions	Partisol 2000	North Pole	NORTH POLE ELEMENTARY SCHOOL 250 SNOWMAN LANE	Not reported to AQS
							cont	Pm2.5 Raw Data	Thermo TEOM/FTMS	North Pole	NORTH POLE ELEMENTARY SCHOOL 250 SNOWMAN LANE	Not reported to AQS
							cont	Black Carbon	Magee Scientific Aethalometer	North Pole	NORTH POLE ELEMENTARY SCHOOL 250 SNOWMAN LANE	Not reported to AQS
							1/3	Pm2.5 - Local Conditions	Met One SASS	North Pole	NORTH POLE ELEMENTARY SCHOOL 250 SNOWMAN LANE	Not reported to AQS
								Wind Speed/ Direction	Met One 50.5H Sonic Anemometer	North Pole	NORTH POLE ELEMENTARY SCHOOL 250 SNOWMAN LANE	Not reported to AQS
02	110	0004	81101	3	170	105	cont	Pm2.5 Local Conditions	Met One BAM FEM	Juneau	F DRYDEN JR HIGH/MENDENHALL LOOP RD	
02	110	0004	85101	1	126	105	1/6	Pm10 – Local Conditions Primary	Partisol 2000	Juneau	F DRYDEN JR HIGH/MENDENHALL LOOP RD	
02	170	0008	88501	1	122	105	cont	Pm2.5 Total 0-10um Lo	Met One BAM	Mat-Su Valley	HARRISON COURT/BUTTE	Seasonally Switched
02	170	0008	85101	1	122	105	cont	Pm10 Total 0-10um lo	Met One BAM	Mat-Su Valley	HARRISON COURT/BUTTE	Seasonally Switched
02	170	0008	88101	1	117	105	1/3	Pm2.5 - Local Conditions	Partisol 2000	Mat-Su Valley	HARRISON COURT/BUTTE	

State Code	County Code	Site ID	Parameter Code	POC	Method Code	Unit Code	Frequency	Parameter Description	Instrumentation	City Name	Street Address	Notes
							cont	Pm2.5 - Local Conditions	Met One BAM 1020X	Mat-Su Valley	PALMER	Not reported to AQS
							cont	Pm10 – Local Conditions	Met One BAM 1020X	Mat-Su Valley	PALMER	Not reported to AQS
							cont	Pm2.5 - Local Conditions	Met One BAM 1020X	Mat-Su Valley	WASILLA	Not reported to AQS
							cont	Pm10 – Local Conditions	Met One BAM 2010X	Mat-Su Valley	WASILLA	Not reported to AQS
							1/6	Pm2.5 - Local Conditions	Partisol 2000	Mat-Su Valley	WASILLA	Not reported to AQS
							cont	Ozone	Teledyne AP1 400E	Mat-Su Valley	WASILA	Not (yet) reported to AQS
							1/6	TSP-Pb Stp	General Metal Works High-Vol	Noatak	NOATAK	Not (yet) reported to AQS
							1/6	TSP-Pb Stp	General Metal Works High-Vol	Noatak	NOATAK	Not (yet) reported to AQS

APPENDIX D:

Glossary

Air Quality Index (AQI) - The AQI is an index for reporting daily air quality and what associated health concerns the public should be aware of. The AQI focuses on health effects that might happen with in a few hours or days of breathing polluted air. The AQI rates the air quality in 6 steps from good to hazardous.

BAM 1020: Beta Attenuation Monitor Model 1020 continuous particulate monitoring instrument manufactured by Met-One Inc. This sampler can be configured to sample either course or fine particulate matter. Often a pair of the BAM monitoring are configured to simultaneously measure both PM_{10} and $PM_{2.5}$, and then calculate the PM_{Coarse}.

Clean Air Act (CAA) – Enacted by Congress in 1970, the CAA defines EPA's responsibilities for protecting and improving the nation's air quality and the stratospheric ozone layer. Congress amended the CAA twice, the first time in 1977 and again in 1990. The 1977 amendment added authority to regulate industrial emissions for the prevention of significant deterioration to existing ambient air quality referred to as PSD. The 1990 amendments added authority to regulate hazard air pollutants (HAPs), often referred to as air toxics.

Hazardous Air Pollutants (HAPs) – A list of 186 toxic air pollutants established in the 1990 amendments to the CAA

Microgram per cubic meter ($\mu g/m^3$) – Unit of measurement often used to quantify air pollutant concentrations. Since the concentration involves the volumetric measurement of a gas, the units may be corrected to standard conditions for pressure and temperature or expressed at local conditions for the actual pressure and temperature at the time of measurement.

National Air Monitoring Station (NAMS) - NAMS are a subset of the SLAMS network with emphasis on urban and multi- source areas. There are no current NAMS-designated monitors in the monitoring network.

National Ambient Air Quality Standards (NAAQS) – Under authority of the original Clean Air Act of 1970, the EPA established standards for ambient air quality concentrations to protect public health and welfare. Standards were developed for six *criteria pollutants* which included; particulate matter (PM), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and lead (Pb). Over the years, the EPA has amended the NAAQS based on scientific evaluation of air pollutant levels as correlated human health effects and damage to the environment.

Particulate matter ($PM_{2.5}$) – particulate matter in a particle size range less than or equal to 2.5 micrometers

Particulate matter (PM_{10}) – particulate matter in a particle size range less than or equal to 10 micrometers in size

Particulate matter (PM_{Coarse}) – particulate matter in a particle size range greater than 2.5 micrometers but less than 10 micrometers

Particulate matter (TSP) – particulate matter as total suspended particulate typically in a particle size range equal to or less than 40 micrometers. The measurement is now associated with the NAAQS for lead referred to as (TSP-Pb)

Parts per million (ppm) - Unit of measurement used to often to quantify air pollutant concentrations. The units may be expressed based on volumetric measurements or mass units.

