Allegheny County Health Department

Air Quality Program

Special Studies

School Air Toxics, 2009

- Heavy metals sampling at Montessori (Bridgeville) and Highlands High School (Natrona)
- TSP /quartz filter – Mn, Pb, Ni, Cr (total)

  24 hour/every six days/50 cfm
- PM2.5 FRM sampler- Cr+6 (EPA-modified CARB 039, analysis by ERG)

  24 hour/every six days/15 lpm

Highlands High School / Natrona

	Cr (ng/m3)	Mn (ng/m3)	Ni (ng/m3)	Pb (ng/m3)
Average (29 samples)	**25.0**	**72.1**	**23.0**	**111.3**
Max	**99.9**	**370.9**	**173.7**	**904.1**
I.R.I.S Rfc (Chronic Inhalation)		**50**		
NAAQS (3 month average)				**150**
Occupational (8 hour LOAEL)		**50,000**		

Highlands High School / Natrona Cr+6

	Cr VI ng/m³
Avg (10 samples)	0.08
Max	0.15
I.R.I.S Rfc (Chronic Inhalation)	100
I.R.I.S. Cancer Risk (Inhalation)	
1 in 100,000	0.8
1 in 1,000,000	0.08

Highlands Conclusion

- A report was submitted to the Highlands School District
- Department indicated that no “short term” health concerns are indicated by the data.
