Near-Road Monitoring Network

Status and Preliminary Data

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MARAMA Air Monitoring Meeting
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Near-Road Monitoring Background

- Near-road NO_2 monitoring requirements were promulgated in 2010 NO_2 NAAQS revision
  - Subject to CASAC review & public notice and comment
- The NAAQS revision was keyed on minimizing 1-hour NO_2 exposures that occur anywhere in an area
- Health-based evidence suggested a majority of exposures are linked to mobile sources, prompting the new near-road monitoring requirements
- Installation deadlines revised in 2013, introducing a phased implementation plan
  - Subject to public notice and comment

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Near-Road Monitoring Specifics

- Multi-pollutant near-road sites will fill a number of current data gaps:
  - Improved understanding of human exposure on and near roads
  - Improved understanding of pollutant behavior, interaction, and dispersion in the near-road environment
- Required Metrics:
  NO_2, CO, $PM_{2.5}$
- Optional Metrics:
  Black Carbon, Ultrafine PM, Air Toxics, Ozone, Meteorology, Traffic Count

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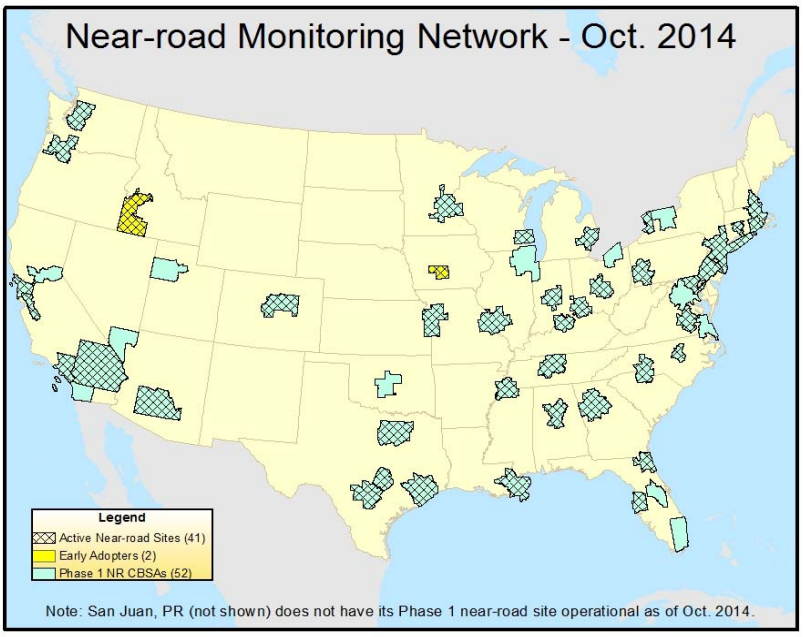
Near-Road Monitoring Timeline

Implementation Phase	CBSA Population	NO_2	CO*	$PM_{2.5}$*
Phase 1 52 Sites [funded]	≥ 1 Million	Jan 1, 2014	Jan 1, 2015 for CBSAs ≥ 2.5M	Jan 1, 2015 for CBSAs ≥ 2.5M
Phase 2 23 Sites (second sites) [funded]	≥2.5 Million **OR** road segment ≥250,000 AADT (NO_2 only)	Jan 1, 2015 (second site)	Jan. 1, 2017 for CBSAs ≥ 1M and ≤ 2.5M	Jan. 1, 2017 for CBSAs ≥ 1M and ≤ 2.5M
Phase 3 51 Sites [unfunded]	Between 500K and 1 Million	Jan 1, 2017		

*Near-road CO and PM2.5 monitors are required to be co-located with an NO_2 monitor. 4



Near-road Siting Process

- Sites are to be located adjacent to highly trafficked roads where NO_2 maxima are expected
  - explicitly considering AADT, fleet mix, congestion patterns, roadway design, terrain, and meteorology
- Sites are to be "as near as practicable" to the target road and no greater than 50 meters from the outside nearest edge of the traffic lanes
- Establishing a near-road site includes:
  - Considering the required metrics, including researching traffic data
  - Engaging transportation agencies (typically)
  - Surveying candidate locations (considering safety, access, power, telecom, etc.)
  - Securing leases and equipment