Special Purpose Monitors (SPM) - Special Purpose monitors are not permanently established and can be adjusted to accommodate changing needs and priorities for special studies needed by the State and local agencies. The SPM are used to supplement the fixed monitoring network as circumstances require.

State and Local Air Monitoring Station (SLAMS) - The SLAMS consist of a network or roughly 4000 monitoring station nation-wide. Distribution depends largely on the needs of the State and local air pollution control agencies to meet their respective State Implementation plan (SIP) requirements. The SIPs provide for the implementation, maintenance and enforcement of the NAAQS in each air quality control region with in a state. The State of Alaska monitoring network currently has 8 SLAMS sites for carbon monoxide and PM.

TEOM – FDMS: Thermo Election Inc. Tapered Element Oscillating Microbalance Filter Dynamic Measurement System continuous monitoring sampler. This sampler can sample for coarse or fine particulate matter.

U.S. Environmental Protection Agency (EPA) - The mission of EPA is to protect human health and the environment. The EPA is responsible for establishing regulations to implement, uphold, and enforce federal environmental laws such as the CAA.

APPENDIX E

Alaska 2011 Monitoring Plan - PM Design Data for 2010 -2008

Alaska Monitoring Design Values for $PM_{2.5}$ as µg/m^3

$PM_{2.5}$ Monitoring Sites	98th Percentile			Weighted Mean			2010-2008 Design Value	
	2010	2009	2008	2010	2009	2008	24-hour	Annual
Trinity Christian Church	23.2	23.9	17.3	6.1	7.1	5.5	21	6.3
DHHS Site	17.2	15.3		4.8	5.3		16	5.0
Parkgate Site	17.0	22.4		5.5	6.3		20	5.9
Harrison Court (Butte) Site	37.5	28.8	30.8	7.5	7.8	6.2	32	7.2
State Office Building Site	51.8	51.0[1]	46.7	12.5	11.5	11.3	50	11.7
Floyd Dryden Site	27.3	29.0	30.2	8.8	7.0	7.1	29	7.6
South Gulkana Street	13.6			4.9			14	4.9

[1] The 2009 $PM_{2.5}$ 98th percentile value, and the 2008-10 design value (DV), provided in the tables for the Fairbanks State Office Building Site are contingent on EPA concurring on the five high flagged exceptional event days for 2009. Presently, without EPA's approval of these exceptional events, the 2009 98th percentile value for this site is 89.7 µg/m^3, and the 2008-10 DV is 63 µg/m^3.

APPENDIX F

NCORE Self Assessment Form

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

A. Network Design

a. Proposed NCore Station #1 ___NEW SITE X EXISTING SITE AQS #_AQS # Not Established__
b. Proposed NCore Station #2 ___NEW SITE ___EXISTING SITE AQS #_____
c. Proposed NCore Station #3 ___NEW SITE ___EXISTING SITE AQS #_____

	Item	Criteria	Status	Next Steps
1	Urban or Rural	Largest MSA(s) covered by urban station.	Determined – Fairbanks, AK	
2	Scale of Representation	Neighborhood X Urban __ Regional __ Other __	Neighborhood	Neighborhood scale or larger as recommended.
3	Population Oriented	Yes X No __		Population oriented monitoring as recommended.
4	Proximity to local emissions sources	No biasing local sources within 500 meters for urban stations. No biasing sources or large urban population centers within 50 km for rural stations.	Site established in down-town Fairbanks where $PM_{2.5}$ exceedances have been recorded	
5	Suitability for meteorological measurements	Distance from obstructions is 10x height of obstruction above station. See Volume IV: Meteorological Measurements Version 2.0(Final)	A 10 meter tower has been installed adjacent to the new monitoring shelter	Selected site in an open area, any influence from distance obstructions are anticipated to be insignificant
6	Information (including site photographs) provided for AMTIC NCore web site	Photographs in 8 cardinal directions needed.	Photos of existing site provided in the 2012 Monitoring Plan, Section 3.4	
7	Station Coordinates	Determined by GPS	latitude 64.845690 longitude -147.727413	
8	Site visited by EPA in past 3 years	Meets applicable Appendix D and E criteria.	No EPA inspections to date.	Schedule an inspection once the new shelter and instrumentation have been installed.

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

	Item	Criteria	Status	Next Steps
9	Network leveraging	Collocation with other networks encouraged: STN__ Supplemental CSN__ NATTS __ CASTNET __ IMPROVE __ NADP __ PAMS __ Other __	Other network location not readily available	
10	Applicable site fields updated in AQS including coordinates	Consider setting additional monitor type to "Proposed NCore" (station should also be categorized as SLAMS).	Not yet available	
	LOGISTICAL CONSIDERATIONS			
11	Site access	Access for at least five years is suggested.	Site established with new shelter in place to measure Pm_{10}/$PM_{2.5}$ and Met for WS/WD amb Temp, and BP	Installation is currently under way for additional parameters SO_2. NO_Y, NO, O_3, CO, NH_3, $PM_{2.5}$ Speciation, and RH. Anticipated startup in summer 2011.
12	Power requirements and availability	200A service suggested. 240vac service typically needed for a/c. Key power outlets protected by UPS units.	Electrical power in place for new shelter according to bid specs.	
13	Telecommunications	Minimum dial-up service. Broadband service suggested for polling of 1-minute data.	DR DAS web-based system data acquisition in place and operational.	
14	A/C cooling capacity	Minimum 18,000BTU a/c capacity.	New shelter in place to accommodate temperature control issues for Sub-Arctic location	
15	Interior space	Sufficient for minimum of two 19" inner dimension, 6' tall instrument racks and related equipment and accessories, or equivalent shelf space.	New shelter in place, analyzers to be installed in instrument racks.	Interior design requirements according to bid specs.

