

Creation of an Air Quality Database for Health Effects Studies

Geoffrey Sunshine
Senior Scientist, HEI

December 1, 2005



Health Effects Institute

- An independent, non-profit organization established in 1980
- Funded jointly by the EPA and industrial sponsors (predominantly car and engine manufacturers)
- Mission to fund research and health effects of mobile source-derived air pollutants.

One Aspect of the HEI Strategic Plan

Develop a program to systematically address which components and characteristics of the ambient PM mixture (and which sources) are the major contributors to the health effects of PM.

HEI's approach

1. Create a database of air pollutant and other information relevant for health studies (RFP December 2003).
2. Hold workshop to discuss study design issues for multi-site epi and parallel tox studies (August 2004).
3. Issue RFA to fund multi-site epi and/or tox studies (RFA 05-1A and B, July 2005).

HEI Air Quality Database for Health Effects Studies

Website/database <http://hei.aer.com>
released September 2005

Information compiled by Atmospheric and Environmental Research Inc, San Ramon California

Christian Seigneur, Betty Pun,
S.-Y. Chen, M. Sze

Information in HEI Air Quality Database

EPA's Speciation Trends Network (2000-2004)

EPA's AQS PM Air Quality Data

- Site characteristics
- Ambient measurements of PM_{2.5} and components

Gases SO₂, O₃, NO_x, CO (2000-2004)

- AQS

Local population (2000)

- Census Population Data

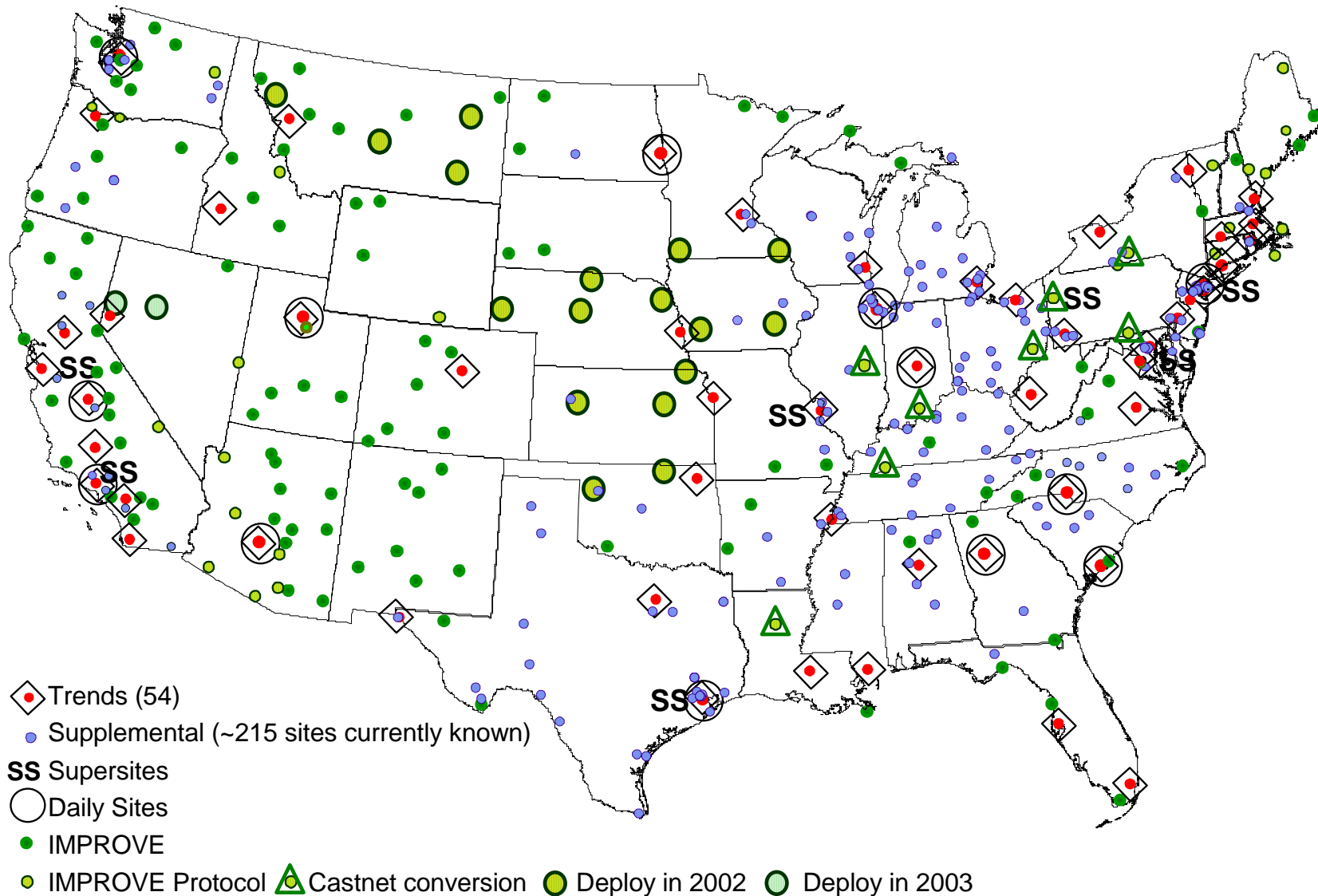
Local emissions (1999)