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CBSA	Population	Phase	Optional Info	AADT	AADT Rank in CBSA	FE-AADT	FE-AADT Rank in CBSA	Distance to Target	Probe Height	Operational	Start Date
Detroit	4,292,060	1	Eliza Howell	140,500		188,200		8.5	5.2	YES	7/27/11
Boise	637,896	3		103,000	2	162,000	2	32	4.6	YES	4/1/12
Des Moines	588,999	3		110,000	6	150,140	14	13	3	YES	1/1/13
St. Louis	2,795,794	1		159,326	8	360,077	8	25	3	YES	1/1/13
Hartford	1,214,400	1		159,900	2	231,855	2	17.7	3.6	YES	4/1/13
Minneapolis	3,422,264	1		277,000	1	387,250	1	32.5	4.9	YES	4/1/13
Boston	4,640,802	1		193,000	1			10	4	YES	6/1/13
Denver	2,645,209	1		249,000	1	263,118	1	8.7	5	YES	6/1/13
Philadelphia	6,018,800	1		124,610	6	257,460	4	12	5	YES	8/1/13
Richmond	1,231,980	1		151,000	1	259,720	1	20	3.3	YES	10/17/13
Birmingham	1,136,650	1		141,190	4	215,527	6	23.2	5.5	YES	1/1/14
Cincinnati	2,128,603	1		163,000	1	386,380	8	8	4.7	YES	1/1/14
Columbus	1,944,002	1		142,361	10	286,050	4	32	5.3	YES	1/1/14
Jacksonville	1,377,850	1		139,000	1	304,062	1	20	4.6	YES	1/1/14
Kansas City	2,038,724	1		114,495	5	347,582	3	20	3	YES	1/1/14
Los Angeles	13,052,921	1	Anaheim	272,000	32	695,776	3	9	4.5	YES	1/1/14
Louisville	1,251,351	1		163,000	2	247,600	8	32	4.7	YES	1/1/14
Milwaukee	1,566,981	1		133,000	4	133,000	4	14	3.5	YES	1/1/14
Nashville	1,726,693	1		144,204	14	338,879	12	30	4.5	YES	1/1/14
Raleigh	1,188,564	1		141,000	3	203,280	3	20	4.3	YES	1/1/14
San Antonio	2,234,003	1		201,640	21	405,295	3	20	4	YES	1/8/14
Houston	6,177,035	1		324,119	1	496,226	1	24	4	YES	1/22/14
S.F. - Oakland	4,455,560	1	Oakland	216,000	22	424,008	2	20	6.4	YES	2/1/14
Indianapolis	1,928,982	1		189,760	1	362,110	1	24.5	4	YES	2/7/14
Phoenix	4,329,534	1	Tempe	320,138	1	624,315	1	12	5.1	YES	2/13/14
Tampa	2,842,878	1	Tampa	190,500	1	327,660	1	20	5	YES	3/1/14
New Orleans	1,227,096	1		68,015	23	129,229	23	28.5	4.22	YES	3/18/14
Buffalo	1,134,210	1		131,019	2			20	4	YES	3/24/14
Seattle	3,552,157	1		237,000	2	471,630	3	4.5	3	YES	3/24/14
Baltimore	2,753,149	1		186,750	13	452,309	1	16.15	4	YES	4/1/14
Providence	1,601,374	1		186,300	1	416,790	1	5	3.9	YES	4/1/14
Dallas	6,700,991	1		235,790	15	431,027	8	24	4	YES	4/2/14
Austin	1,834,303	1		188,150	7	350,712	10	27	4	YES	4/16/14
Portland	2,289,800	1		156,000	5	289,052	4	25	3	YES	4/21/14
Atlanta	5,457,831	1	Ga. Tech	284,920	2	406,256	3	2	4.5	YES	6/15/14
Charlotte	2,296,569	1		153,000	11	260,830	6	30	4.5	YES	6/22/14
New York	19,831,858	1	Fort Lee, NJ	311,234	1	612,212	11	20	4.6	YES	6/26/14
Memphis	1,341,690	1		140,850	1	292,968	2	23.75	4.3	YES	7/1/14
Pittsburgh	2,360,733	1		87,534	3	148,248	4	18	3	YES	7/29/14
Riverside	4,350,096	1	Ontario	245,300	8	646,804	3	50	4.5	YES	*8/1/14*
San Jose	1,894,388	1	San Jose	191,000	8	294,140	4	32	6.4	YES	8/21/14
Cleveland	2,063,535	1		153,660	1	287,580	1			NO	FALL '14
Las Vegas	2,000,759	1		260,000	1	353,825	1	15	4	NO	FALL '14
Miami	5,762,717	1	Broward Co.	306,000	1	622,161	1	30	4.5	NO	FALL '14
Oklahoma City	1,296,565	1		155,300	1	195,554	7	20		NO	FALL '14
Orlando	2,223,674	1		195,773	1	312,062	1	15	4.5	NO	FALL '14
Rochester	1,082,284	1		110,990	3			20	4	NO	FALL '14
Sacramento	2,196,482	1		186,000	9	475,000	1	20	5.3	NO	FALL '14
San Diego	3,177,063	1	Rancho Carmel Dr	223,000	5	358,000	4	37	6	NO	FALL '14
Virginia Beach	1,699,925	1		199,000	1	239,816	1			NO	FALL '14
Washington, D.C.	5,860,342	1	Springfield, VA	297,000	1	553,164	1	16	3.3	NO	FALL '14
Chicago	9,522,434	1								NO	Unknown
Salt Lake City	1,123,712	1								NO	Unknown
San Juan, P.R.	2,627,081	1								NO	Unknown