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

	Item	Criteria	Status	Next Steps
16	Exterior space (roof and accompanying platforms)	Allow for: a) 1m spacing of low-volume PM sampler inlets – up to seven* required plus PEP audit sampler. b) 1m spacing between low-volume PM sampler inlets and gas manifold cane or Teflon tubing. Facilitate usage of TTP audit vehicle or trailer.	Design features in accordance with bid specs.	
17	10m tower compatibility	Required for meteorological equipment, NO_y converter. Room to drop tower for calibrations and audits.	10 meter in place	

*Notes

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

B. REQUIRED PARAMETER/METHODOLOGICAL EVALUATION

d. Proposed NCore Station #1 ___NEW SITE _X EXISTING SITE AQS #_AQS # Not Established__
e. Proposed NCore Station #2 ___NEW SITE ___EXISTING SITE AQS #_____
f. Proposed NCore Station #3 ___NEW SITE ___EXISTING SITE AQS #_____

	Parameter	Existing Measurements Sampling Began	Method	Future Measurements Date Expected	New or Relocated	Notes
1	Ozone			2/1/2011	Teledyne API Model 400E EQOA-0992-087 Purchased new	Year-round operation (not seasonal)
2	Sulfur dioxide			2/1/2011	Thermo Electron Model 43i EQSA-0486-060 Purchased new	High sensitivity
3	Carbon monoxide			2/1/2011	Thermo Electron. Model 48 RFCA-0981-054 Purchased relocated	High sensitivity
4	Nitrogen oxides (NO_Y/NO/NO_2)*			2/1/2011	Thermo Electron. Model 42i-Y RFNA-1289—074 Purchased new	High sensitivity External converter mounted at 10m
5	Lead (Pb)			na	TSP-Pb by ICP-MS	Not required
6	PM2.5 mass	10/29/09	Thermo Electron Partisol 2000 RFPS-0498-117			1-in-3 day FRM/FEM integrated
8	PM2.5 Elemental Carbon	10/29/09	Magee Scientific Aethalometer/BGI 2.5 VSCC			
9	PM10-2.5 mass				Met-One BAM 1020X	Integrated samplers continuous monitor

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

	Parameter	Existing Measurements Sampling Began	Method	Future Measurements Date Expected	New or Relocated	Notes
10	PM2.5 speciation				Met-One Super SASS	Details to be provided later on sampling requirements.
11	Wind speed and direction**				New	At 10 m
12	Ambient temperature**				New	At 2 m
	Barometric Pressure				New	At 2 m
13	Relative humidity**				New	At 2-m Planned for installation summer 2011
14	Optional – Vertical wind speed, solar radiation, precipitation, barometric pressure, delta-T for 2-10m.					(Not planned at this time)
15	Optional – Ammonia and nitric acid			4/1/2011	Thermo Electron Model 17i Ammonia Analyzer	Planned for installation summer 2011

Notes

* Although the measurement of NO_y is required in support of a number of monitoring objectives, available commercial instruments may indicate little difference in their measurement of NO_y compared to the conventional measurement of NOx, particularly in areas with relatively fresh sources of nitrogen emissions. Therefore, in areas with negligible expected difference between NOy and NOx measured concentrations, the Administrator may allow for waivers that permit high-sensitivity NO_X monitoring to be substituted for the required NOy monitoring at applicable NCore sites.

** EPA recognizes that, in some cases, the physical location of the NCore site may not be suitable for representative meteorological measurements due to the site's physical surroundings. It is also possible that nearby meteorological measurements may be able to fulfill this data need. In these cases, the requirement for meteorological monitoring can be waived by the Administrator.

NCore Readiness Self-Assessment for State/local/Tribal Agencies

Agency Name: ADEC **Date Prepared:** May 4, 2011 **By:** Bob Morgan

C. **SUPPORTING EQUIPMENT EVALUATION**

a. Proposed NCore Station #1 ___NEW SITE _X EXISTING SITE AQS #_AQS # Not Established__
b. Proposed NCore Station #2 ___NEW SITE ___EXISTING SITE AQS #_____
c. Proposed NCore Station #3 ___NEW SITE ___EXISTING SITE AQS #_____

	Item	Criteria	Status	Next Steps
1	Calibrator (field)	Suitable for trace-level dilutions, see Appendix A audit concentrations. Capable of automated QC checks. Internal O3 generator – photometer preferred.	Environics Model 9100 Multi-gas calibration with certified ozone generator Purchased	Installation and startup anticipated for summer 2011
2	Calibrator (lab or field)	Suitable for generation of MDL-level concentrations	See note above	Installation and startup anticipated for summer 2011
3	Zero Air Source	Compliant with TAD recommendations. Ultra-pure air cylinder recommended for occasional comparison to zero air source. Capacity for 20+ LPM of dilution air.	Purchased (Teledyne API 701 zero air system)	Installation and startup anticipated for summer 2011
4	Data acquisition system	Digital-capable system	DR DAS web based system in place and operational	
5	Gas cylinder standards	Suitable for trace-level dilutions, see Appendix A audit concentrations, EPA Protocol certifications. Special low-level standards needed for MDL concentrations (CO, SO_2, NO_y)	EPA Protocol Calibration Gases for SO_2, NO_X, and CO with Certificates of Analysis	
6	Meteorological calibration devices	Provide NIST traceability of required meteorological parameters.	Calibration devices in-house	NIST traceability available for temperature devices. Need to investigate NIST traceability for WS/WD.
7	Sampling manifold	Per Appendix E. Residence time <20 seconds, only glass or Teflon materials, probe and monitor inlets acceptable heights.		Sampling manifold to be included with bid package for new monitoring shelter.

