

Particulate Matter by Day of Week; Yuma, AZ & San Luis, Sonora Air Pollutant Concentrations

By Peter Hyde, Arizona State University
June 4, 2008
Air Quality Trends in the Southwest
Pima Association of Governments
Tucson, Arizona

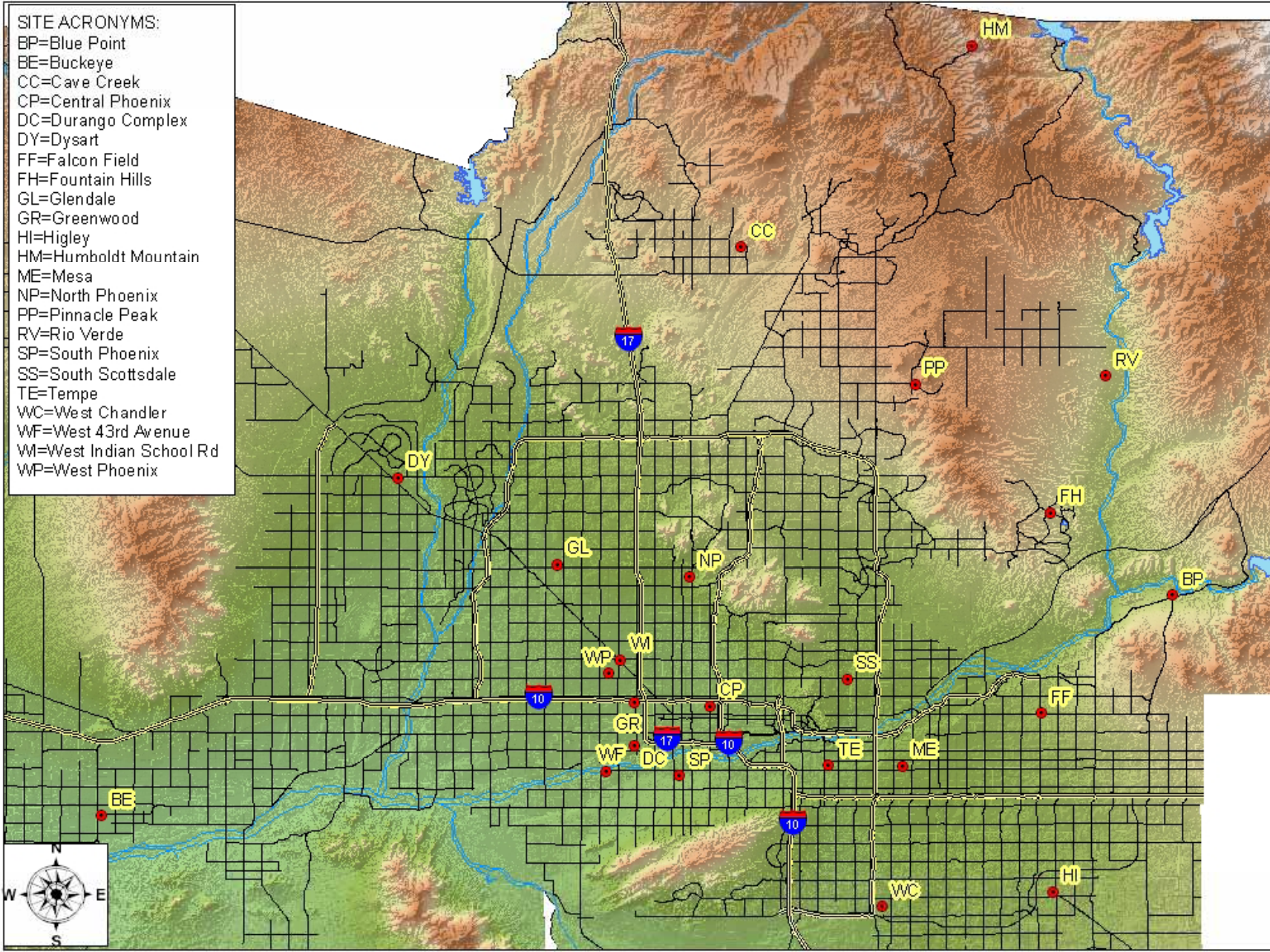
Particulate Matter

- Abbreviation: PM
- Size of particles is important
- That fraction 10 microns and smaller is called “PM₁₀”
- PM is a complex mixture of solid (and liquid) particles of variable chemical composition.

PM day of week variation

- Four sites in central Phoenix, AZ
- 2005
- Hourly PM concentrations by continuous monitors, reduced to the appropriate averages

- SITE ACRONYMS:**
- BP=Blue Point
 - BE=Buckeye
 - CC=Cave Creek
 - CP=Central Phoenix
 - DC=Durango Complex
 - DY=Dysart
 - FF=Falcon Field
 - FH=Fountain Hills
 - GL=Glendale
 - GR=Greenwood
 - HI=Higley
 - HM=Humboldt Mountain
 - ME=Mesa
 - NP=North Phoenix
 - PP=Pinnacle Peak
 - RV=Rio Verde
 - SP=South Phoenix
 - SS=South Scottsdale
 - TE=Tempe
 - WC=West Chandler
 - WF=West 43rd Avenue
 - WM=West Indian School Rd
 - WP=West Phoenix