- National Emission Inventory PM_{2.5} Emission Inventory Data

Meteorology (2000-2004)

- EPA or NCDC

Current/Planned Urban & Rural PM_{2.5} Speciation Networks



Core STN is geared towards population exposure monitoring

Monitoring Purpose

- Population exposure: 27 sites (50%)
- Population exposure + other: 7 sites (14%)
- Highest concentration: 5 sites (9%)
- Other: 14 sites (26%)

Setting

- Urban: 25 sites (46%)
- Suburban: 26 sites (48%)
- Rural: 2 sites (4%)

Land use

- Commercial: 19 sites (35%)
- Residential: 28 sites (52%)
- Agricultural + industrial + mobile: 6 sites (12%)

Some STN sites have co-located gaseous pollutant measurements

Ozone: 34 sites (63%)

NO_x: 28 sites (52%)

CO: 25 sites (46%)

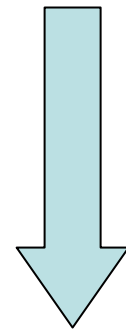
SO₂: 17 sites (31%)

All 4 pollutants: 11 sites (20%)

None of the 4 pollutants: 16 sites (30%)

PM measurements at STN sites

- PM_{2.5} mass
- Ions: sulfate, nitrate, ammonium
- Carbon: elemental (black) and organic
- Elements
 - Ca, Cu, Fe, K, Mn, Si, S, Zn
 - Al, Br, Cr, Pb, Ni, Se, Ti, V
 - As, Ba, Cl, Mg, Na, P, Sb, Sn
 - 24 others