8	Auditing equipment	Independent calibrator, zero air source and gas standards compatible with trace level specifications. Independent meteorological and flow standards, it not already available.	Audit equipment already available and NIST traceability of reference devices will be provided.	

D. ORGANIZATIONAL FACTORS

	Item	Criteria	Status	Next Steps
1	Training considerations	Key monitoring personnel have attended OAQPS provided monitoring workshops or equivalent training.		
2	Monitoring station documentation	NCore station(s) described in Annual Monitoring Network Plan.		Included in an addendum to the 2011 network plan. Presented in the appendices for the 2012 network plan..
3	Section 103 funds received and obligated for equipment purchases			Work with EPA Regional contacts.

APPENDIX G

FAIRBANKS NORTH STAR BOROUGH NCORE SITE SELECTION RATIONALE:

The Alaska Department of Environmental Conservation (ADEC) decided to locate the NCore site in Fairbanks, because this community was dealing with the most significant air quality impacts in the state. Locating the additional samplers for the NCore site at the already established PM2.5 SLAMS State Office Building site (SOB) was not an option, because space on the building roof is limited.

In late 2006 and 2007 Gerry Guay, ADEC Air Monitoring and Quality Assurance Program Manager, and Jim Conner, Air Quality Manager for the Fairbanks North Star Borough (FNSB) surveyed the Fairbanks air shed, to evaluate the PM2.5 sources as well as the overall flow patterns governing the downtown area, see Figure 1.

ADEC selected several possible NCORE sites at that time and started a plan to enhance our knowledge the next winter with a moveable site (the RAMS system) to fill in the holes in our knowledge. At the same time ADEC and EPA were also in negotiations regarding the boundaries of the Non-Attainment area. Using the RAMS trailer (about 4 different sites) and additional fixed sites (the Transportation Admin Center on south Peger southwest of downtown, Nordale Elementary School east of downtown, and the RAMS sites-north, west, southeast, and northwest of town) ADEC surrounded the Fairbanks bowl for 2-3 week periods, see Figure 2. In addition FNSB equipped a vehicle with a DataRAM 4000 and made mobile measurements (called the *"sniffer"* vehicle) to verify assumptions about the hot spots and general background areas including the North Pole area and south all the way to Eielson AFB. These surveys and the subsequent met analyses for the definition of the non-attainment area indicated that the downtown Fairbanks area is quite representative for the greater Fairbanks area, and when the NAAQS for PM2.5 was exceeded in Fairbanks, it was exceeded in North Pole as well. That said, the accumulation of smoke can be highly localized in neighborhoods and unhealthy levels can exist in local pockets, and not downtown. To address this FNSB used the *"sniffer"* vehicle to "map" the area with the intention to derive a correlative factor that could be used to estimate the values in the neighborhoods based on the downtown measurements. The correlated emission factor map is a work in progress at this time.

To find the most appropriate site, many factors were considered: the general meteorology, specifically airflow/drainage; the local emission sources such as commercial/industrial and neighborhood; the availability of space and suitable siting criteria such as trees and buildings; logistics such as power, communications, cost of any long term leasing, and access.

ADEC tentatively selected the NCORE location after review of the RAMS data and continued to investigate and confirm the selection with several seasons of *"sniffer"* data. Compilation and analysis of the data suggests for following conclusions:

- East of downtown, ADEC/FSNB found the Nordale Elementary/Hamilton Acres neighborhood site to represent neighborhood solid fuel burning only. However, when

present, the general airflow/drainage moves pollution to the west and into the downtown area.

- This was true of the other sites to the north and to the west of downtown. The sites were only impacted by solid fuel burning and subsequent drainage feeds into the downtown area from the North.

- From the west, again primarily solid fuel pollution from the Goldstream Valley and the community of Ester, both of which drain into the downtown area or South/Southwest through the Wood River/University west down through Watershed Elementary and down the river away from downtown. This air is relatively clean, concentrations on the order of 10 $\mu g/m^3$, and has the effect of diluting pollutant concentrations.

- From the south, ADEC/FSNB located the RAMS trailer between North Pole and Fairbanks. Emissions were attributed to commercial buildings and vehicles; mostly Solid Fuel Burning Devices (SFBDs) that were warming businesses and local emissions from mobile home parks. The general flow is to the west down the river or just south of south Fairbanks.

- Directly south/southwest, at the Transportation Admin Center on South Peger Road, ADEC/FSNB found significant SFBDs as well as mobile source emissions. It was felt that this site would over estimate the mobile sources and was not representative but was a good indication of mobile sources. The Peger Road site, as it turns out, has a similar percentage of SFBD smoke as downtown (~60-70%) but the mobile sources from the busy arterial road is as much as 15-25% and ADEC estimates the downtown mobile sources component at around 5-10%.

- North Pole sites were also considered, but the sites were likely not impacted by industrial emissions. The North Pole industrial sources are located on the west side of town and emissions are transports down the valley, away from North Pole and Fairbanks.

The downtown site is located where the drainage from the north, east, and sometimes the west flow into town. The industrial/commercial activities to the north, east, and sometimes the west will impact monitors at the state office building and the NCORE site. Additionally, the downtown/NCORE sites are the best location to catch emissions from the northeast and east from business that combust used lubricating oil for space heating. The typical airflow diagram below shows the drainage/air flow into the downtown area (Figure 1).