0 2.5 5 10 15 20 Miles

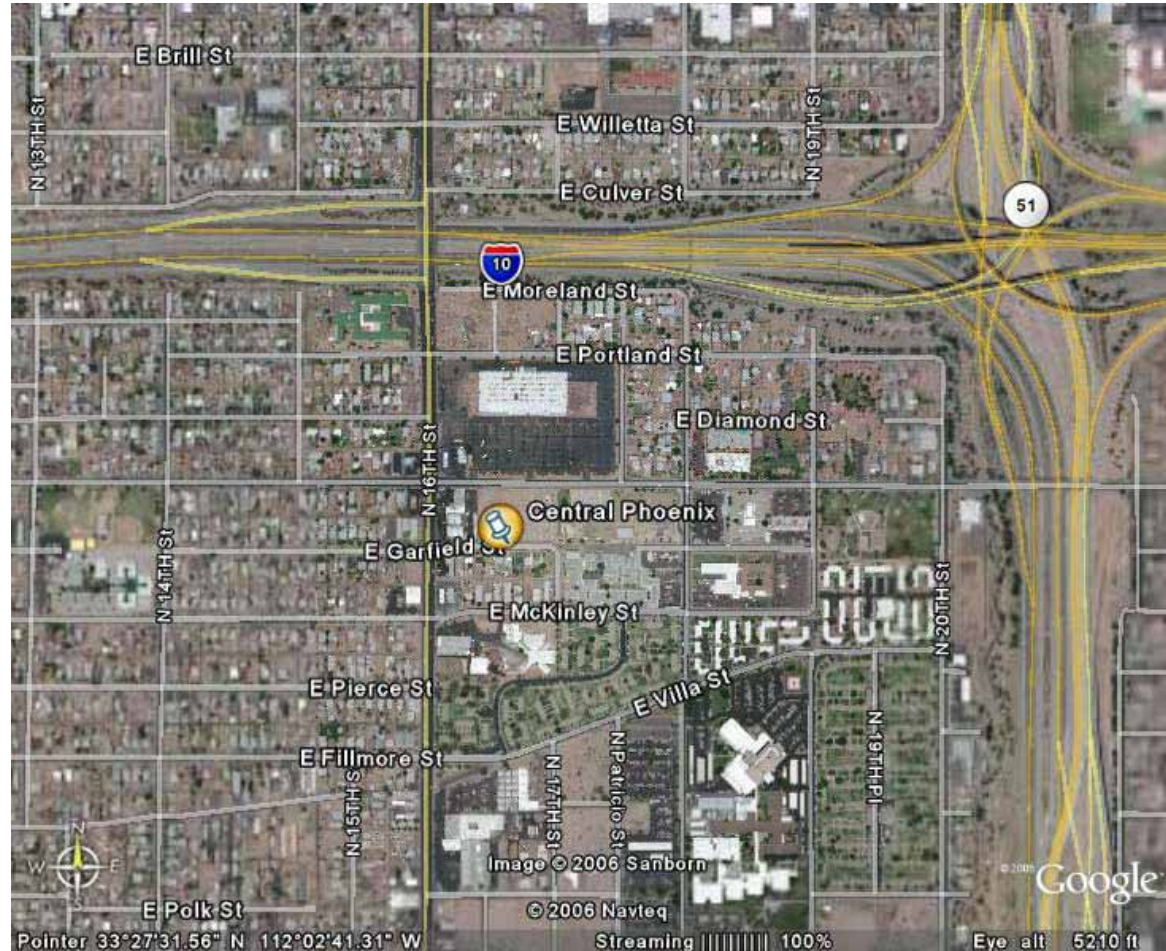
Monitoring Sites Current as of December 31, 2006

Sites

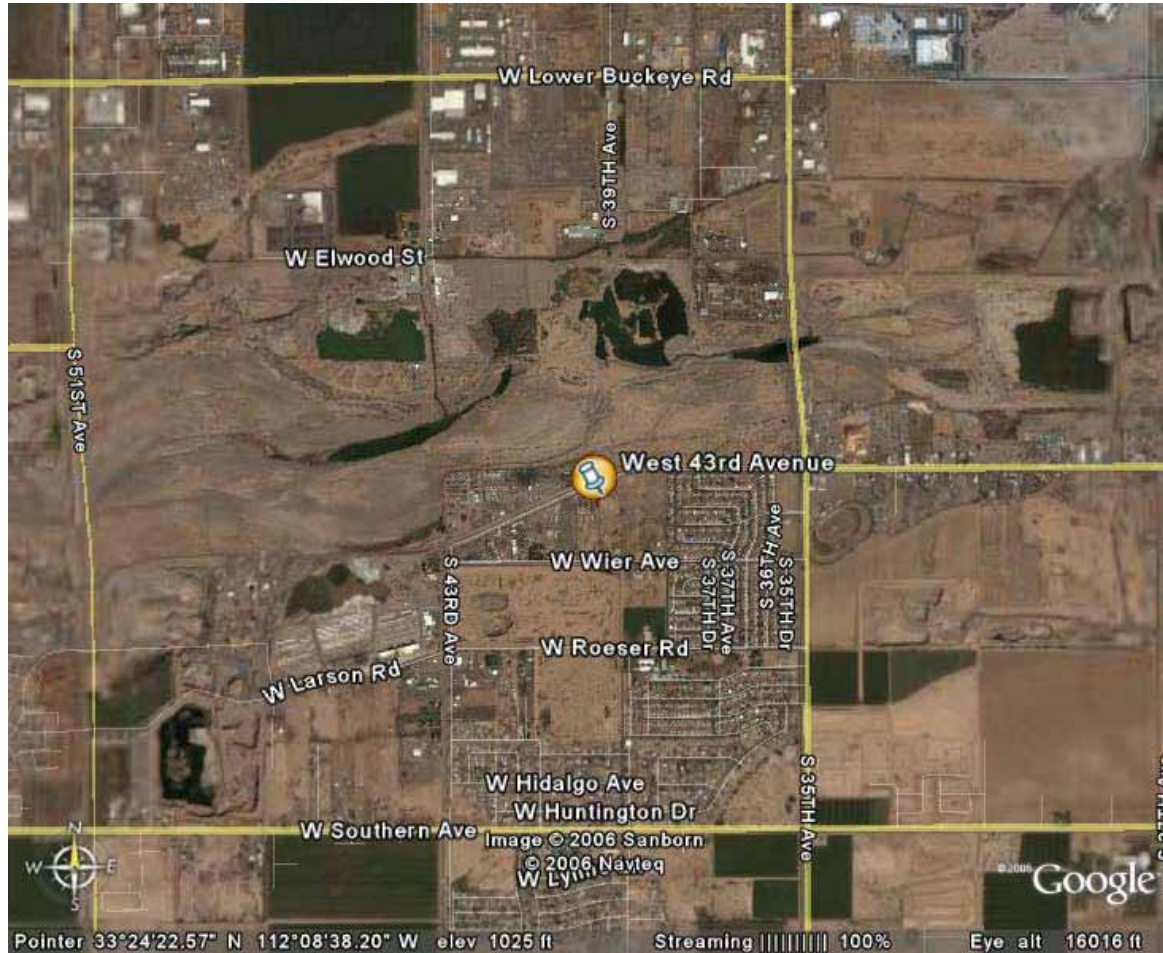
- Central Phoenix CP 16th Street/Roosevelt
- West 43rd Avenue WF 43rd Ave./Broadway
- Durango Complex DC 27th Ave./Durango St.
- Supersite SS 19th Ave./Camelback