- The manganese levels are a concern based on exceedance of IRIS Rfc standard
- TSP sampling and analysis will continue at this location. The Department may consider switching to a low volume PM10 sampling method

Montessori / Bridgeville

	Cr (ng/m3)	Mn (ng/m3)	Ni (ng/m3)	Pb (ng/m3)
Average (8 samples)	**17.8**	**33.7**	**14.4**	**12.7**
Max	**53.9**	**58.0**	**43.1**	**24.4**
I.R.I.S Rfc (Chronic Inhalation)		**50**		
NAAQS (3 month average)				**150**
Occupational (8 hour LOAEL)		**50,000**		

Montessori/ Bridgeville
Cr+6

	Cr VI ng/m³
Avg (10 samples)	**0.119**
Max	**0.835**
I.R.I.S Rfc (Chronic Inhalation)	**100**
I.R.I.S. Cancer Risk (Inhalation)	
1 in 100,000	**0.8**
1 in 1,000,000	**0.08**

Montessori Bridgeville Conclusion

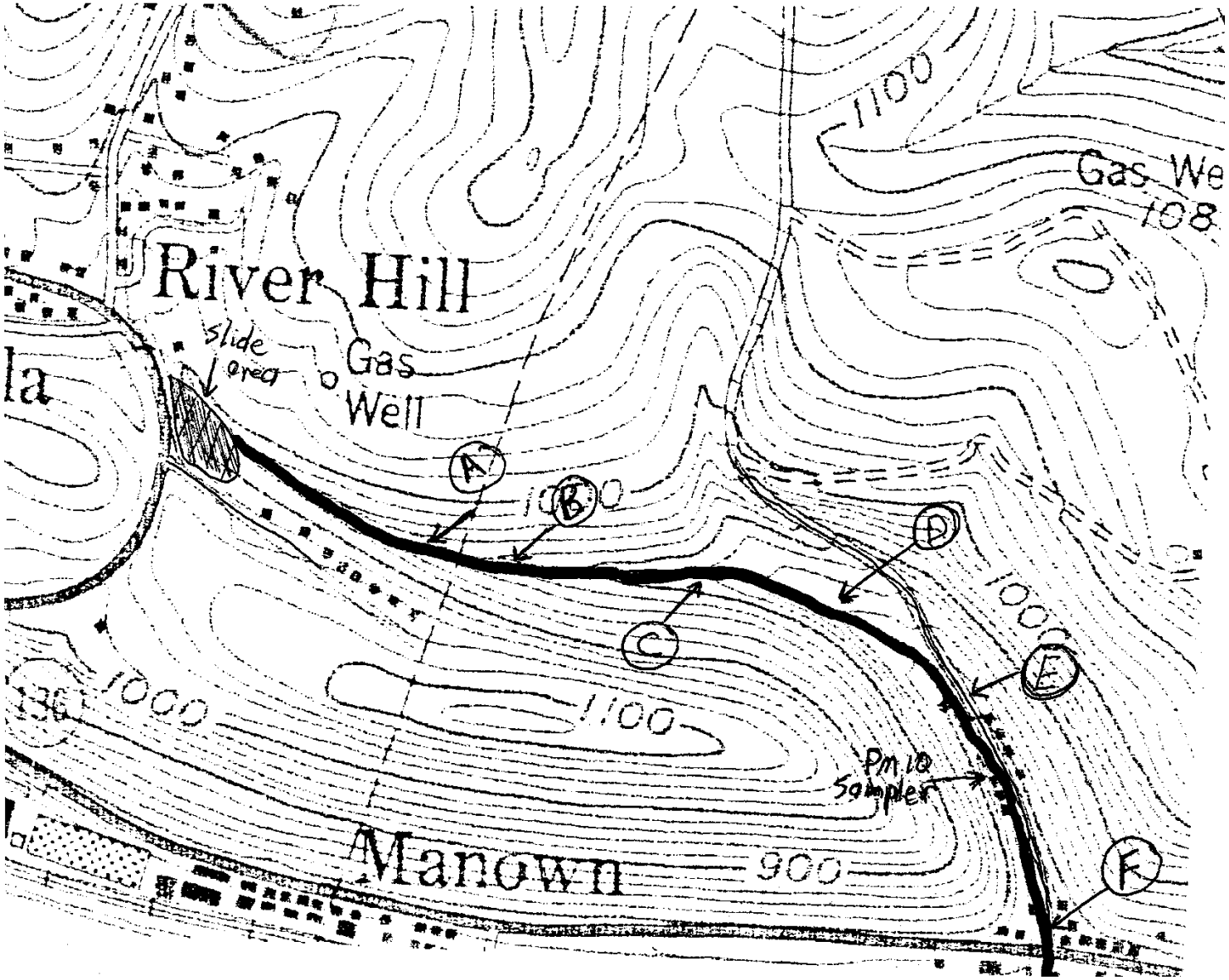
- A report was submitted to the Montessori School
- No short term or long term health concerns are indicated by the data.
- No further monitoring is scheduled for this location
- One Cr+6 sample was much higher than the rest of the group. Contamination may have occurred.