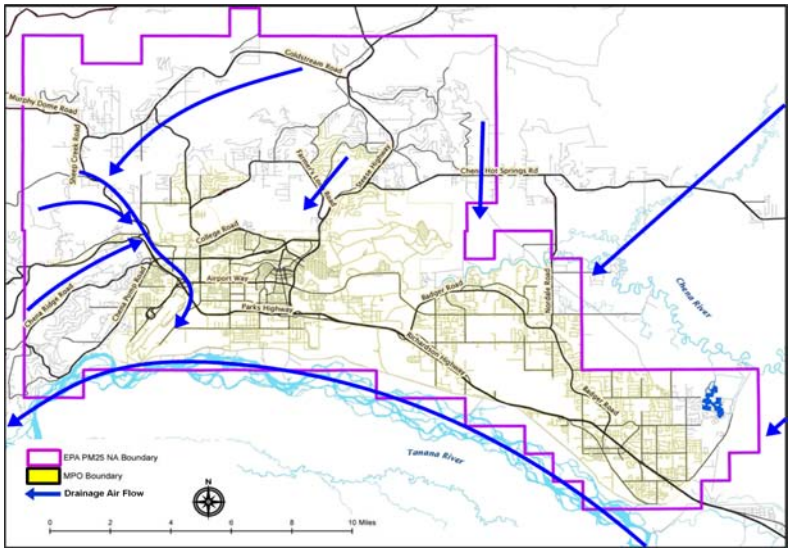


Figure 1: Drainage Flow impacting the non-attainment area

The map in Figure 2 shows all the sites where PM2.5 was measured for 2-3 week periods. The red lines indicate the mobile *"sniffer"* routes that were travelled routinely over a two year period.

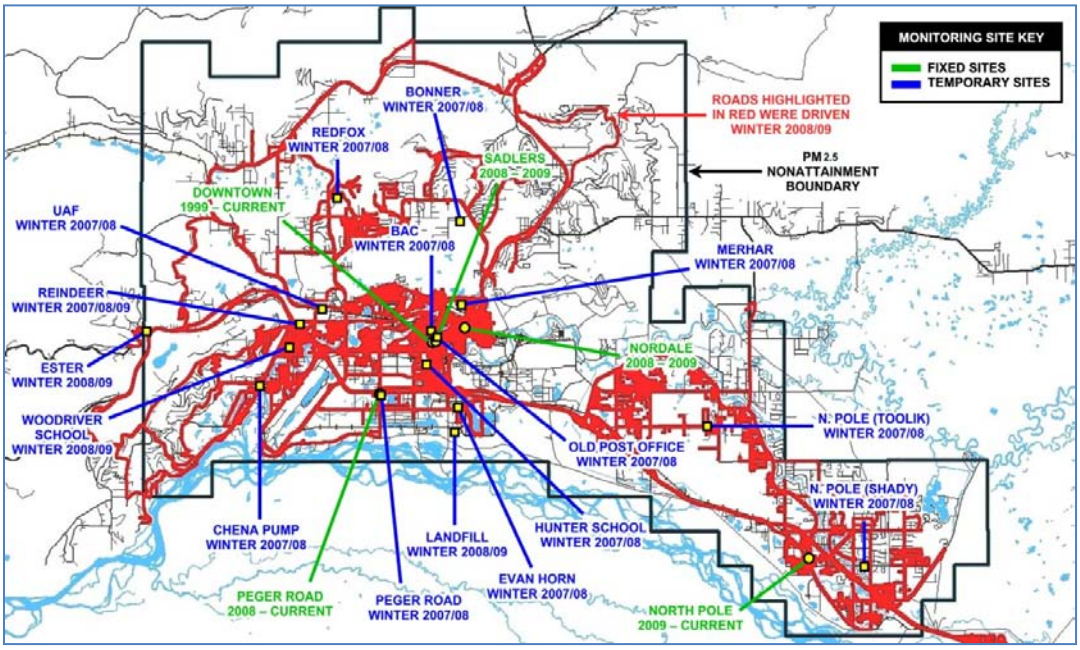


Figure 2: Fairbanks Monitoring sites and *"sniffer"* routes traveled during the winter of 2008/9

FNSB have continued the *"sniffer"* measurements into the present and used the surveys to construct a map of the typical concentration distribution on poor air quality days. The map in Figure 3 shows three particularly bad areas ADEC has identified as the "hot zones" with the downtown/NCORE area in the middle of the center hot zone.

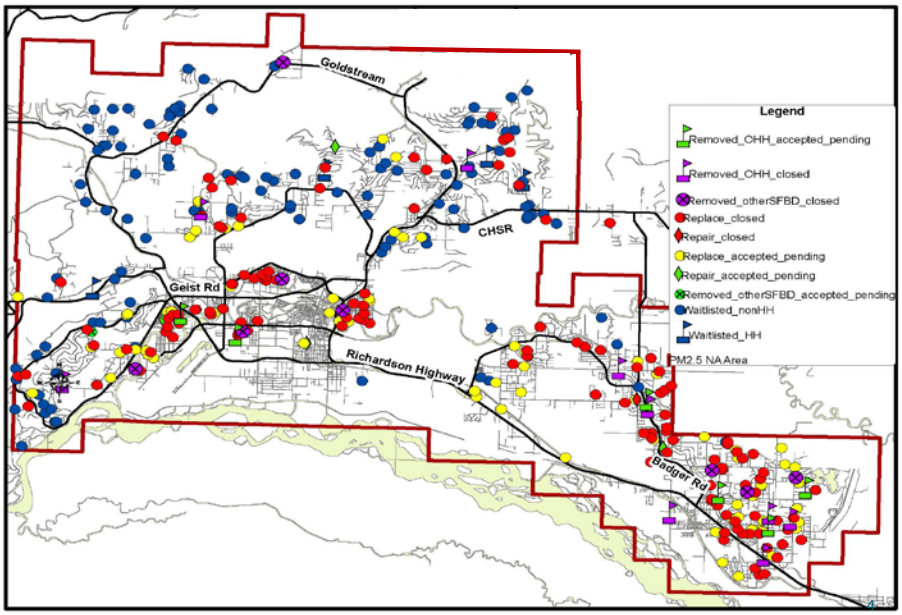


Figure 3: Areas of elevated fine particulate matter (hot spots) in the non-attainment area

The preliminary CMB modeling results, coupled with the ^{14}C and levoglucosan results, support that woodsmoke is the major contributor to the ambient $PM_{2.5}$ in the Fairbanks airshed during the winter months, see Figure 4. Analysis for the first 3 months of 2009 at multiple sites, finds similar distributions, with wood smoke making up 40-80% of the particulate mass.

