

Second Avenue Subway (SAS) Construction Phase Air Monitoring Study

Presentation at Community Board Eight
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by

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Presentation Agenda

- Sources of air pollution from construction activities
- Emission control measures for the SAS
- Air monitoring study objectives
- Air pollutant standards and guidance levels
- Selection of monitored pollutants, locations and data collection
- Preliminary monitoring results



Construction-Related Air Pollution

- Dust particles from:
 - ◆ Excavation & blasting
 - ◆ Demolition
 - ◆ Transport & materials handling
 - ◆ Re-suspension of road dust by moving traffic
- Diesel-engine exhaust
 - ◆ Powers most construction equipment & trucks



Emissions and Dust Control Measures

- Dust-particles control (reduction measures)
 - ◆ Watering underground blasting areas
 - ◆ Surface level watering using spraying devices
 - ◆ Dust containment - screens and enclosures
- Diesel emission control (reduction measures)
 - ◆ Diesel Particulate Filters (DPF)
 - ◆ Ultra low sulfur diesel
 - ◆ Electric cranes



Underground Dust Suppression



Dust Suppression Water Spraying 72nd Street



Dust Suppression Water Spraying 72nd St Enclosure



Water spraying system Open Excavation 86th St



Equipment retrofitted with DPF



Air Monitoring Study Objectives

- Determine the air quality, dust and odor effects of construction activities and underground blasting on abutters and general public
- Evaluate possible public health effects of construction activities through comparison of monitored data to health based standards and guidance levels
- Evaluate the effectiveness of the ongoing dust/air pollution control program based on analysis of monitored data



Air Monitoring Requirements

- There are no State or National requirements to monitor construction related air pollution



Air Pollutant Standards and Guidance Levels

- National and State Ambient Air Quality Standards (NAAQS)
- NYSDEC Short and Long Term Guideline Concentrations of air contaminants when reviewing the permitting of new facilities
- WTC “Air Task Force Working Group” established health based benchmarks as action levels for a list of air contaminants



National Ambient Air Quality Standards (NAAQS) - Clean Air Act

- Based on health effects - Set with adequate margin of safety
- Six pollutants identified
 - ◆ Particulate Matter (PM10 and PM2.5)
 - ◆ Carbon monoxide (CO)
 - ◆ Nitrogen dioxide (NO₂)
 - ◆ Sulfur dioxide (SO₂)
 - ◆ Ozone (O₃)
 - ◆ Lead (Pb)



National Ambient Air Quality Standards (NAAQS)

- Every 5 years Clean Air Scientific Advisory Committee (CASAC) reviews thousands of health studies & recommends pollutant levels to protect public health
 - ◆ PM2.5 added to the list during 1990'
 - ◆ Levels for PM2.5, O3, NO2 and SO2 revised during last decade



Monitored Pollutants

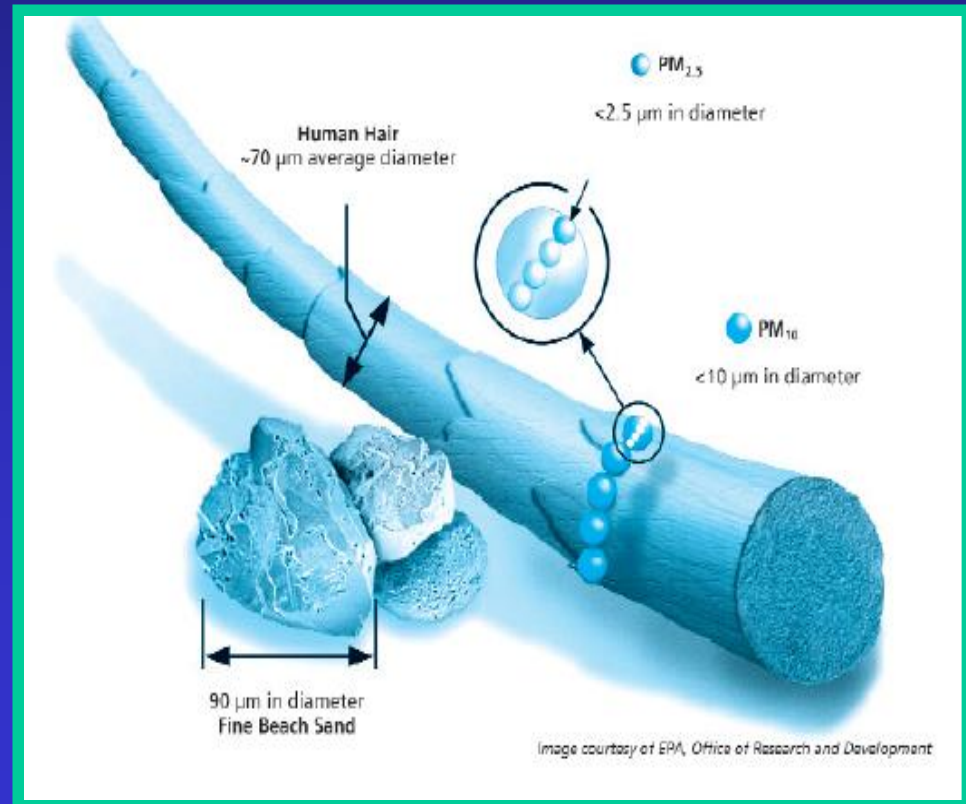
The most significant pollutant from construction activities is particulate matter