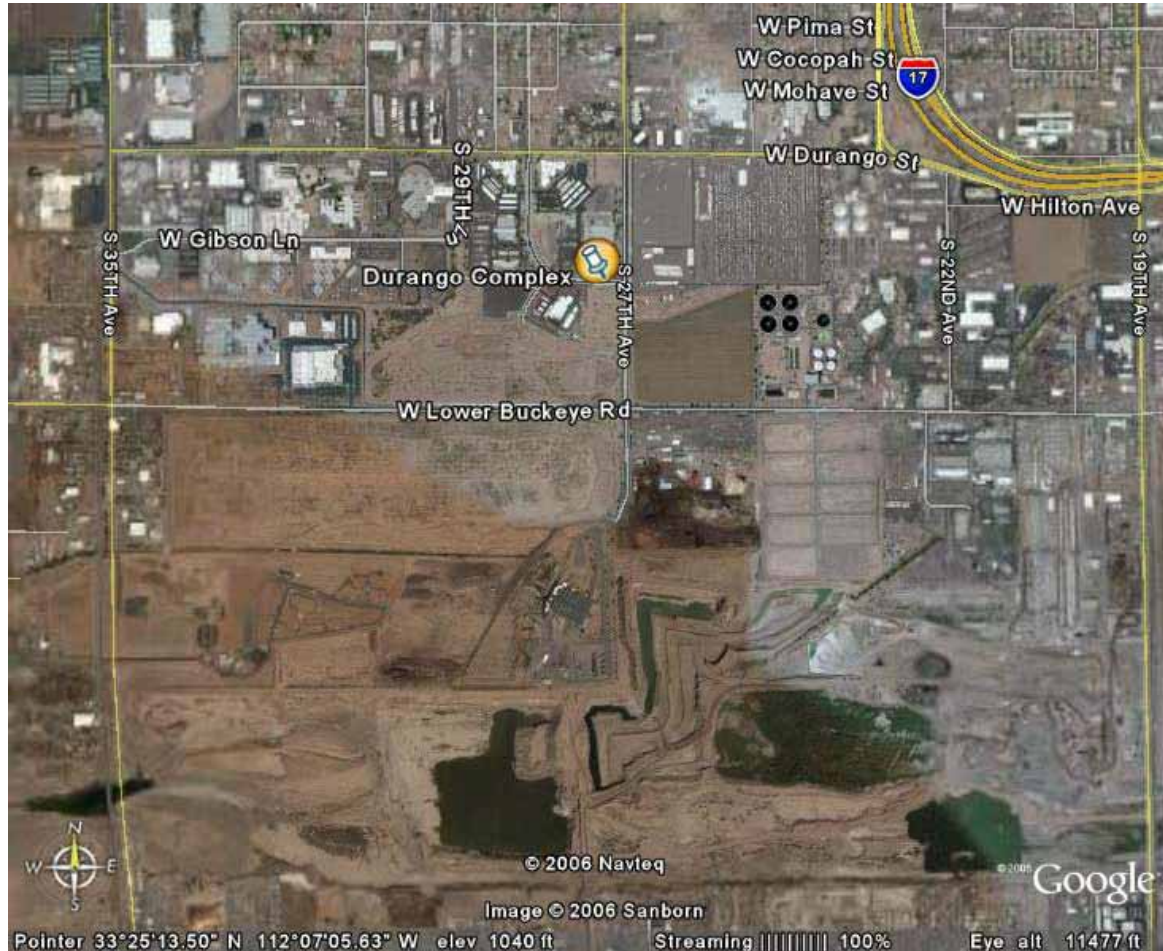
Central Phoenix CP 16th Street/Roosevelt



West 43rd Avenue WF 43rd Ave./Broadway

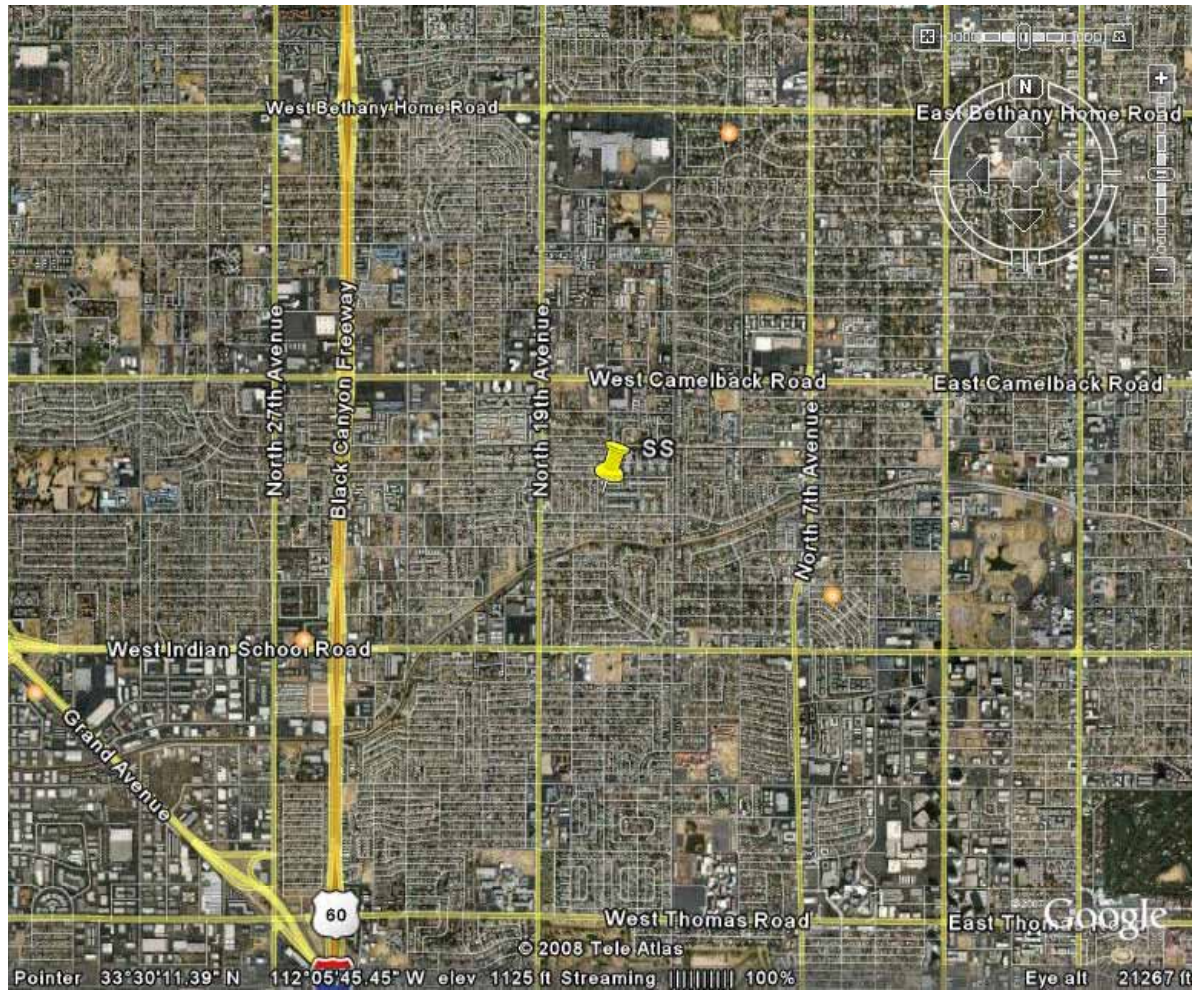


Durango Complex DC 27th Ave./Durango St.