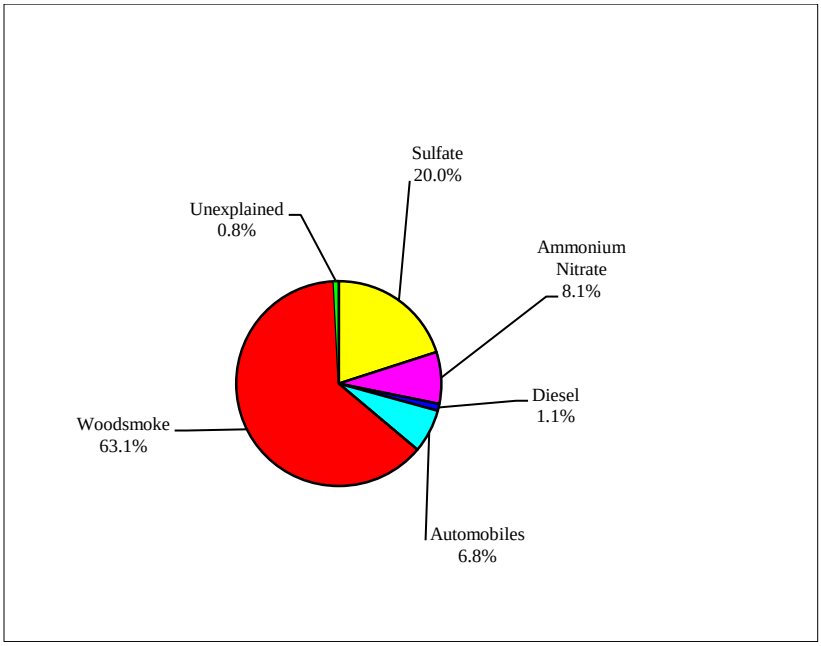


Figure 4: Chemical Mass Balance results for the 2008/9 winter using speciated PM2.5 data from the SOB SLAMS site

A comparison of the SLAMS PM2.5 FRM data at the Fairbanks SOB with the new NCORE site for 2010 shows a very good correlation, see Figure 5 below. It is ADEC's hope to eventually eliminate the SOB site and replace it with the NCORE site. The close correlation of both sites leads ADEC to believe that both sites are similarly influenced by wood smoke. The downtown SOB monitoring site is located inside a downtown business and shopping district, which is surrounded by small residential neighborhoods. The NCore site is located approximately 0.5 miles from the SOB site across the Chena River. The NCore site is located next to some commercial buildings, which abut residential neighborhoods. So far no speciation data has been collected for the NCore site. FNSB plans to have a Met One Super SASS operational at this site by mid-September, 2011.

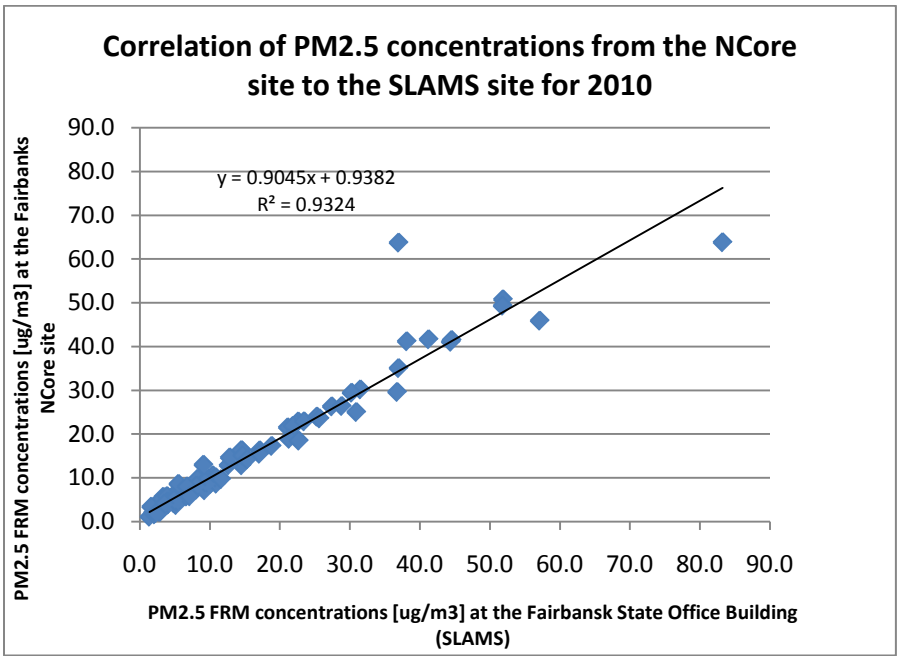


Figure 5: Correlation of PM2.5 concentrations measured at the NCore site in 2010 to the SLAMS site at the State Office Building

A question which is still under investigation is the source of sulfur. The speciation data shows a stoichiometric discrepancy between the elemental sulfur results from the XRF analysis and the sulfate results through Ion Chromatography. ADEC/FNSB are currently investigating the various sources of sulfur and the chemical pathways. One potential source is stack emissions from the nearby Chena River coal-fired power plant owned by Aurora Energy. So far, there is no indication of downward mixing of the stack plumes into the surface layer inversion, which typically coincides with exceedance events. ADEC believes that home heating plays a major role, but still need to await the results from several studies which are currently on-going.