- PM10 (coarse particles - less than 10 microns)
- Major sources include:
 - ◆ Demolition & debris removal
 - ◆ Excavation, blasting & drilling
 - ◆ Materials loading & unloading
 - ◆ Suspended road dust



Monitored Pollutants

- PM_{2.5} (fine particles - less than 2.5 microns) results from:
 - ◆ Regional pollution (sulfates and nitrates)
 - ◆ Fuel combustion
 - ◆ Diesel exhaust



Monitored Pollutants

- Silica is one of the most common elements on earth (sand, glass, rocks, etc)
- Present in Manhattan rock as:
 - ◆ quartz, cristobalite and tridymite
- Respirable Silica (component of dust particles) is a significant health concern in underground mining operations
 - ◆ Identified as a concern in the WTC clean up and demolition air monitoring study
 - ◆ There is no National or State ambient standard for respirable silica



Monitored Pollutants

- Carbon monoxide (CO), VOC, nitrogen oxides (NO and NO₂) and sulfur dioxide (SO₂) are the product of fuel combustion
 - ◆ Motor-vehicles
 - ◆ Possible byproduct from blasting operations
 - ◆ Present in the urban environment
- Ammonia (NH₃) and hydrogen sulfide (H₂S) can be odor producing blasting byproducts



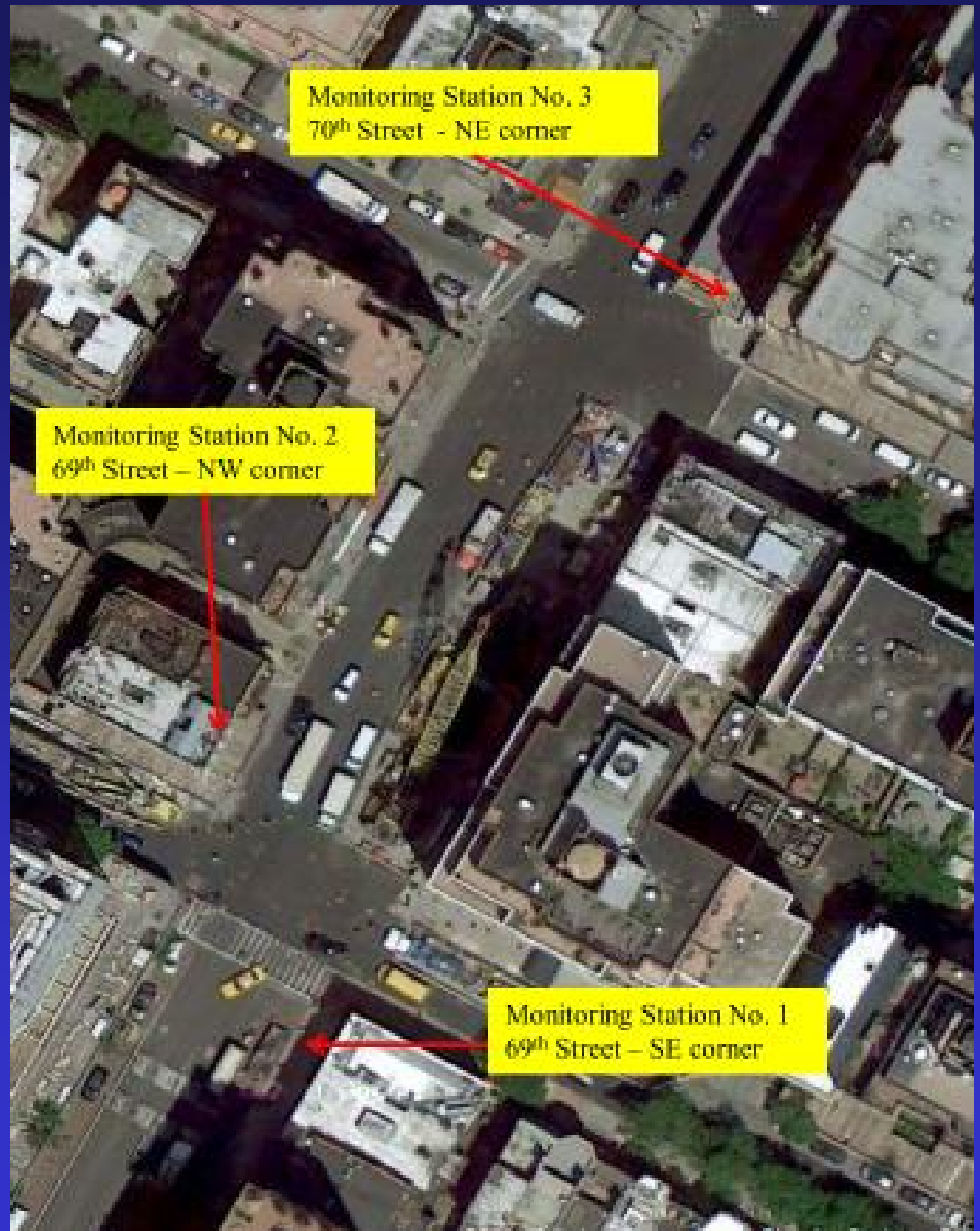
Air Monitoring Locations

10 locations were selected to represent:

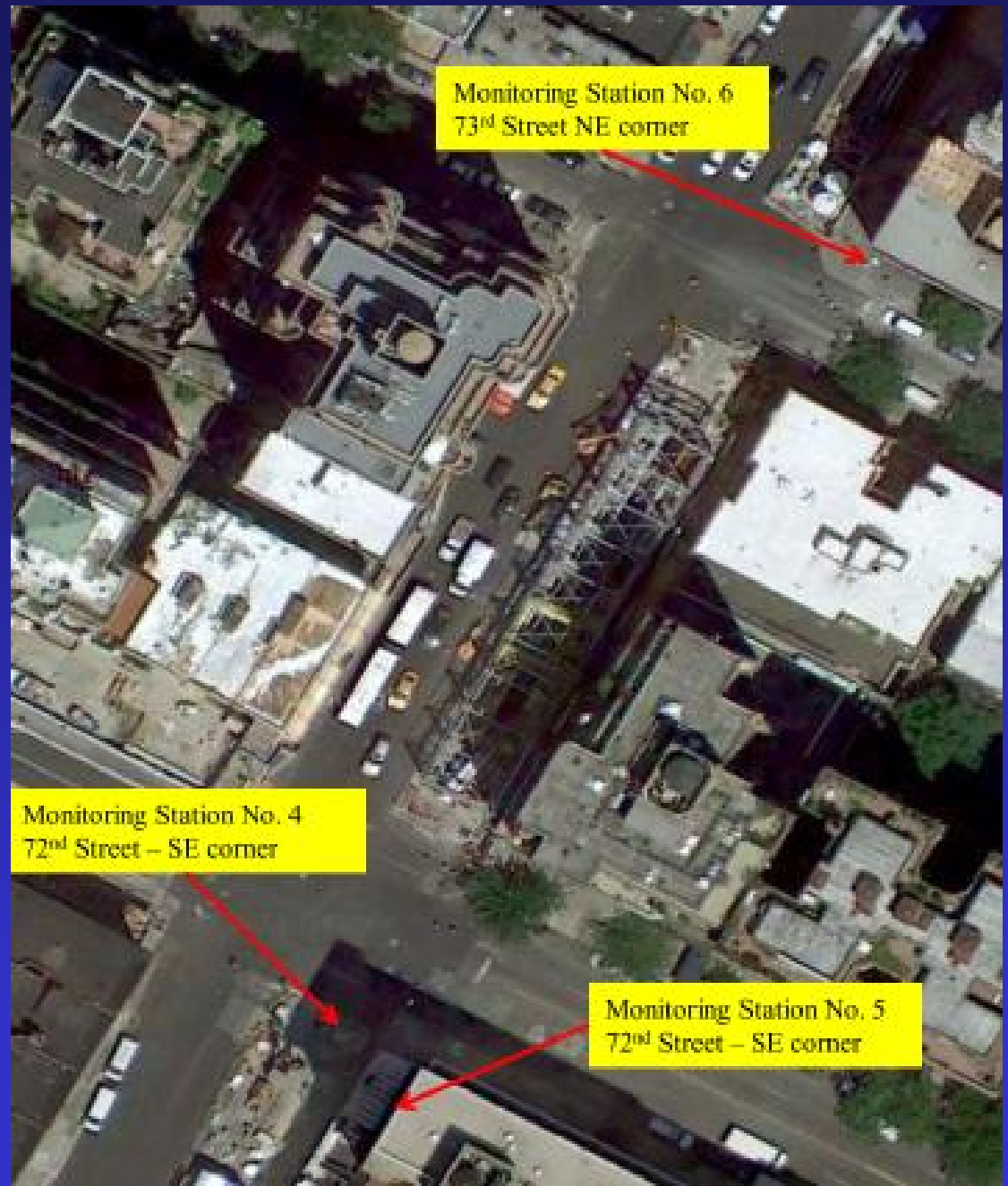
- Public exposure at close proximity of each excavation shaft (30-80 feet distance)
- Elevated locations to represent abutters windows or balconies
- Sufficient coverage to capture multiple wind directions in an high density urban environment