Supersite SS

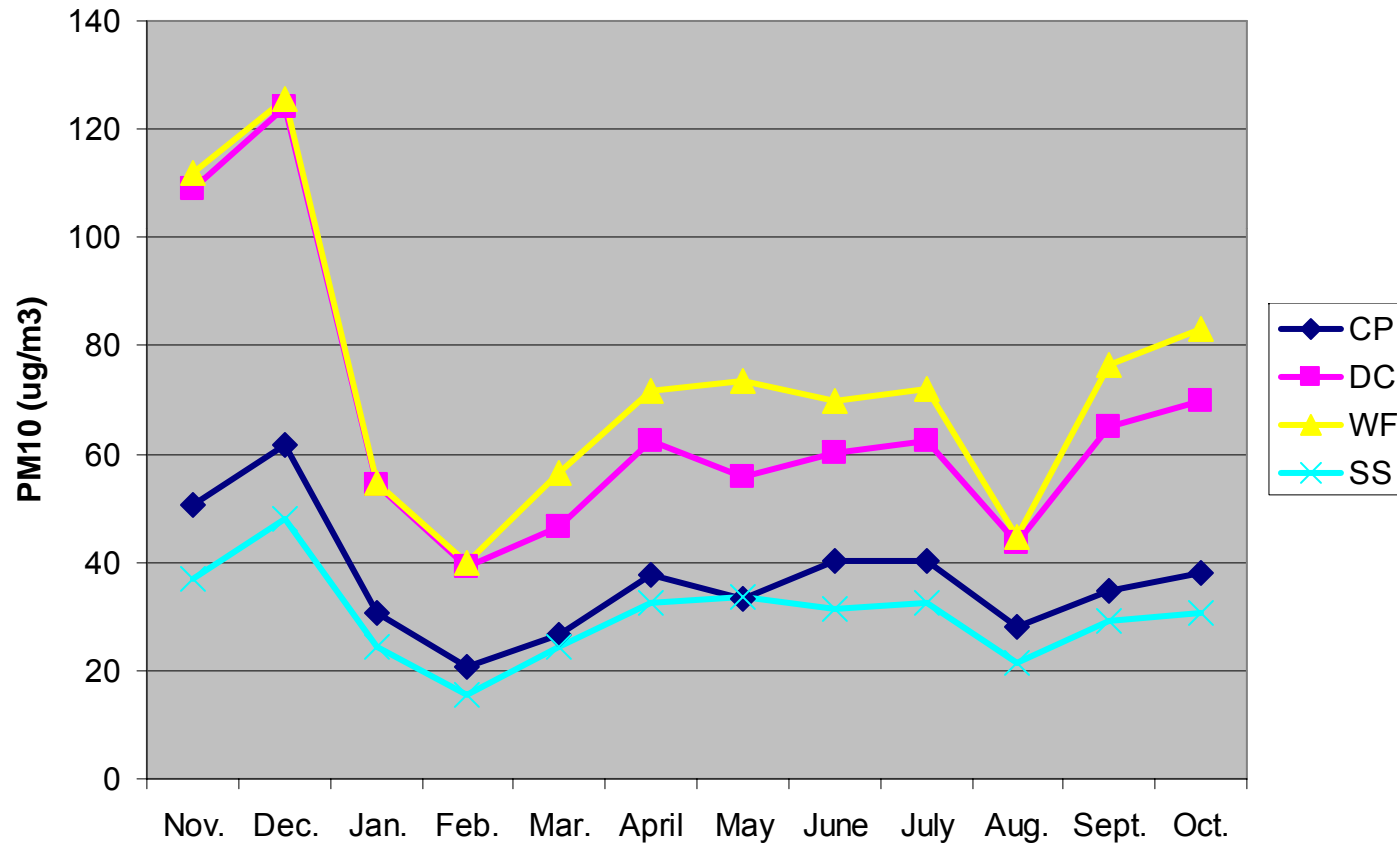
19th Ave./Camelback



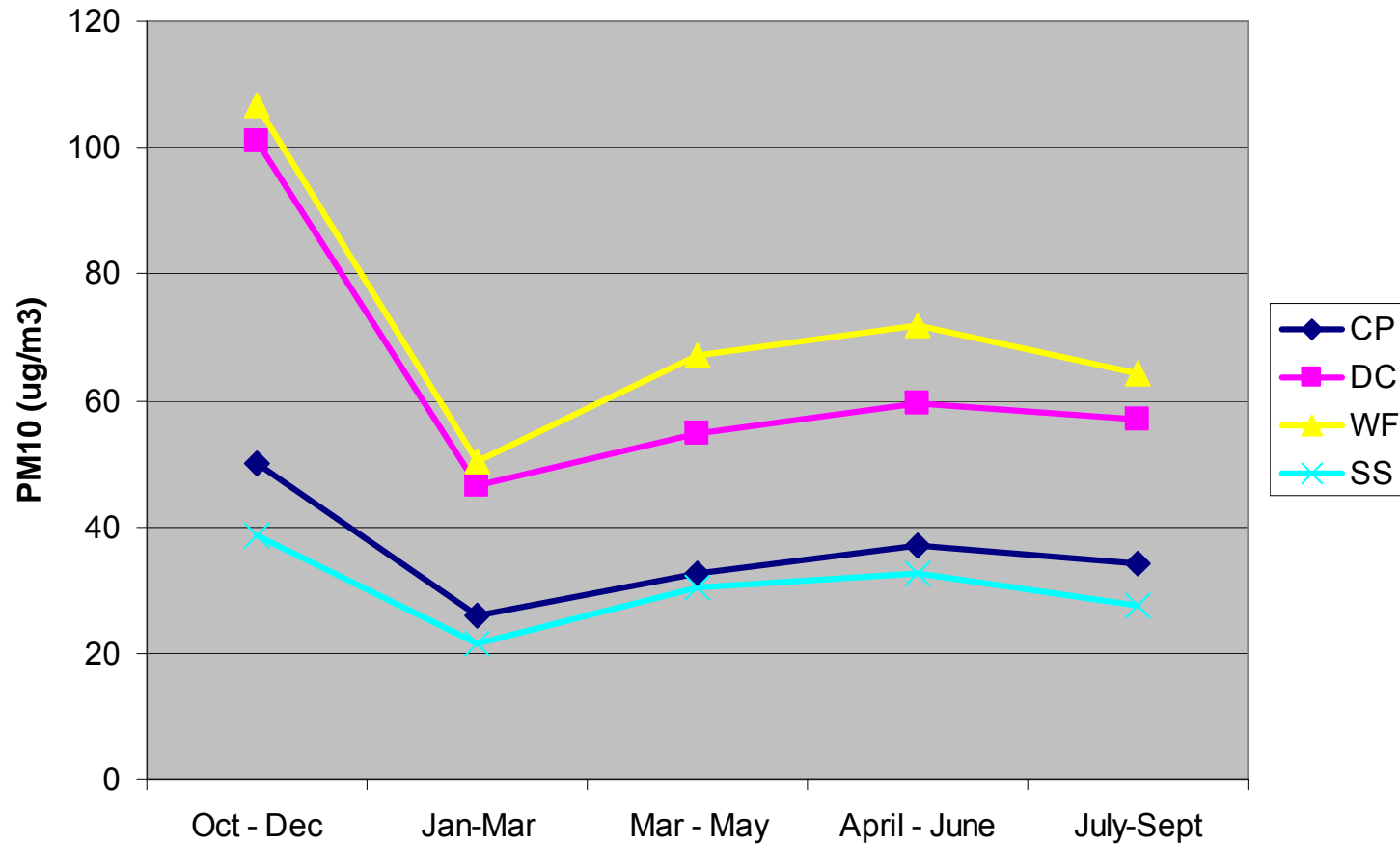
Monthly and Quarterly Variation

- November through January: highest PM concentrations without high winds

PM, Monthly Variation: 2005



PM Quarterly Variation: 2005



Activity by Day of Week

- Traffic Volume
 - Saturday: 72% of Monday – Friday
 - Sunday: 59% of Monday – Friday
- PM₁₀ emissions from SW Phoenix industries and roadways
 - Saturday: 57% of Monday – Friday