Increasing
uncertainty

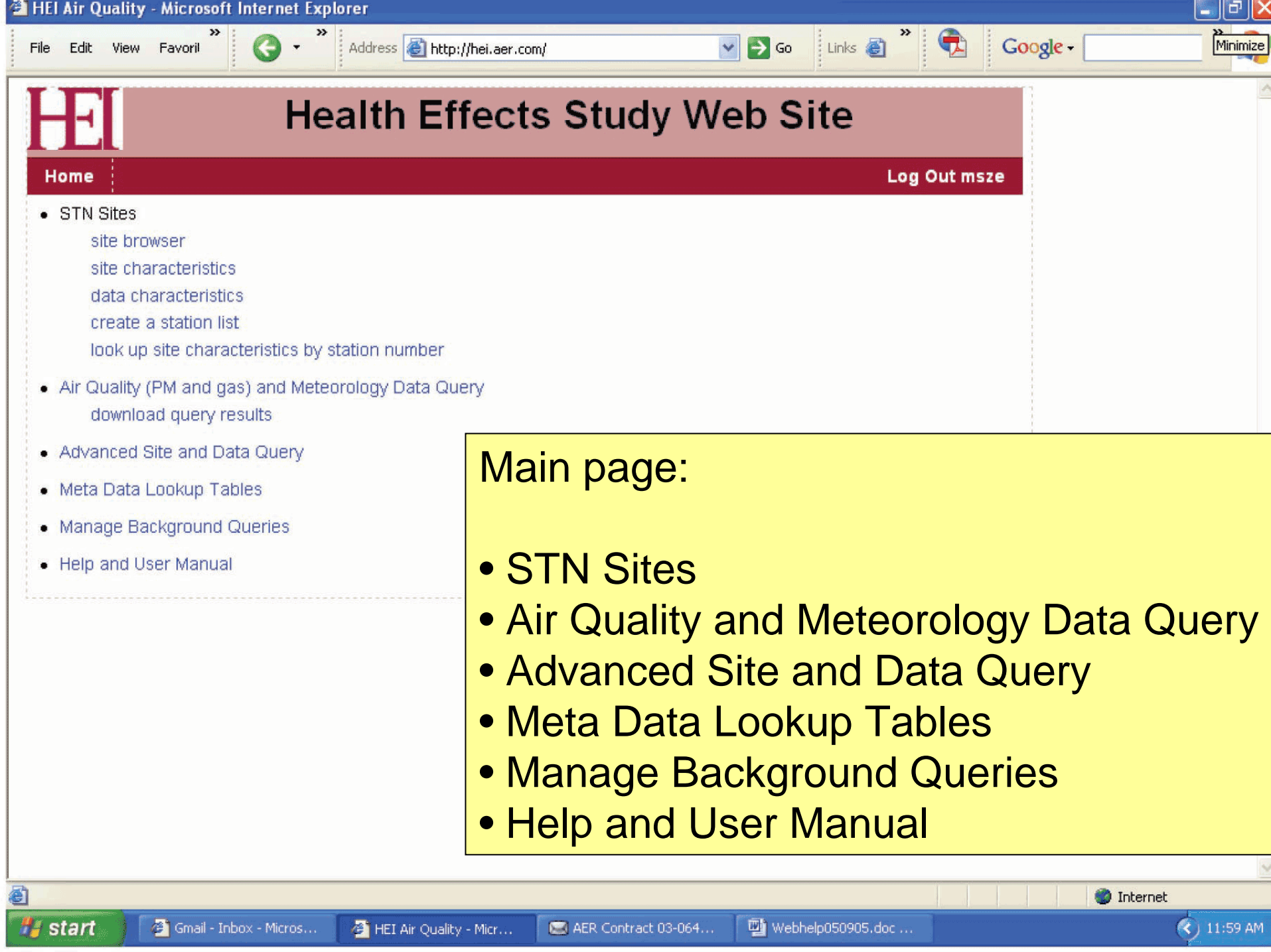
Accessing the HEI Air Quality Database

Contact Betty Pun at AER

pun@aer.com (925) 244-7125

to obtain log-in information and password

Go to: <http://hei.aer.com>



Health Effects Study Web Site

Home

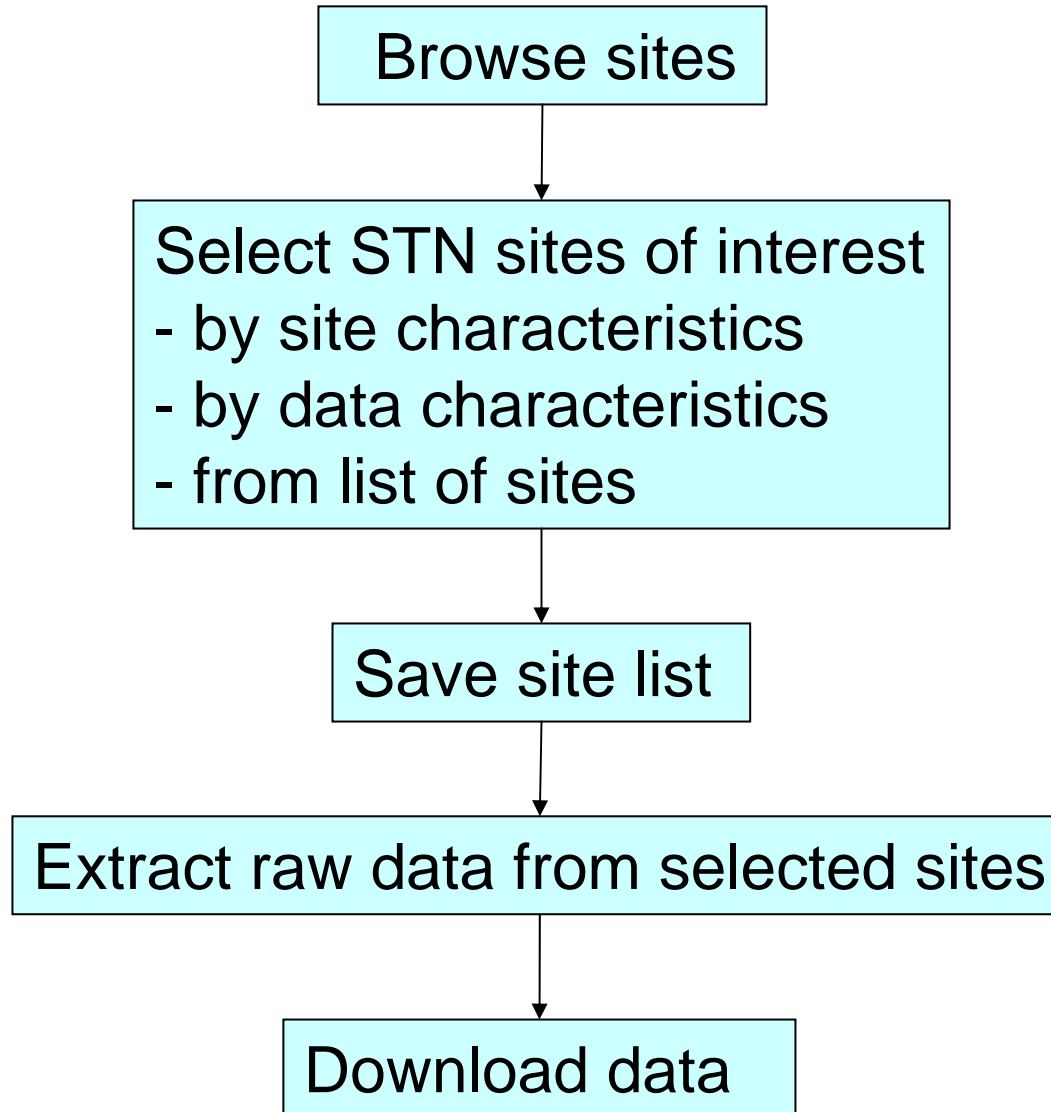
Log Out msze

- STN Sites
 - site browser
 - site characteristics
 - data characteristics
 - create a station list
 - look up site characteristics by station number
- Air Quality (PM and gas) and Meteorology Data Query
 - download query results
- Advanced Site and Data Query
- Meta Data Lookup Tables
- Manage Background Queries
- Help and User Manual

Main page:

- STN Sites
- Air Quality and Meteorology Data Query
- Advanced Site and Data Query
- Meta Data Lookup Tables
- Manage Background Queries
- Help and User Manual