ADEC does not know the degree to which the NCore site might be impacted by other nearby power plants. This is an area of active research that is being undertaken. However, it is ADEC's current opinion that many other locations within the urban area are just as likely to be similarly impacted by either this source or by other nearby power plant sources.

ADEC believes that the NCore site is located in a representative location for a large area inside the Fairbanks non attainment area. If after one year of comparison between the speciation data from the SOB and the NCore site it becomes clear that the site is not adequately sited, ADEC will start looking for alternate locations and work with EPA to find a more representative location.

APPENDIX H:

Visibility and Regional Haze Monitoring Network

In 1977, Congress amended the Clean Air Act to include provisions to protect the scenic vistas of the nation's national parks and wilderness areas. In these amendments, Congress declared as a national visibility goal:

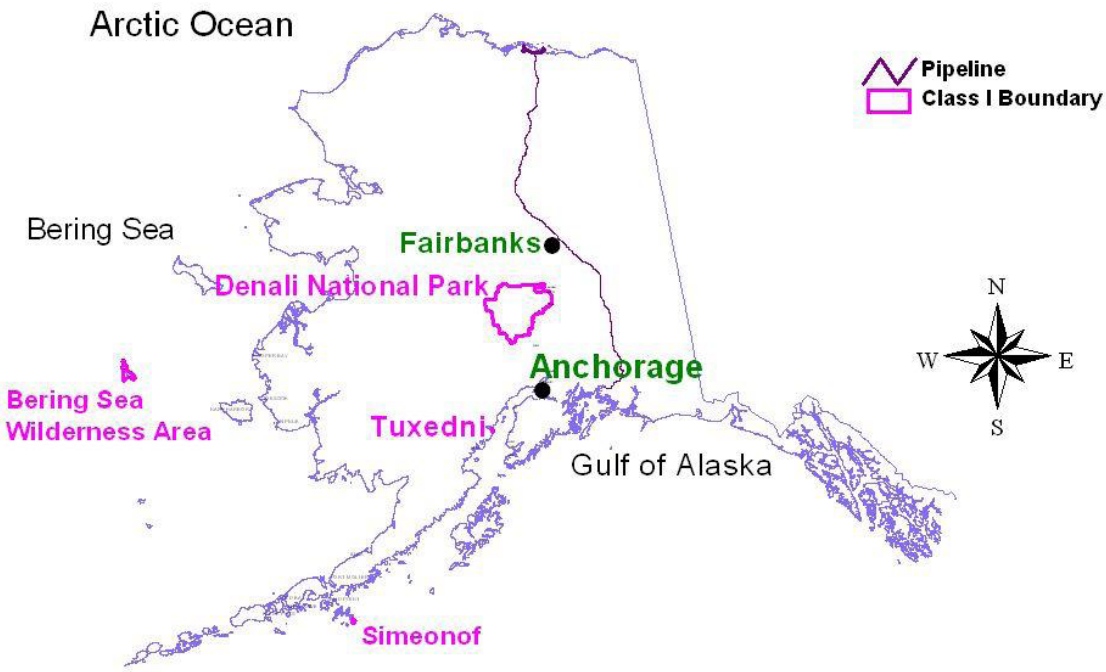
> *The prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution. (Section 169A)*

At that time, Congress designated all wilderness areas over 5,000 acres and all national parks over 6,000 acres as ―mandatory federal Class I areas. These Class I areas receive special visibility protection under the Clean Air Act.

The 1990 amendments to the Clean Air Act established a new Section 169(B) to address regional haze. To address the 1990 Clean Air Act amendments, the problem of long-range transport of pollutants causing regional haze, and to meet the national goal of reducing man-made visibility impairment in Class I areas, EPA adopted, the Regional Haze Rule in 1999.

Alaska has four Class I areas subject to the Regional Haze Rule: Denali National Park, Tuxedni National Wildlife Refuge, Simeonof Wilderness Area, and Bering Sea Wilderness Area. They were designated Class I areas in August 1977. Figure 1 shows their locations, with Denali National Park in the Interior, Tuxedni and Simeonof Wilderness Areas as coastal, and the Bering Sea Wilderness Area.

Figure 1-Alaskan Class I Areas



In Alaska, Class I Areas are managed by the National Park Service (NPS) and the U.S. Fish and Wildlife Service (USFWS.)

The IMPROVE Monitoring Network

The Alaska Regional Haze SIP includes a monitoring plan for measuring, estimating and characterizing air quality and visibility impairment at Alaska's four Class I areas. The haze species concentrations are measured as part of the IMPROVE monitoring network deployed throughout the United States. Alaska uses four IMPROVE monitoring stations representing three of the four Class I Areas. Three of these stations were initiated specifically in response to Regional Haze rule requirements. There is no air monitoring being conducted for the Bering Sea Wilderness Area due to its remote location.

Denali National Park and Preserve

Denali National Park and Preserve is a large park in the interior of Alaska. It has kept its integrity as an ecosystem because it was set aside for protection fairly early in Alaska's history. Denali National Park headquarters lies 240 miles north of Anchorage and 125 miles southwest of Fairbanks, in the center of the Alaska Range. The park area totals more than 6 million acres.. Denali is the only Class I site in Alaska that is easily accessible and connected to the road system. Denali has the most extensive air monitoring of Alaska's Class I areas, so more detailed examinations of long-term and seasonal air quality trends are possible for this site.

IMPROVE monitoring sites were established at two locations within or near the boundaries of the National Park and Preserve. The first air monitoring site is located near the eastern end of the park road at the Park Headquarters. A second, newer site, known as ―Trapper Creek, is located to the south of the Park at another site with reliable year-round access and electrical power.