 - Sunday: 34% of Monday -- Friday

Emissions by Day of Week

Emission Type	Percentage	Fractions	
	All Days	Sat/M-F	Sun/M-F
Construction	42.1	0.57	0.34
Onroad exhaust/tire/brake AND dust	17.4	0.72	0.59
Unpaved roads & parking lots	12.9	1	1
Aircraft & support	7.1	1	1
Others*	20.5	0.75	0.75
Total	100		

Overall: Sat: fraction of M-F	0.39
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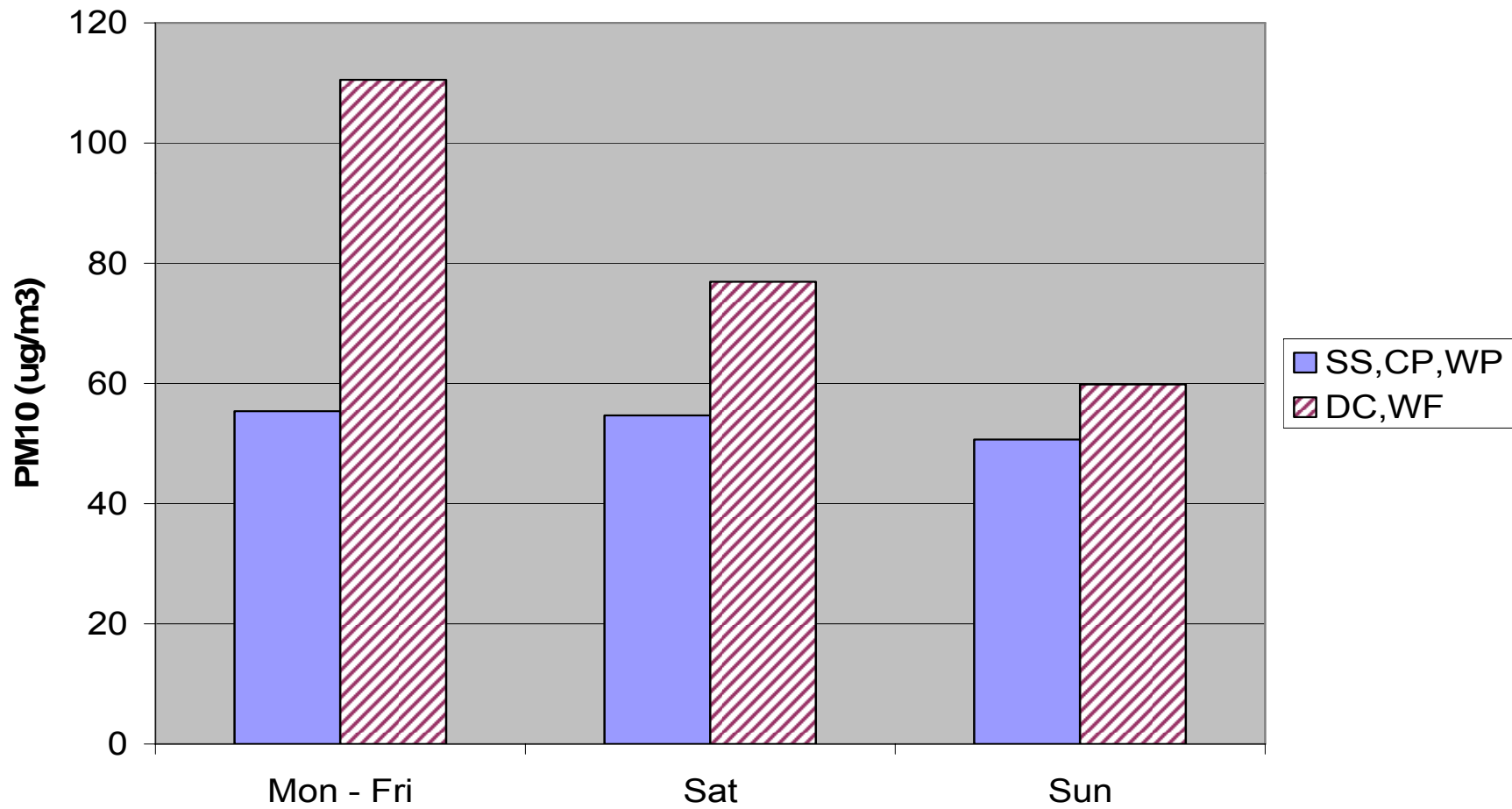
Overall: Sun: fraction of M-F	0.31
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*Others