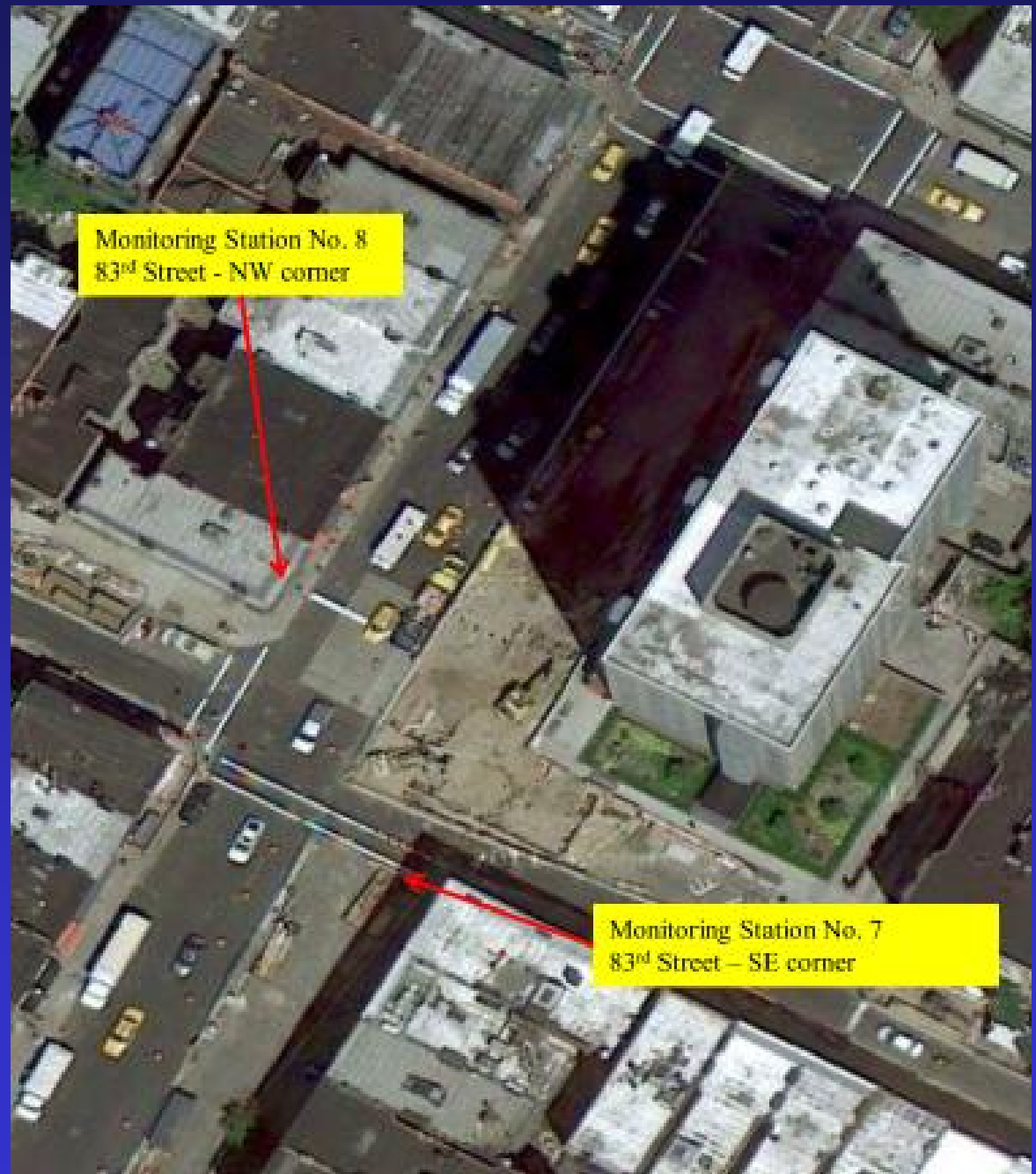
Monitoring Locations between 69 and 70 Streets