Near-road Network Status

- 41 operational sites
- Of the 52 Phase 1 CBSAs, 39 are established (~75% installed)
- Two Phase 3 sites established early (Boise & Des Moines)

* As of Oct. 2014

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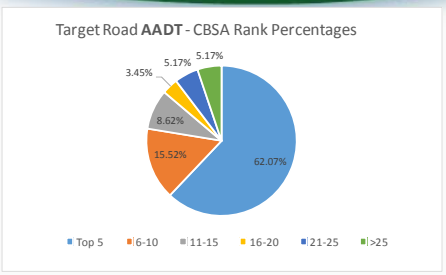
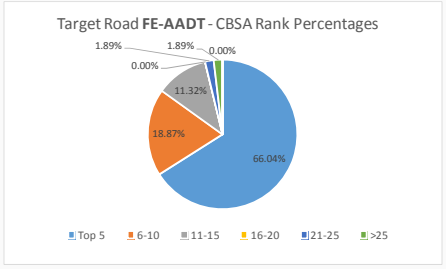
Near-Road Monitoring Target Roadway Rankings





- A majority of sites target a top 5 trafficked road segment in their CBSA
  - 20 sites along #1 ranked road segment for AADT
  - 16 sites along #1 ranked road segment for FE-AADT*
- Over 75% of sites along a top 10 ranked AADT road
- Over 95% of sites along a top 15 ranked road for FE-AADT

*Fleet Equivalent AADT (FE-AADT) is a single metric accounting for both traffic volume and fleet mix (diesel vs gasoline ratio)

NOTE: These data are current for October 2014

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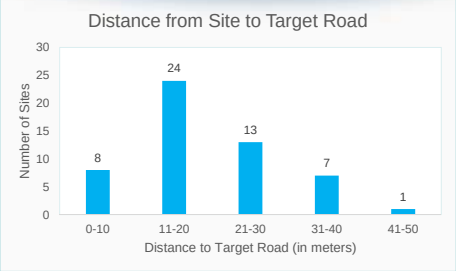
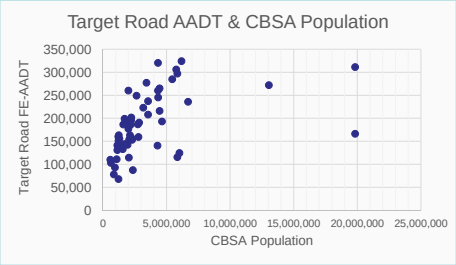
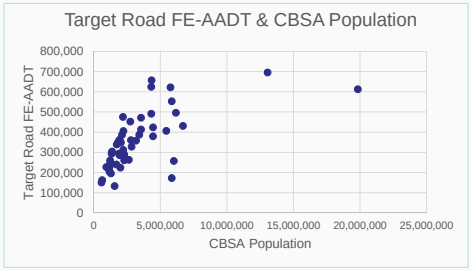
Near-Road Monitoring Site Characteristics



- ~60% of sites within 20 meters of target roads
- ~85% of sites within 30 meters of target road
- Largest population cities tend to have monitors at higher traffic volume roads
- Many roads with monitors have large truck volumes (reflected in FE-AADT)





NOTE: These data are current for October 2014

Near-Road Monitoring Preliminary Results

2012 & 2013 Near-road NO_2 Data Reported to AQS

Year	City	1-Hr Max.	98th %ile	~Annual Avg.	Notes
2012	Detroit	51.0	43.0	25.1	Complete year
	Boise	49.8	44.3*	26.5*	*Incomplete year
2013	Denver	70.8	61.7*	41.1*	*Incomplete year
	St. Louis	64.7	50.4	26.9	Complete year
	Hartford	59.0	48.0*	29.1*	*Incomplete year
	Richmond	58.3	46.0*	26.7*	*Incomplete year
	Minneapolis	54.0	45.0*	24.6*	*Incomplete year
	Boston	50.0	45.0*	27.9*	*Incomplete year
	Detroit	48.0	43.0	23.9	Complete year
	Kansas City	46.1	40.7*	26.1*	*Incomplete year
	Boise	45.9	39.3	25.1	Complete year
	Des Moines	42.2	34.1	19.0	Complete year

UNITS in PPB - PRELIMINARY DATA ANALYSIS - DO NOT CITE OR QUOTE

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Near-Road Monitoring Preliminary Results

Selected 2014 Near-road NO_2 Data Reported to AQS (incomplete year)