Rostosky Ridge Fly Ash (2005)

Rostosky Ridge Response

- PA DEP organized the initial clean-up effort
- Pa DEP and ACHD conducted sampling and analysis of soil
- ACHD conducted air monitoring
- ACHD conducted urine and nail testing of impacted residents and conducted health surveys to document negative health impacts

Soil Samples



Soil Sample Results

- Only Arsenic was detected at “unsafe” levels
- Soil and ground water limit = 150 mg/kg
- Residential direct contact = 12 mg/kg
- Results ranged from 198 to 268 mg/kg

Air Monitoring

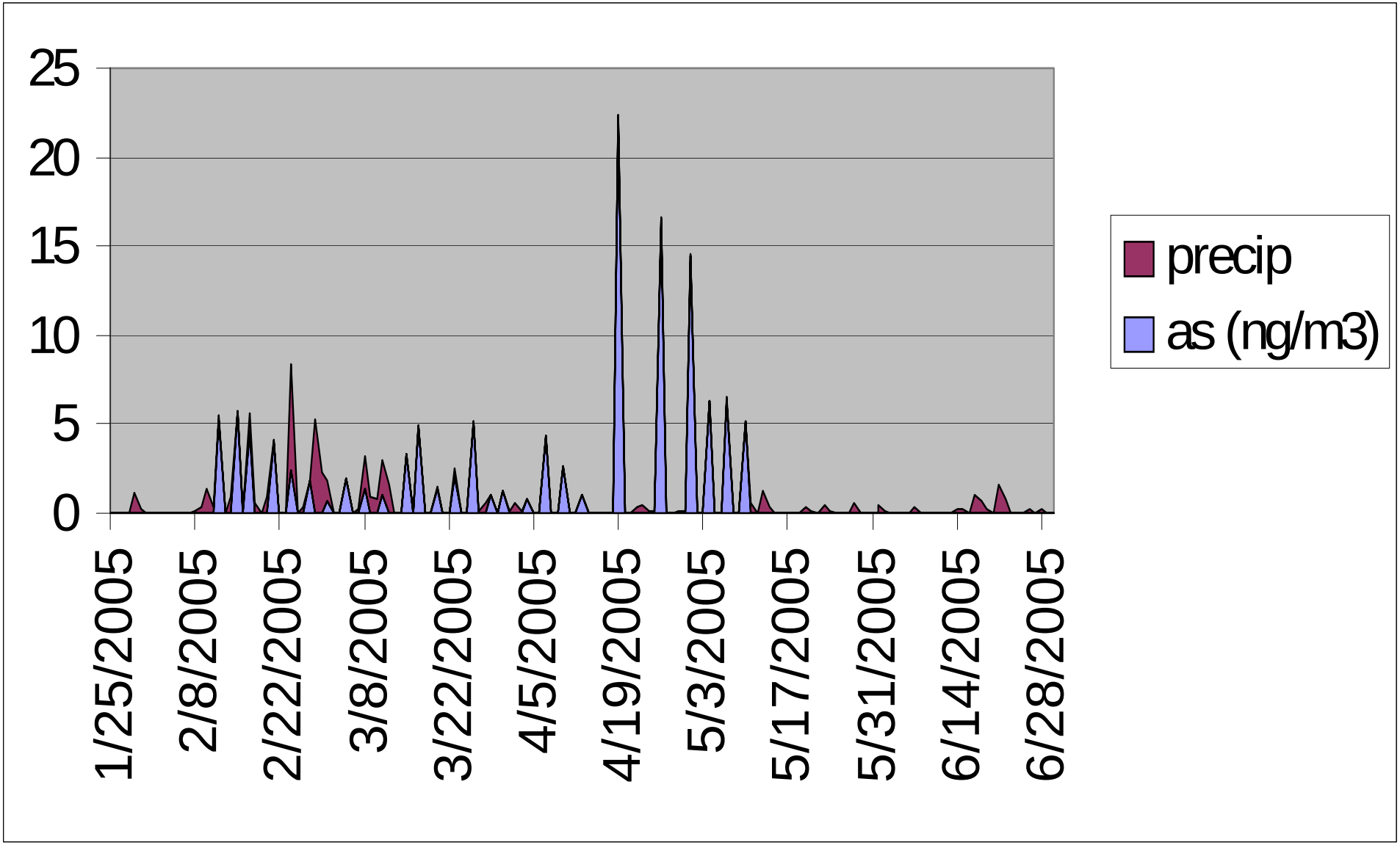
- Soil analysis results pointed to arsenic as the highest potential health risk
- High Volume PM10 sampling with quartz filters was conducted at the site of the highest soil arsenic measurements
- Airborne dust was evident in this area, kicked up by cleanup efforts and vehicular traffic especially on dry days.

Monitoring Results

- **24 hour samples, every three days.**
- **2/12/2005 through 6/27/2005, 46 samples**
- **Analysis for total mass and total arsenic**
- **Results: avg 3.5 ng/m^3, max 22.3 ng/m^3**
- **Analysis of archived PM10 filters from nearby monitoring stations showed similar results from the same time period.**
- **4/19/05- Rostosky Ridge 22.3 ng/m3**

  Liberty 24.1 ng/m3

Precipitation Analysis



Urine and Nail Analysis

- A total of 32 urine specimens and 7 nail samples from impacted residents and control subjects were collected.
- No samples showed the presence of inorganic arsenic above the detection limit.
- Normal levels of organic arsenic are detected in several samples from each group, assumedly from consumption of food or tobacco containing arsenic

ATSDR Analysis 03/28/05

- Fly ash was composed of 22% of particles PM10 or smaller
- pH of 9.65 (alkaline)
- 200 ppm arsenic
- classified the site as a potential public health hazard in its condition at that time
- Potential dermal and respiratory irritant (pH) and the arsenic in the ash may have been associated with the reported GI disturbances