Monitoring Locations between 72 and 73 Streets



Monitoring Locations between 83 and 84 Streets



Monitoring Locations between 86 and 87 Streets



Monitoring Equipment Site 8 – 83rd street



Monitoring Equipment Site 9 – 86th street



Monitoring Data Being Collected

- Data recorded every minute of the day at each station for each pollutant for PM10, PM2.5, CO, VOC, NO, NO2, H2S, SO2 and NH3
- Daily samples for respirable silica
- Approximate 3.3 million data points over 4 week period



Health Based National Standards NAAQS

Pollutant	Time Period Exposure	Standard
PM10	24 Hours	150 ug/m ³
PM2.5	24 Hours	35 ug/m ³



Guidance for Respirable Silica ($\mu\text{g}/\text{m}^3$)

Guidance	Threshold	Type
OSHA – Immediate Danger to life and health (30 min exposure)	50,000	Quartz
	25,000	Cristobalite and Tridymite
OSHA (ACGIH) worker protection level (40 hour week exposure)	100	Quartz
	50	Cristobalite
	50	Tridymite
WTC Task Force Action Level (daily exposure)	10	Quartz



Background Pollutant Levels monitored in Manhattan (NYSDEC)

Pollutant	NAAQS	Monitored Values
PM10 – 24 Hour levels	150	60 ug/m ³
PM 2.5 – 24 Hour levels	35	33.5 ug/m ³