STEPS TO OBTAINING DATA





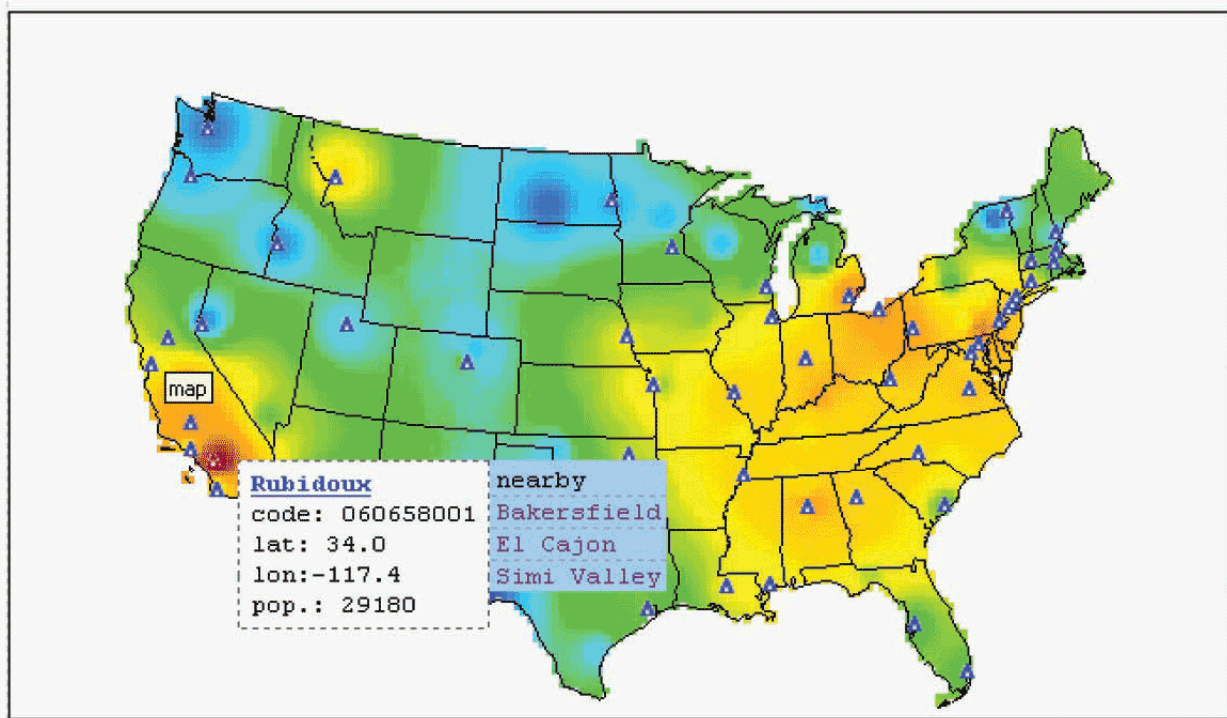
Health Effects Study Web Site

[Home](#)

[Log Out bpun](#)

Site Browser: FPM map

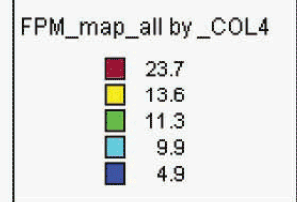
(2003 average concentration in $\mu\text{g}/\text{m}^3$)



[site browser help](#)

- all sites
- core sites

(please note: the display of all sites may be slow)



[EC](#)
[OC](#)
[nitrate](#)
[FPM](#)
[ammonium](#)
[sulfate](#)