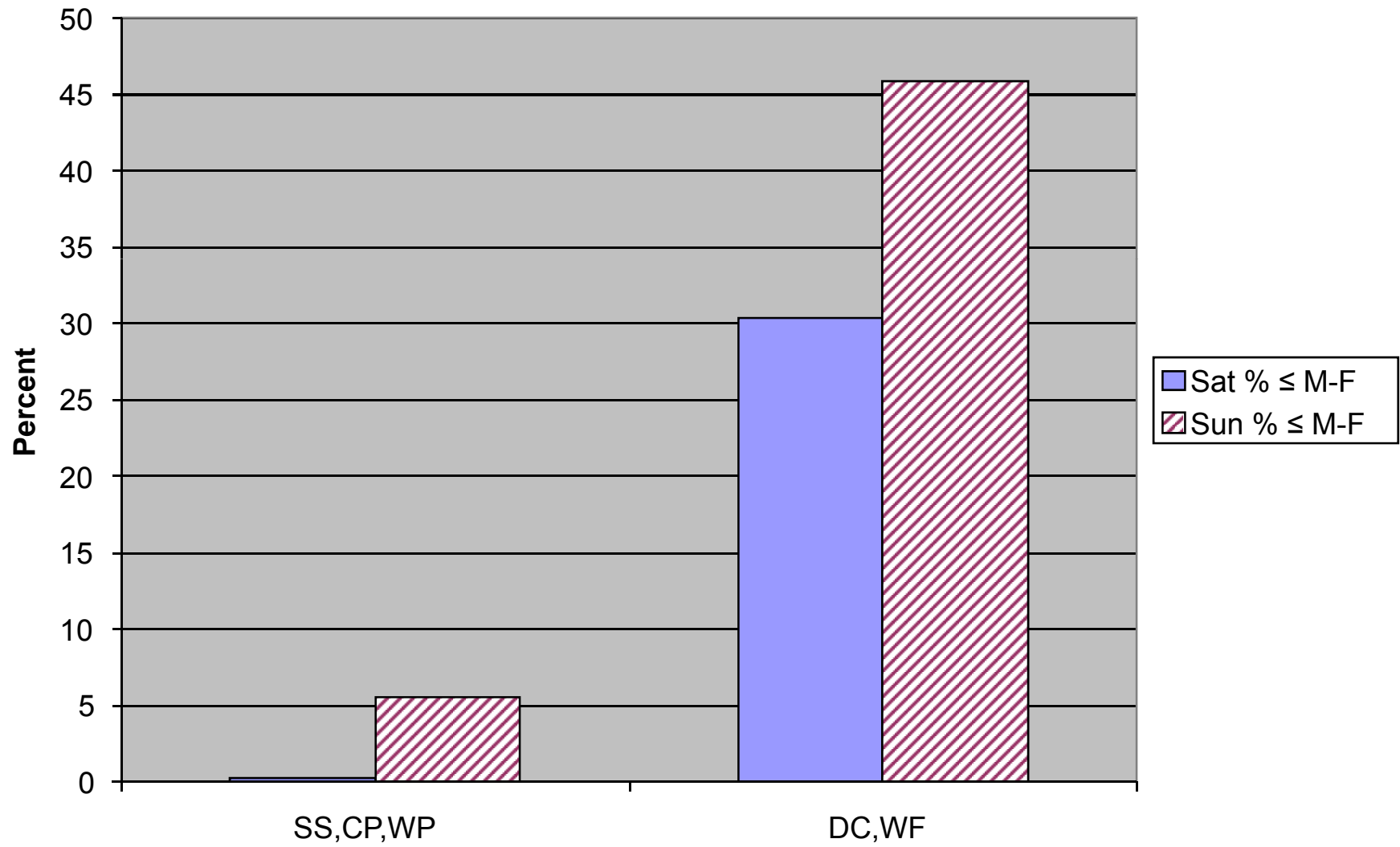
- Agriculture
- Offroad recreational dust
- Manufacturing
- Commercial cooking
- Construction & mining exhaust
- Industrial
- Leaf blowers dust
- Area source fuel combustion
- Non-metallic mineral processing
- Lawn & garden exhaust

PM₁₀ Concentrations: Weekend vs Weekday

Nov - Jan



Percentage Differences between Nov-Jan PM10 Concentrations on Sat & Sun and Mon - Fri



PM by Day of Week Conclusions

- Site specific
- Lower weekend concentrations at WF & DC are consistent with lower “industrial” emissions.
- Neighborhood sites show little effect: why?
- Because transport, deposition, and dispersion vs moderate local emissions need consideration.

Yuma/San Luis Air Pollutant Concentrations

- Third ADEQ Border risk assessment
- April 2006 through April 2007
- Two sites
- Continuous and integrated samples

Western, Arizona / Sonora, Mexico Border Air Quality Study



Author: TS Summers
 Date: Jan 2003
 File: yumasmall

Legend

- | | | | |
|-------------------------------------------------------------------------------------|------------------|-------------------------------------------------------------------------------------|------------------|
|  | Baja Site |  | Sonora Site |
|  | Cortez Site |  | Yuma Mesa Site |
|  | Dome Valley Site |  | Yuma Valley Site |
|  | San Luis Site |  | Yuma West Site |