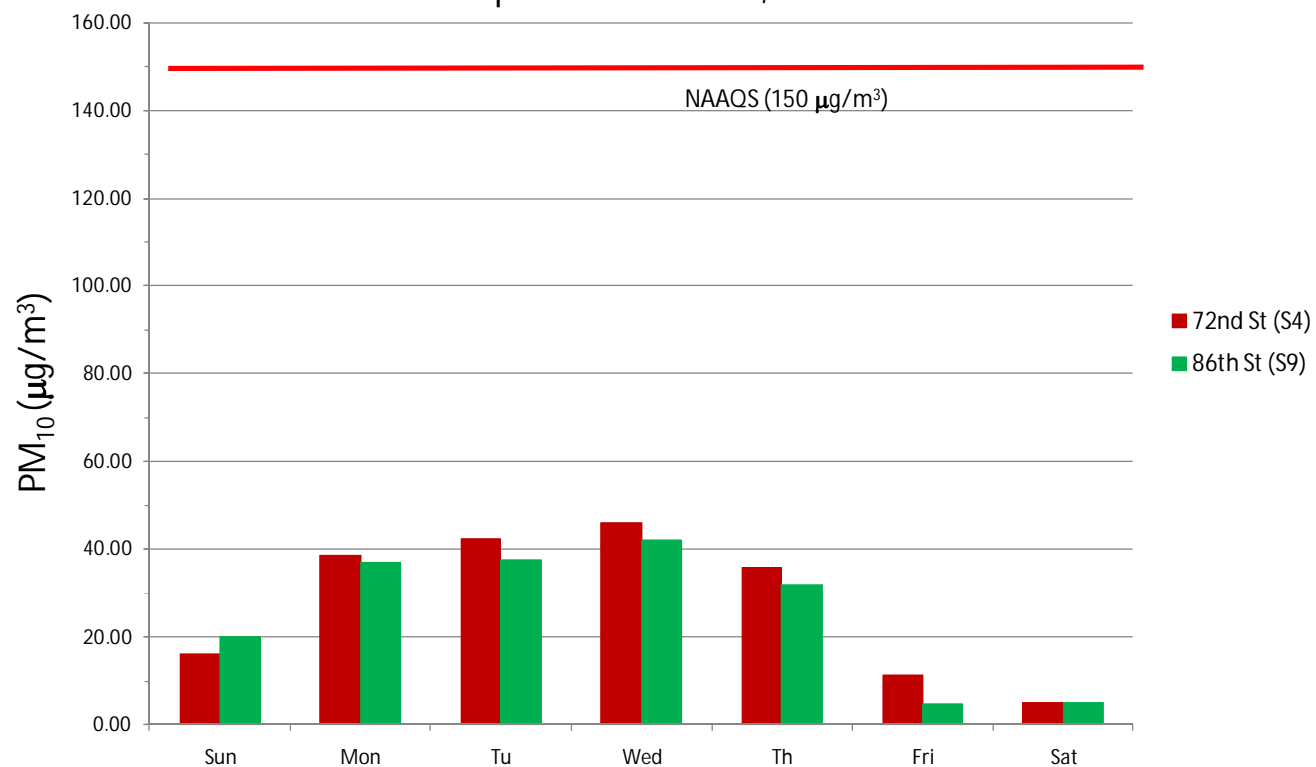
Preliminary Monitoring results

- Data from week of September 11-17
- Hourly and daily levels for PM10 and PM2.5
- Daily levels for respirable silica

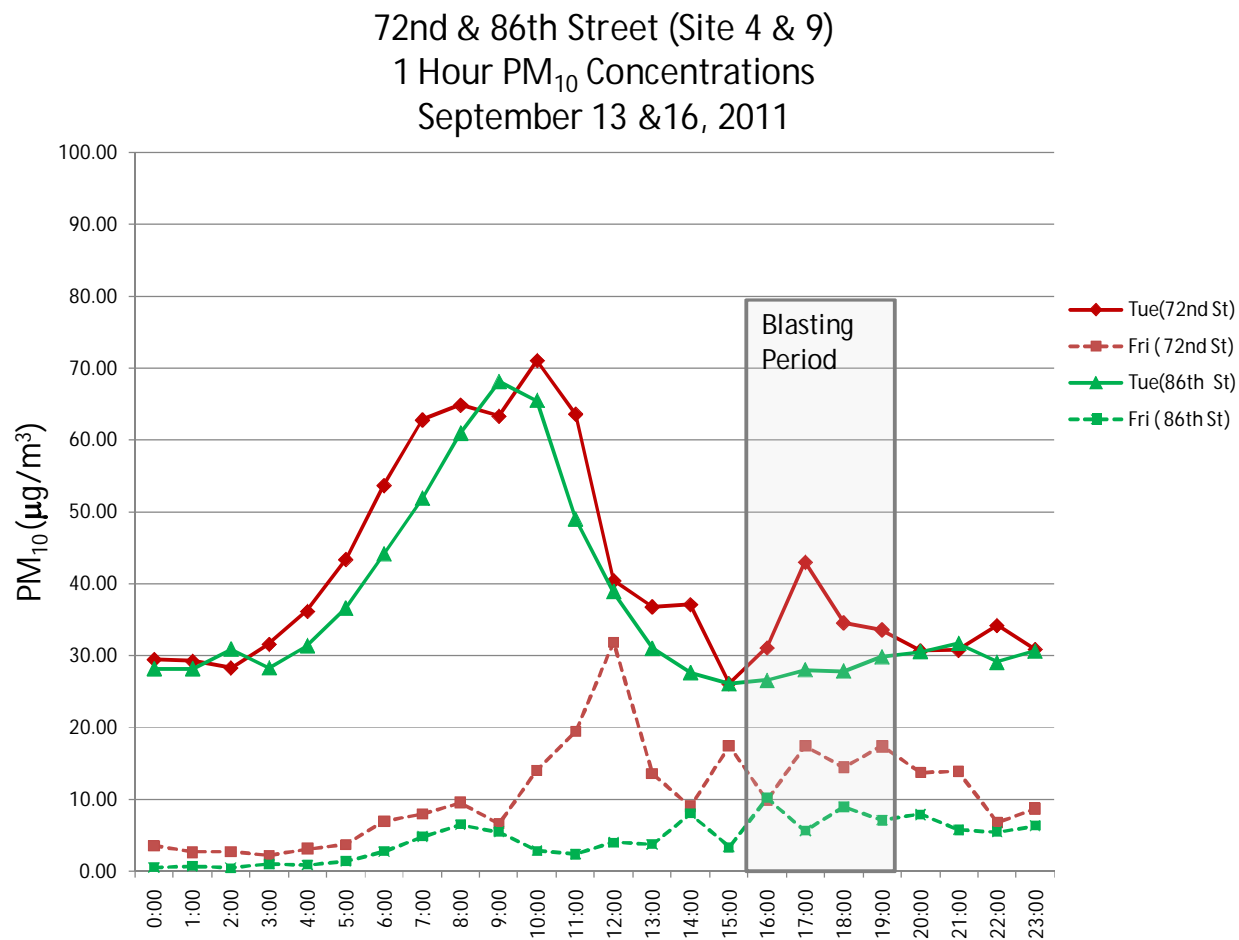


Daily PM10 Levels 72nd and 86th Streets

72nd Street & 86th Street(Site 4&9)
24 Hour Average PM₁₀ Concentrations
September 11 to 17, 2011