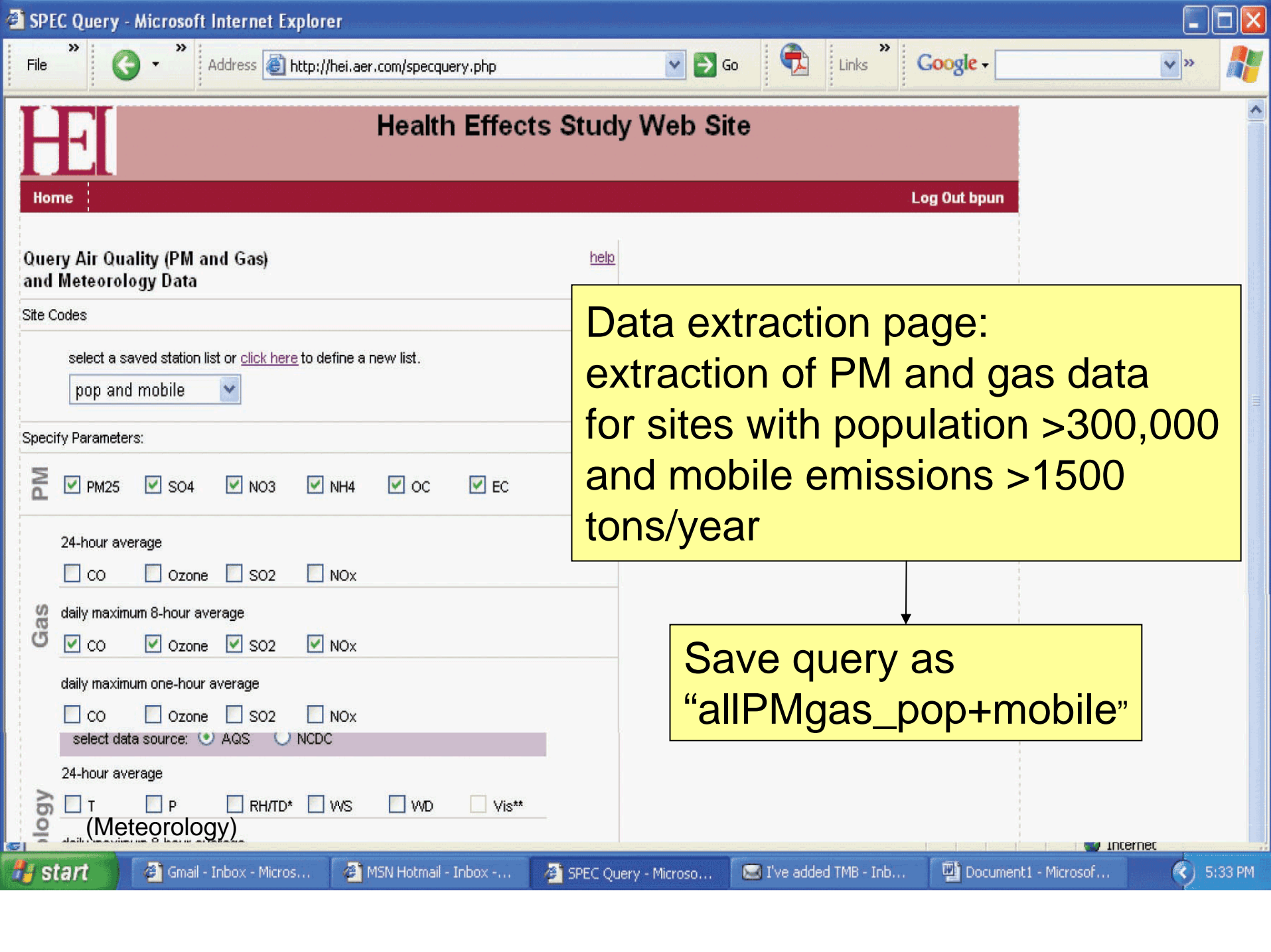
Health Effects Study Web Site

[Home](#)[Log Out bpun](#)STN Query by Site Characteristics [help](#)

State/County/Site	Latitude/Longitude	Cities
State	<input type="text" value="Any State"/>	
County	<input type="text" value="Any County"/>	
Site ID	<input type="text" value="Any Site"/>	
Additional Criteria:		
Population	<input type="text" value="> 300000"/>	
PM2.5 Emissions (tons/year)		
▪ Point	<input type="text"/>	<input type="text"/>
▪ Mobile	<input type="text" value="> 1500"/>	<input type="text"/>
▪ Area	<input type="text"/>	<input type="text"/>
▪ Non-Road	<input type="text"/>	<input type="text"/>
Land Use	<input type="text" value="Any"/>	
Setting	<input type="text" value="Any"/>	
Monitoring Objective	<input type="text" value="any objective"/> <input type="text" value="extreme downwind"/> <input type="text" value="general/background"/> <input type="text" value="highest concentration"/> <input type="text" value="max precursor emissions impact"/>	
<input type="button" value="Submit"/> <input type="button" value="Clear"/>		

Query “by site characteristics”:
sites with population >300,000 and
mobile emissions > 1500 tons/year

Save query as “pop and mobile”



Health Effects Study Web Site

Home

Log Out bpun

Query Air Quality (PM and Gas) and Meteorology Data

[help](#)

Site Codes

select a saved station list or [click here](#) to define a new list.

pop and mobile

Specify Parameters:

- PM**
- PM25
 - SO4
 - NO3
 - NH4
 - OC
 - EC

24-hour average

- CO
- Ozone
- SO2
- NOx

Gas

daily maximum 8-hour average

- CO
- Ozone
- SO2
- NOx

daily maximum one-hour average

- CO
- Ozone
- SO2
- NOx

select data source: AQS NCDC

24-hour average

- T
- P
- RH/TD*
- WS
- WD
- Vis**

(Meteorology)

Data extraction page:
extraction of PM and gas data
for sites with population >300,000
and mobile emissions >1500
tons/year

Save query as
"allPMgas_pop+mobile"



Health Effects Study Web Site

[Home](#)[Log Out bpun](#)

Query Status

[return to manage queries page](#)

name allPMgas_pop+mobile

qpid 1178

status complete

start time 2005-10-17 20:38:13

end time 2005-10-17 20:38:22

filename	# rows	date
702_SO4_20051017203815.csv.zip	751	2005-10-17 20:38:15
702_NO3_20051017203815.csv.zip	502	2005-10-17 20:38:15
702_PM25_20051017203814.csv.zip	747	2005-10-17 20:38:15
702_EC_20051017203816.csv.zip	753	2005-10-17 20:38:16
702_NH4_20051017203815.csv.zip	751	2005-10-17 20:38:16
702_OC_20051017203816.csv.zip	753	2005-10-17 20:38:16
702_COAverage8_20051017203816.csv.zip	2713	2005-10-17 20:38:18
702_O3Average8_20051017203818.csv.zip	4319	2005-10-17 20:38:19
702_SO2Average8_20051017203819.csv.zip	2459	2005-10-17 20:38:21
702_NOxAverage8_20051017203821.csv.zip	3644	2005-10-17 20:38:22

Output: download page for
“allPMgas_pop+mobile” query

zip files

HEI Air Quality Database for health effects studies

- Funding anticipated through 2007
- Available for investigators applying to RFA 05-1 and other epi/tox studies