City	Mean	98th % 1-hr daily max	1-Hr Max.	Obs. (days)
Los Angeles	31.5	68.6	75.6	90
Cincinnati	24.5	62.0	68.0	243
Denver	24.3	67.9	96.8	212
Seattle	21.6	65.4	66.2	96
Atlanta	20.3	49.6	49.6	47
Baltimore	18.7	52.6	56.0	91
Boston	18.4	56.0	64.0	212
Indianapolis	18.3	59.2	64.4	206
St. Louis	14.1	59.4	68.7	181
Houston	11.2	48.8	55.0	191
Buffalo	9.4	46.1	49.5	88
Des Moines	8.6	35.1	41.1	265

UNITS in PPB - PRELIMINARY DATA ANALYSIS - DO NOT CITE OR QUOTE
Statistics calculated from available 2014 data

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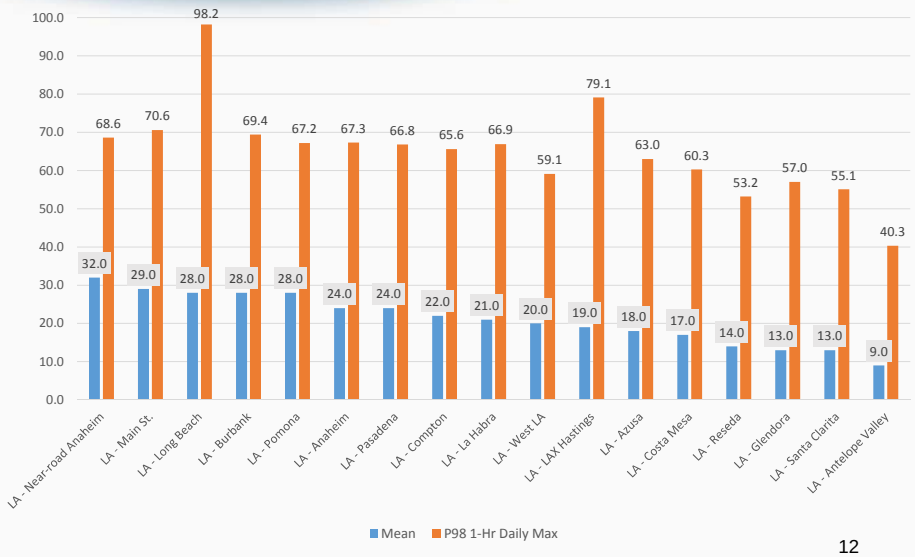
Los Angeles – CBSA wide NO_2 (ppb)



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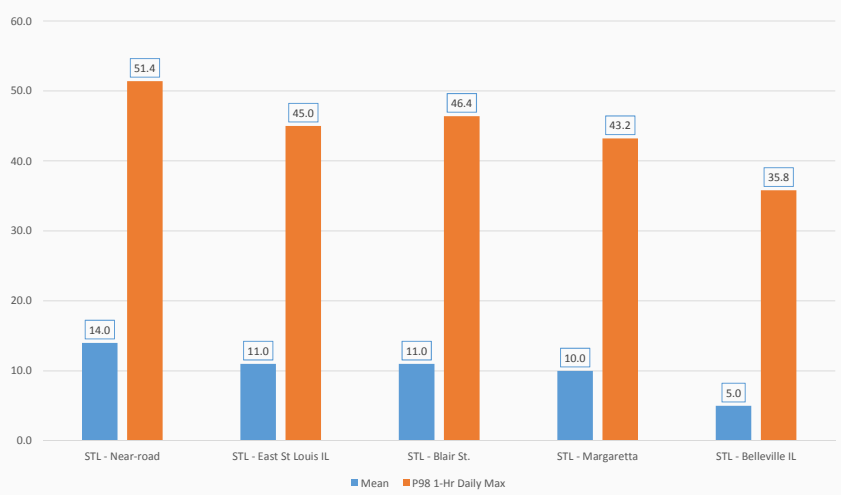
UNITS in PPB - PRELIMINARY DATA ANALYSIS - DO NOT CITE OR QUOTE
Statistics calculated from available 2014 data

St. Louis – CBSA wide NO_2 (ppb)



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UNITS in PPB - PRELIMINARY DATA ANALYSIS - DO NOT CITE OR QUOTE
Statistics calculated from available 2014 data

Near-road Next Steps…

- Continue analyzing NO_2 data as its reported
  - NO_2 NAAQS Review will utilize this new data
  - NACAA has asked for periodic 'updates'
- More time = more data
  - Quarterly & seasonal analysis from Phase 1 sites
  - Intra-CBSA comparisons when Phase 2 sites become operational
- Multi-pollutant data analysis
  - CO & PM2.5 required in 22 sites Jan. 1, 2015

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