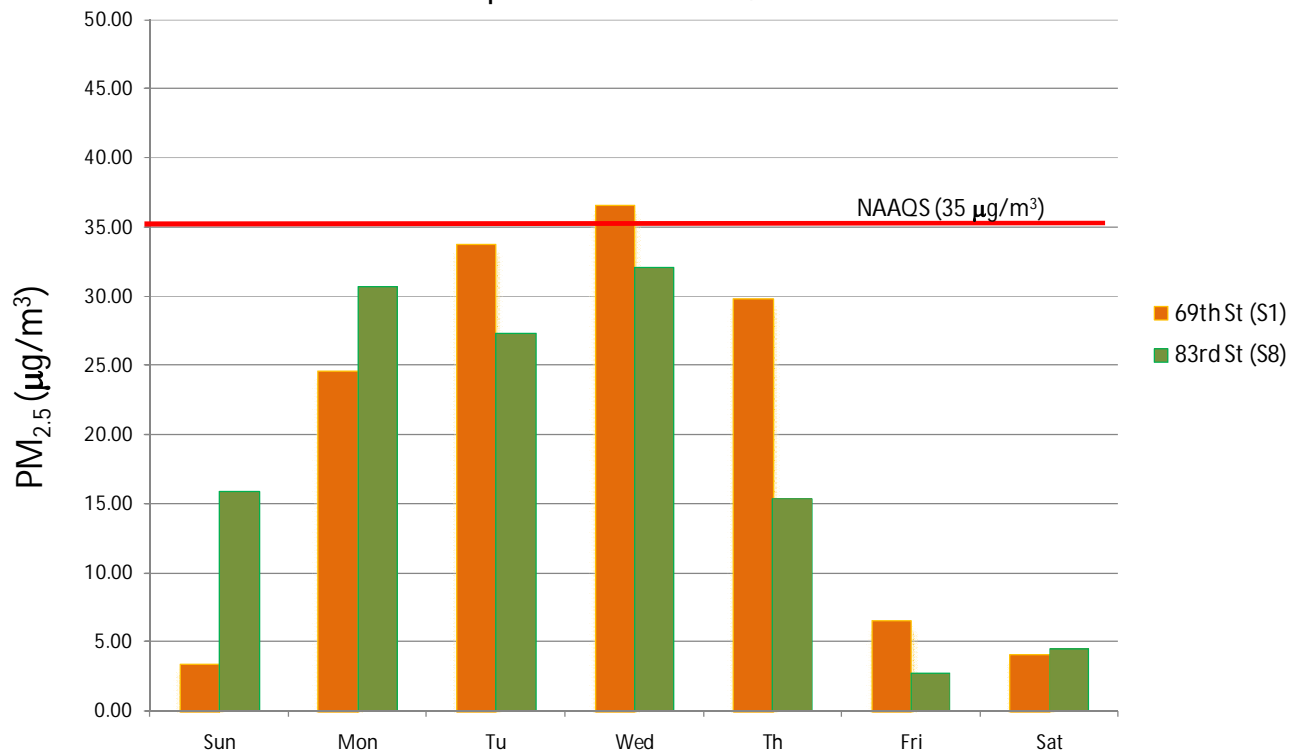


Hourly PM10 levels – 72nd & 86th Sts Tuesday and Friday (Sep-13-16)