The Denali Headquarters monitoring site (DENA1) is across the Park Road from park headquarters, approximately 250 yards from headquarters area buildings. The site (elevation of 2,125 feet) sits above the main road (elevation 2,088 feet). The side road to the monitoring site winds uphill for 130 yards, providing access to the monitoring site and a single-family residential staff cabin. The hill is moderately wooded, but the monitoring site sits in a half- acre clearing. During the park season, mid-September to mid-May, 70 buses and approximately 560 private vehicles per day traverse the road loaded with park visitors. During the off season, approximately100 passenger and maintenance vehicles pass within 0.3 miles of the monitoring site. Private vehicles are only allowed on the first 14.8 miles of the Park Road.

The Trapper Creek IMPROVE monitoring site (TRCR1) is located 100 yards east of the Trapper Creek Elementary School. The site is located west of Trapper Creek, Alaska and a quarter mile south of Petersville Road. The site is the official IMPROVE site for Denali National Park and Preserve and was established in September 2001 to evaluate the long-range transport of pollution into the Park from the south. The elementary school experiences relatively little traffic during the day, about 4 buses and 50 automobiles. The school is closed June through August. This site was selected because it has year-round access to power, is relatively open and is not directly impacted by local sources.

IMPROVE monitoring data have been recorded at the Denali Headquarters IMPROVE site from March of 1988 to present. The IMPROVE monitor near the park's headquarters was originally

the IMPROVE site. Due to topographical barriers, such as the Alaska Range, it was determined that the headquarters site was not adequately representative of the entire Class I area. Therefore, Trapper Creek, just outside of the park's southern boundary, was chosen as a second site for an IMPROVE monitor and is the official Denali IMPROVE site as of September 10, 2001. The headquarters site is now the protocol site. A CASTNet (Clean Air Status and Trends Network) monitor is located near the Denali Headquarters IMPROVE site.

Simeonof Wilderness Area

Simeonof Wilderness Area consists of 25,141 acres located in the Aleutian Chain 58 miles from the mainland. It is one of 30 islands that make up the Shumagin Group on the western edge of the Gulf of Alaska. Access to Simeonof is difficult due to its remoteness and the unpredictable weather. Winds are mostly from the north and northwest as part of the midlatitude westerlies. Occasionally winds from Asia blow in from the west.

The island is isolated and the closest air pollution sources are from marine traffic in the Gulf of Alaska and the community of Sand Point.

The Fish and Wildlife Service has placed an IMPROVE air monitor in the community of Sand Point to represent the wilderness area. The community is on a nearby more accessible island approximately 60 miles north west of the Simeonof Wilderness Area. The monitor has been on line since September 2001. The location was selected to provide representative data for regional haze conditions at the wilderness area.

Tuxedni National Wildlife Refuge

Tuxedni National Wildlife Refuge is located on a fairly isolated pair of islands in Tuxedni Bay off of Cook Inlet in Southcentral Alaska. There is little human use of Tuxedni except for a few kayakers and some backpackers. There is an old cannery built near Snug Harbor on Chisik Island which is not part of the wilderness area; however it is a jumping off point for ecotourists staying at Snug Harbor arriving by boat or plane. The owners of the land have a commercial fishing permit as do many Cook Inlet fishermen. Set nets are installed around the perimeter of the island and in Tuxedni Bay during fishing season.

Along with commercial fishing, Cook Inlet has reserves of gas and oil that are currently under development. Gas fields are located at the Kenai area and farther north. The inlet produces 30,000 barrels of oil a day and 485 million cubic feet of gas per day. Pipelines run from Kenai to the northeast and northeast along the western shore of Cook Inlet starting in Redoubt Bay. The offshore drilling is located north of Nikiski and the West McArthur River. All of the oil is refined at the Nikiski refinery and the Kenai Tesoro refinery for use in Alaska and overseas.

The Fish and Wildlife Service has installed an IMPROVE monitor near Lake Clark National Park to represent conditions at Tuxedni Wilderness Area. This site is on the west side of Cook Inlet, approximately 5 miles from the Tuxedni Wilderness Area. The site was operational as of December 18, 2001, and represents regional haze conditions for the wilderness area.

Bering Sea Wilderness Area

The Bering Sea Wilderness is located off the coast of Alaska about 350 miles southwest of Nome. Hall Island is at the northern tip of the larger St Matthew Island.

The Bering Sea Wilderness Area had a DELTA-DRUM sampler placed on it during a field visit in 2002. However, difficulties were encountered with the power supply for the sampler and no

viable data is available from that effort. No IMPROVE monitoring is currently planned for Bering Sea Wilderness Area because of its inaccessibility.

Monitoring data and additional information for the Alaskan IMPROVE sites are available from the EPA website, http://vista.cira.colostate.edu/improve .

Additional Monitoring Considerations

One of the monitoring issues that Alaska has identified is the logistical difficulty of monitoring at remote locations. Remote locations make it challenging to provide power for instrumentation. If a monitor is located at the nearest power source, such as a town, it is also near local sources of emissions, and therefore less likely to be representative of the Class I area. Remote sampling in Class I areas may be needed to verify that data from an off-site IMPROVE monitor are representative. DRUM aerosol impactor sampling may provide an opportunity to verify impacts at remote Class I areas like Simeonof and Tuxedni. The challenges for ongoing air and visibility monitoring in Alaska are transportation and site maintenance. Sites are remote, access may be only by air or water, and electrical power may be lacking. In many places winter temperatures are extreme, often dipping well below zero Fahrenheit for weeks at a time.

DELTA-DRUM Samplers have been used at several sites in Alaska for relatively short periods. Researchers have unsuccessfully modified these samplers for remote winter use in Denali Park. Drum samplers were set up at the Denali and Trapper Creek sites as well as in McGrath and Lake Minchumina in February and March 2008. They proved to be quite problematic with mechanical and pump issues in winter conditions. They ran intermittently between February/March 2006 and April 2009.

Alaska will continue to evaluate as resources allow their portable sampling platforms for use in remote environments.