ACHD Analysis

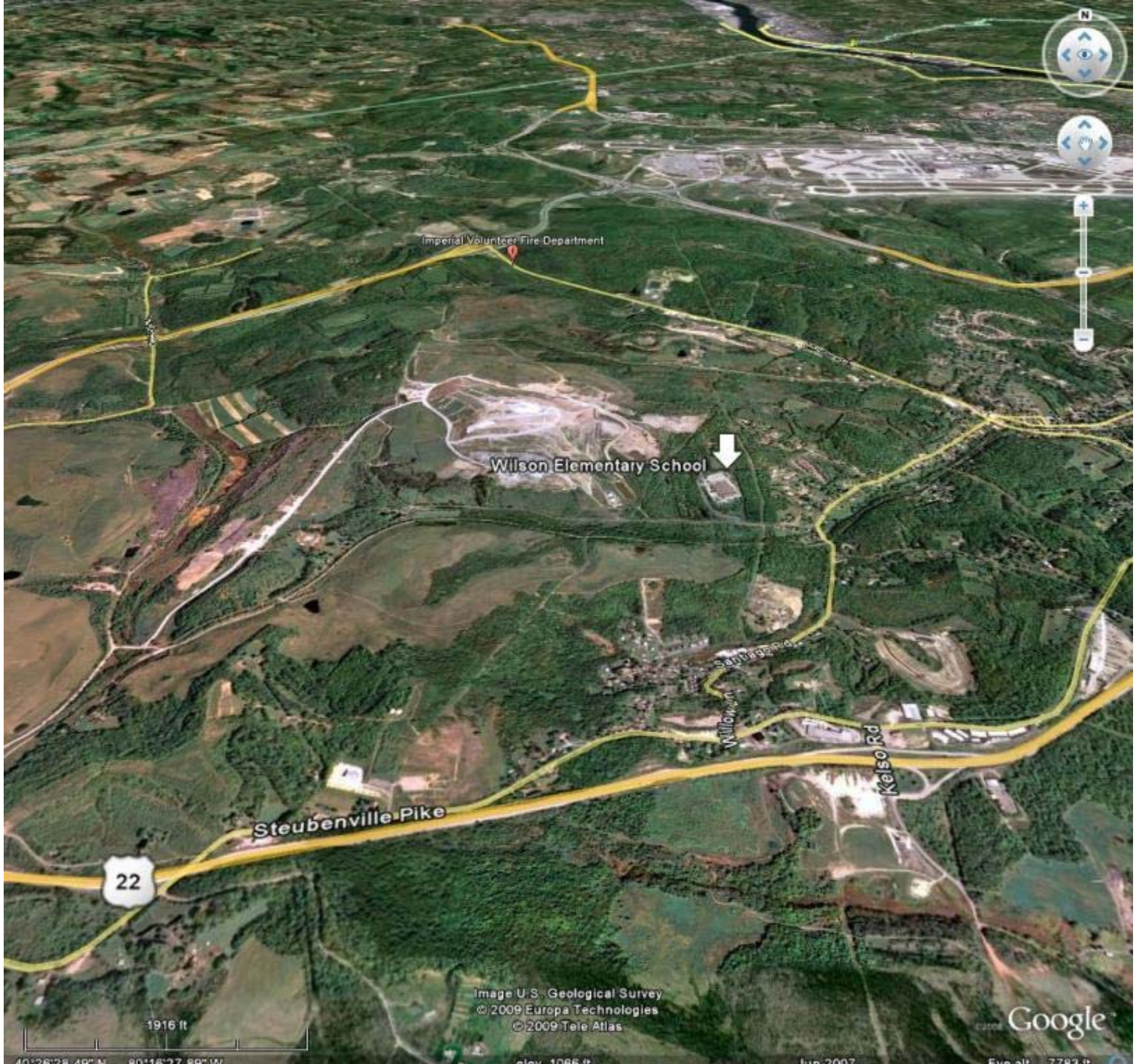
- PM10 sampling did not indicate arsenic levels significantly higher than local communities
- Alkaline nature of airborne particles may have contributed to respiratory irritation of residents.
- Urine and nail analysis suggest that health risks due to arsenic exposure are low due to this incident.

Remediation

- The remaining fly ash pile was stabilized by constructing retaining walls
- Removal of contamination from the community was completed

Imperial Landfill Odor Complaints

- Problem- Numerous citizen complaints concerning odors from BFI residential landfill in Imperial.
- Wilson Elementary School near landfill is impacted and produces constant complaints


Imperial Volunteer Fire Department
Wilson Elementary School
Willowdale Dr
Kelso Rd
Steubenville Pike
22
Image U.S. Geological Survey
© 2009 Europa Technologies
© 2009 Tele Atlas
1916 ft
Google

Identifying Monitoring Targets

- Emission Inventory
- Landfill gas analysis
- Assorted mercaptans and hydrogen sulfide are main odor components
- Hydrogen sulfide is the component of highest concentration
- Potential for emission of a broad variety of air toxics at low levels

Monitoring solutions

- Wilson Elementary is selected as the monitoring site.
- Continuous hydrogen sulfide monitor installed to sample outside air April 16, 2009. Data is telemetered.
- Short term indoor and outdoor TO-15 sampling was conducted 05/31/09 until 07/12/09, 16 samples (Analysis by Maryland DEP)

Hydrogen Sulfide Monitoring System

- Monitor Labs 8770
  (SO2 scrubber/H2S converter)
- EC9850B sulfur dioxide analyzer
- ESC 8816 data logger
- Teflon probe line to outside

TO-15 Results

- Levels of most components were equal to or lower than those collected at the background site for the Pittsburgh Air Toxic Study (2006)
- A few components were slightly elevated over background concentrations, including chlorinated methanes, chloroform and acrolein.