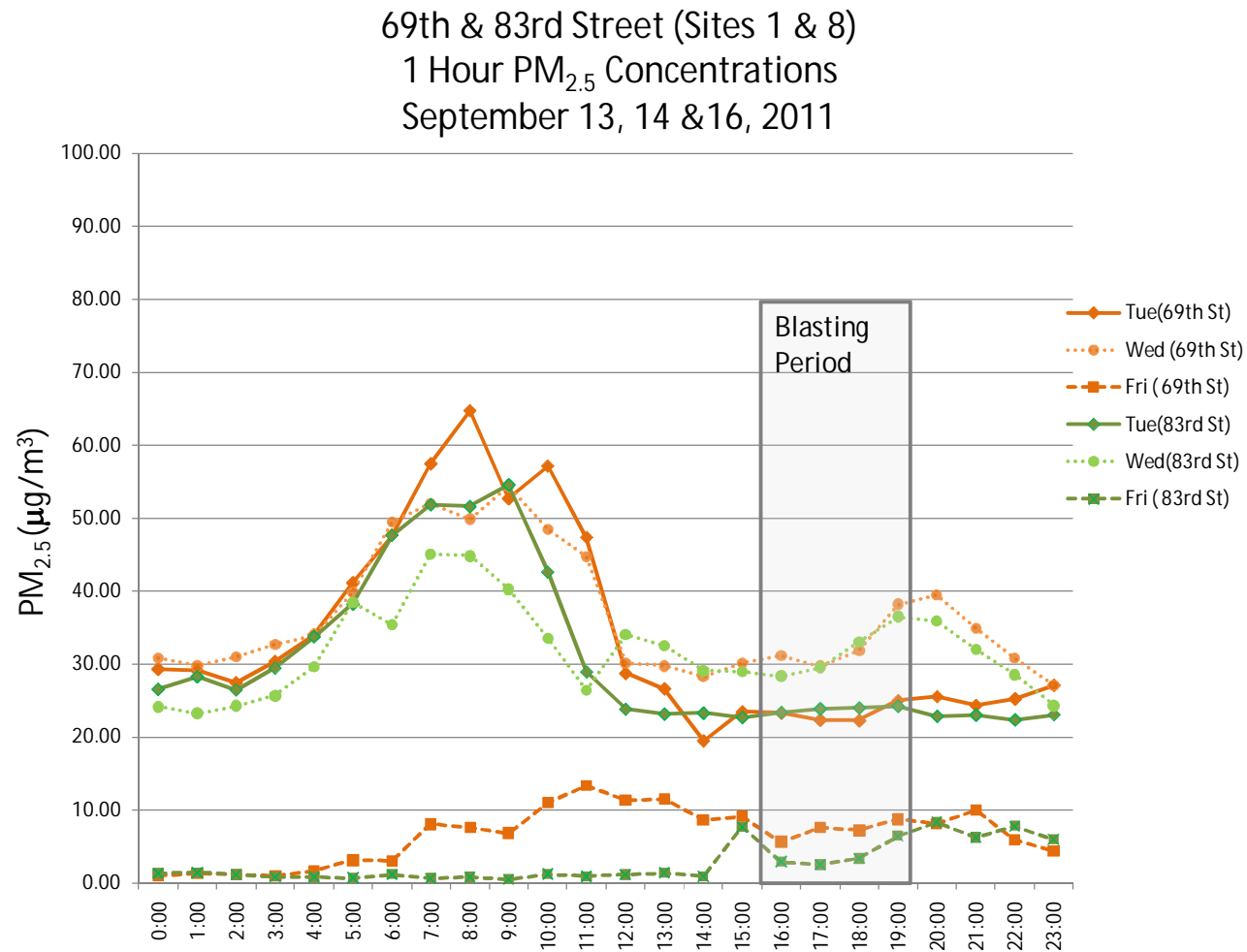


Daily PM_{2.5} Levels 69th and 83rd Streets

69th Street & 83rd Street (Sites 1 & 8)
24 Hour Average PM_{2.5} Concentrations
September 11 to 17, 2011



Hourly PM2.5 levels – 69th & 83rd Sts Tues, Wed and Friday (Sep-13,14,16)



Respirable Silica Quartz (ug/m³)

Location	Date	Measured Value
Site 3 – 70 th St	9/12-13	6
Site 3 – 70 th St	9/13-14	3
Site 3 – 70 th St	9/14-15	3
Site 4 – 72 nd St	9/12-13	6
Site 4 – 72 nd St	9/13-14	ND
Site 4 – 72 nd St	9/14-15	5
Site 7 – 83 rd St	9/15-16	3
WTC Action Level		10



Discussion of Preliminary Results

Week of September 11th Data

■ PM 10

- ◆ Daily (24 hour) levels are below the NAAQS
- ◆ Hourly levels seem to reflect combined effects of motor-vehicle emissions (morning peaks), and blasting/construction activities (afternoon peaks)

■ PM2.5

- ◆ Very similar patterns, but less noticeable effect of blasting

■ Silica levels below the WTC guidance

- ◆ Tridymite and cristobalite were not detected



Discussion of Preliminary Results

One week of Data

- Significant differences between days of the week (Tuesday, Wednesday and Friday)
- More data and analysis are needed to better determine the contribution of different sources
 - ◆ Traffic emissions component, versus
 - ◆ Construction component

Thank you for coming and listening !!!

Questions ??