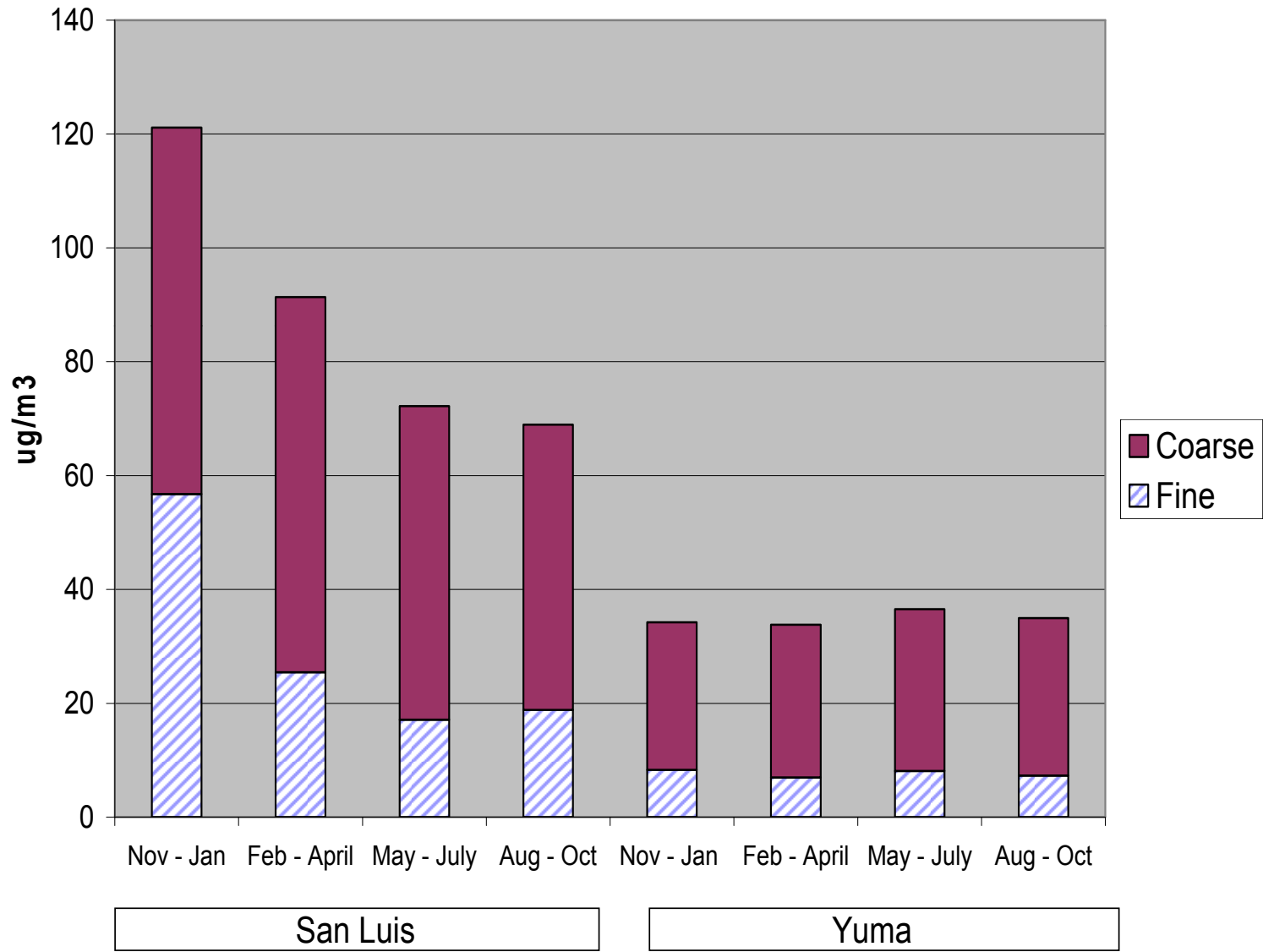
0 2 4 8 Miles

Disclaimer Information:
 This map is a (WORKING DOCUMENT), it is designed for (FIELD STUDIES), presentation and discussion and is subject to change and further refinement.

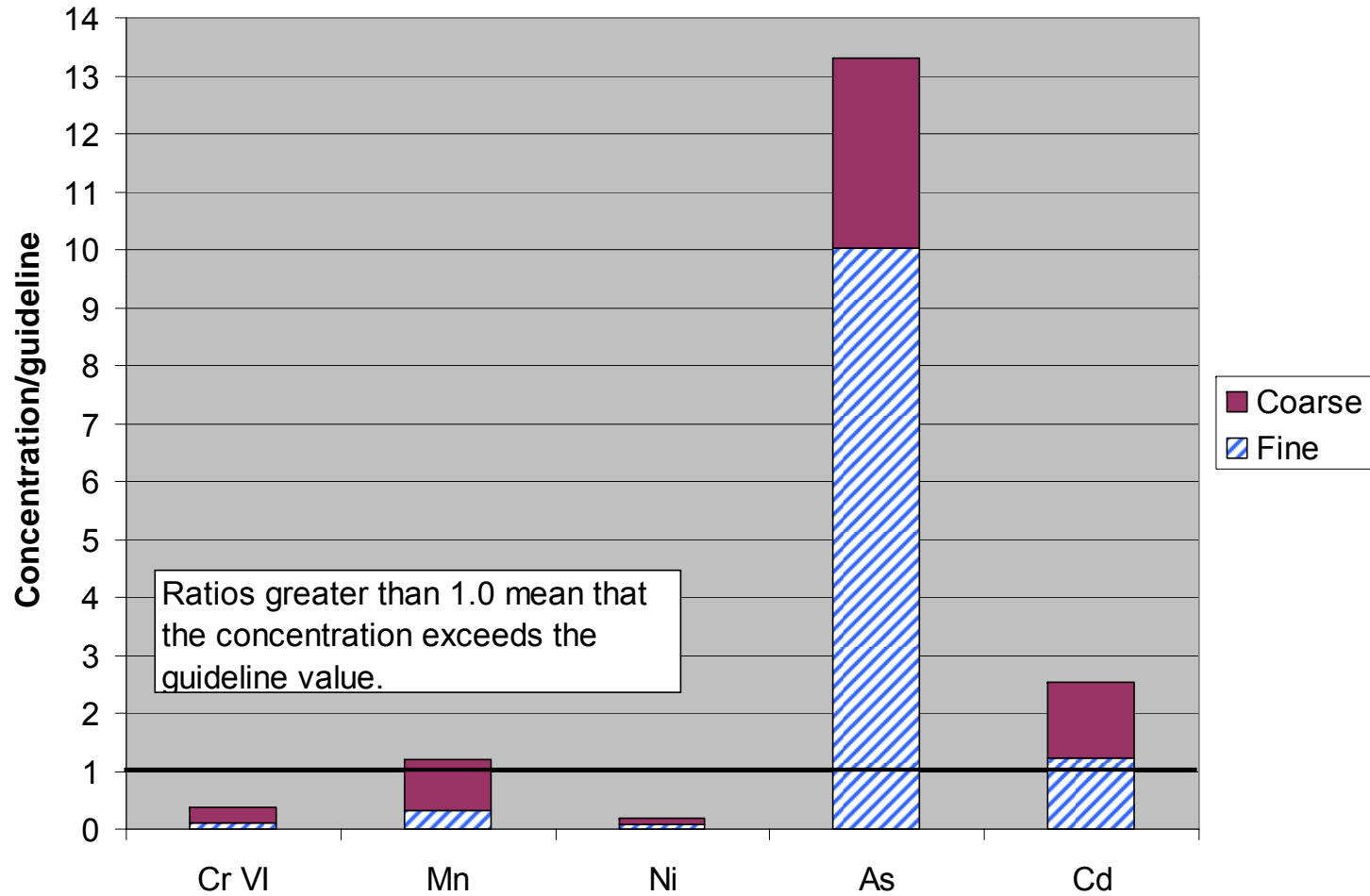
Integrated samples only discussed here

- 24 hours long
- Every sixth day
- Canisters for hydrocarbons, etc: gaseous
- “Dichot” samplers for filter-based samples
- Laboratory analyses of filters for ions, carbon, and metals

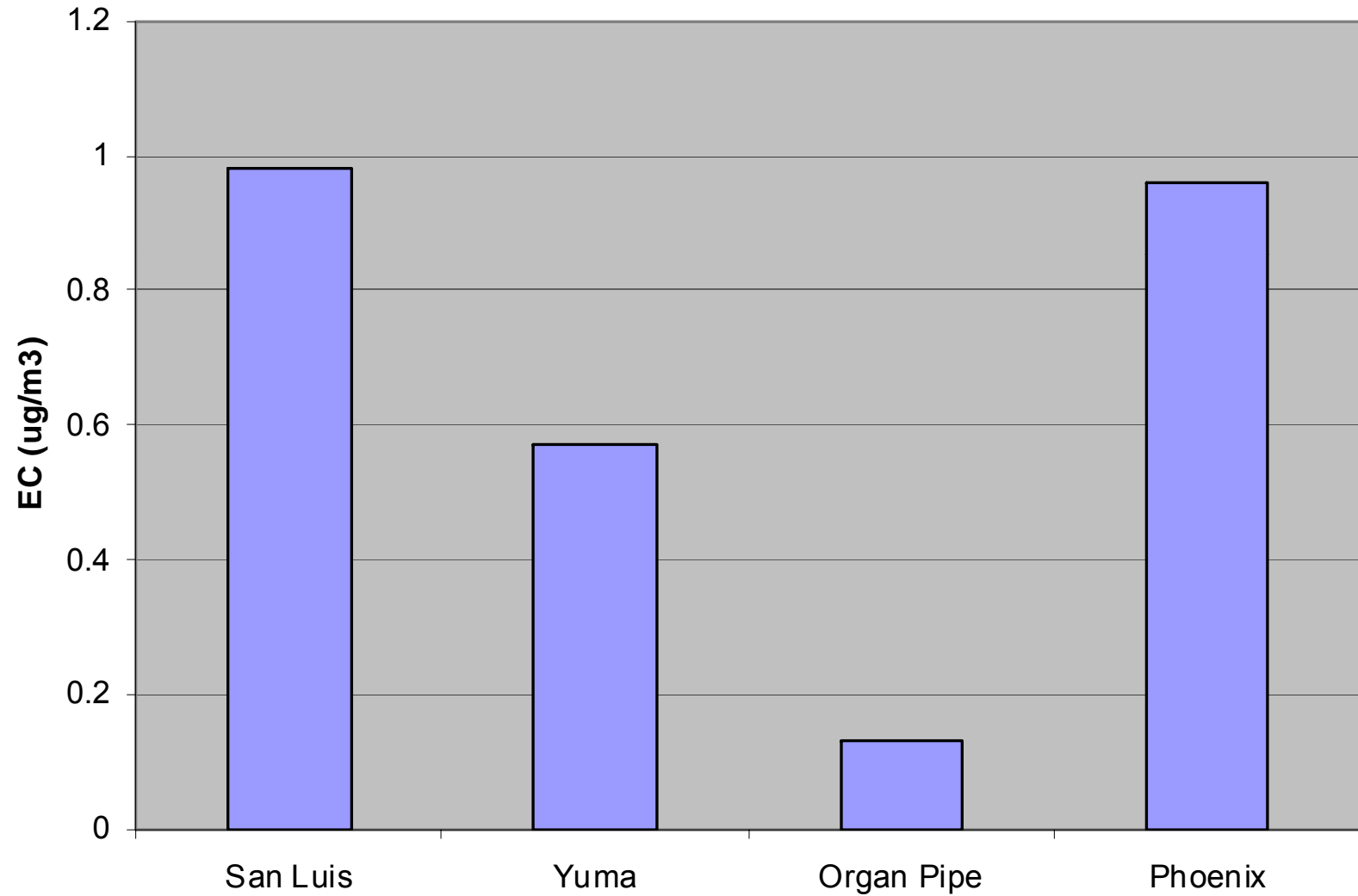
PM concentrations only

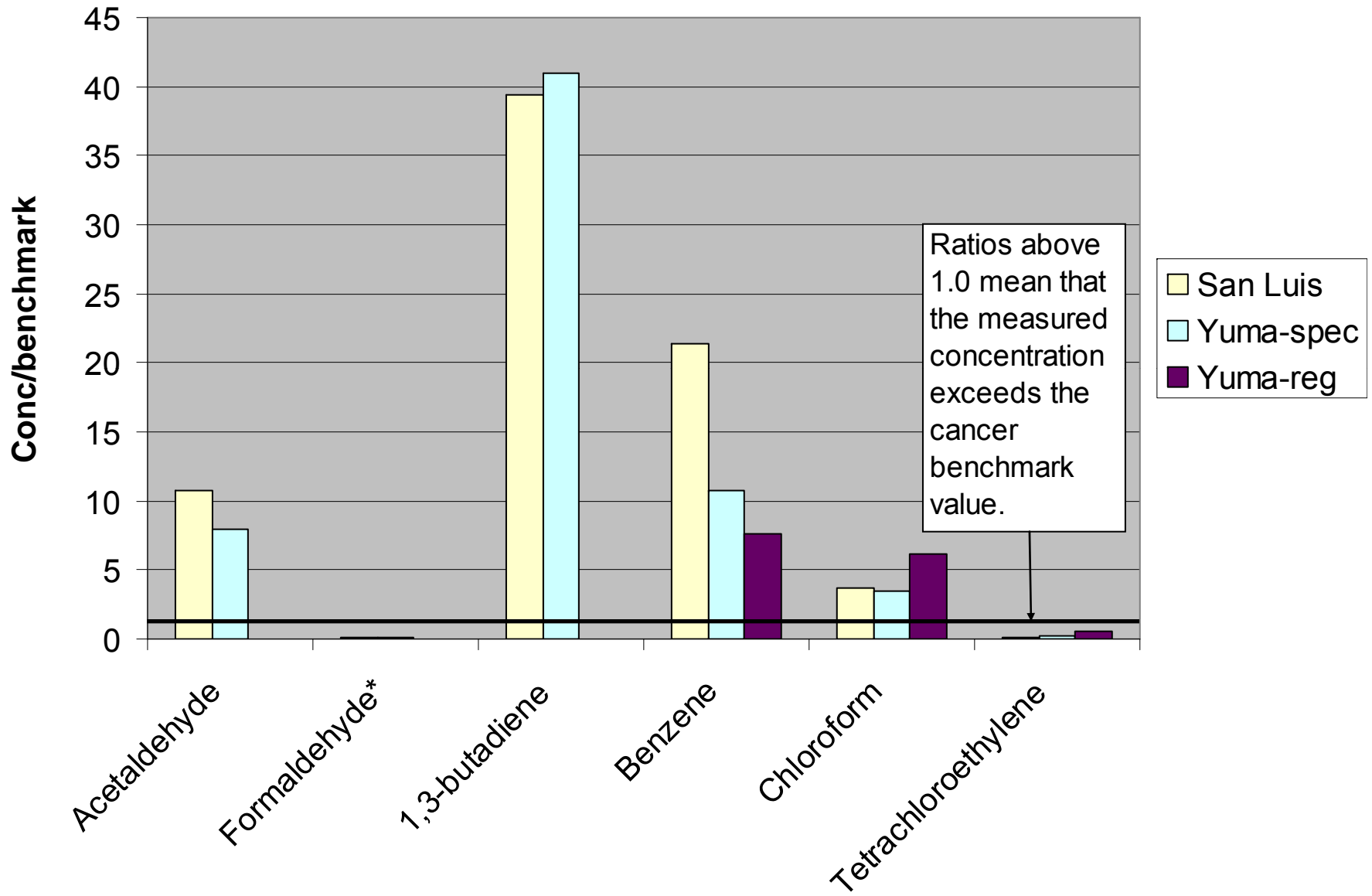


Annual toxic metal concentrations divided by the guideline values – San Luis



Fine fraction elemental carbon concentrations at four sites





Conclusions

- Many pollutants have their higher concentrations in San Luis.
- Mexican (and U.S.) standards for PM being exceeded in San Luis.
- Finished work (ambient monitoring; emission inventory)
- More work: Met and pollutant monitoring; exposure and risk assessment