Indoor Air Results

- **Isopropyl and ethyl alcohols were consistently present (cleaning agents, hand sanitizers?)**
- **Alcohols interfere with GC analysis (false benzene ID in charcoal tube analysis)**
- **The Department had discovered measurable levels of alcohols in other schools.**

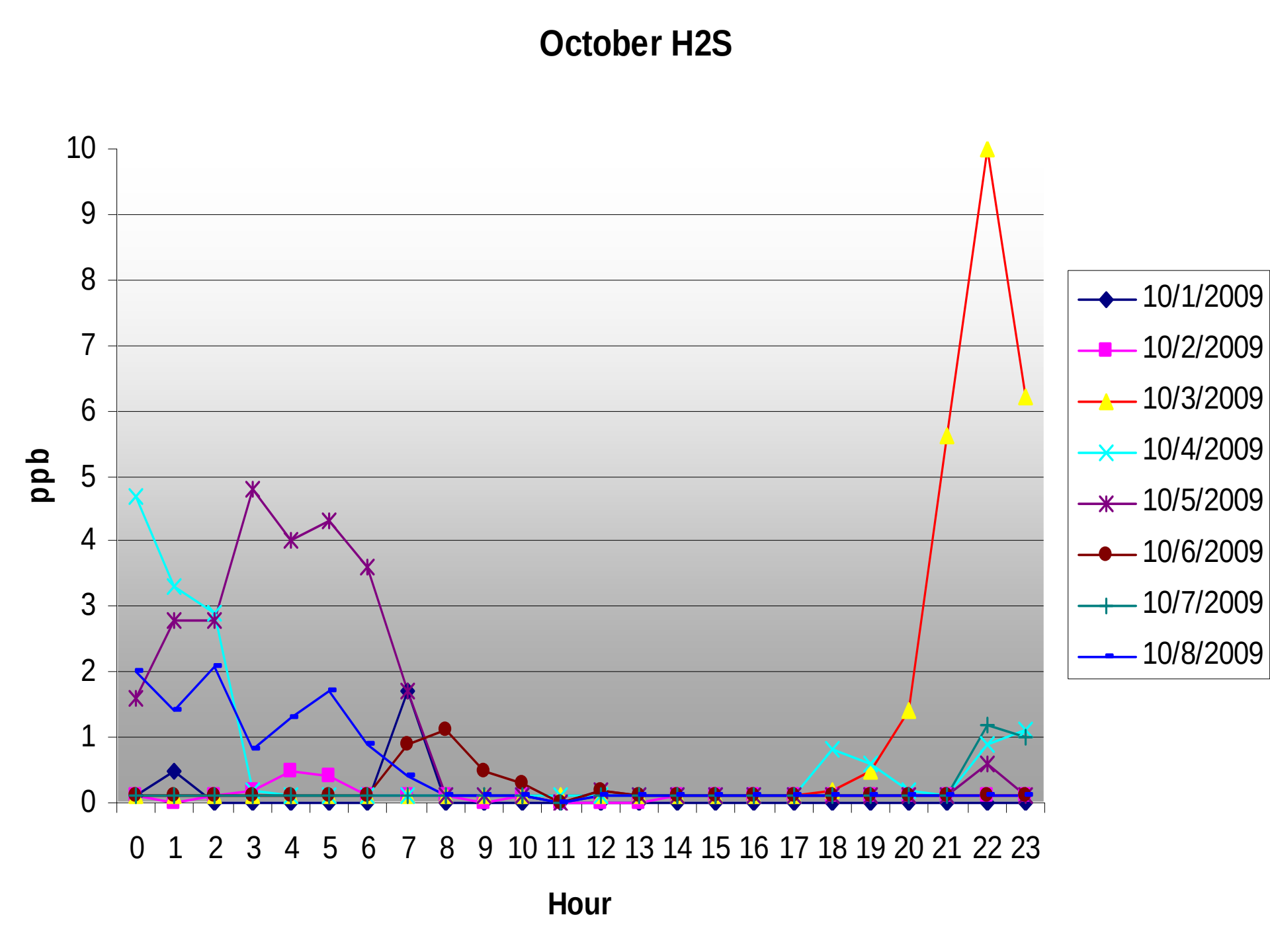
Hydrogen Sulfide Results

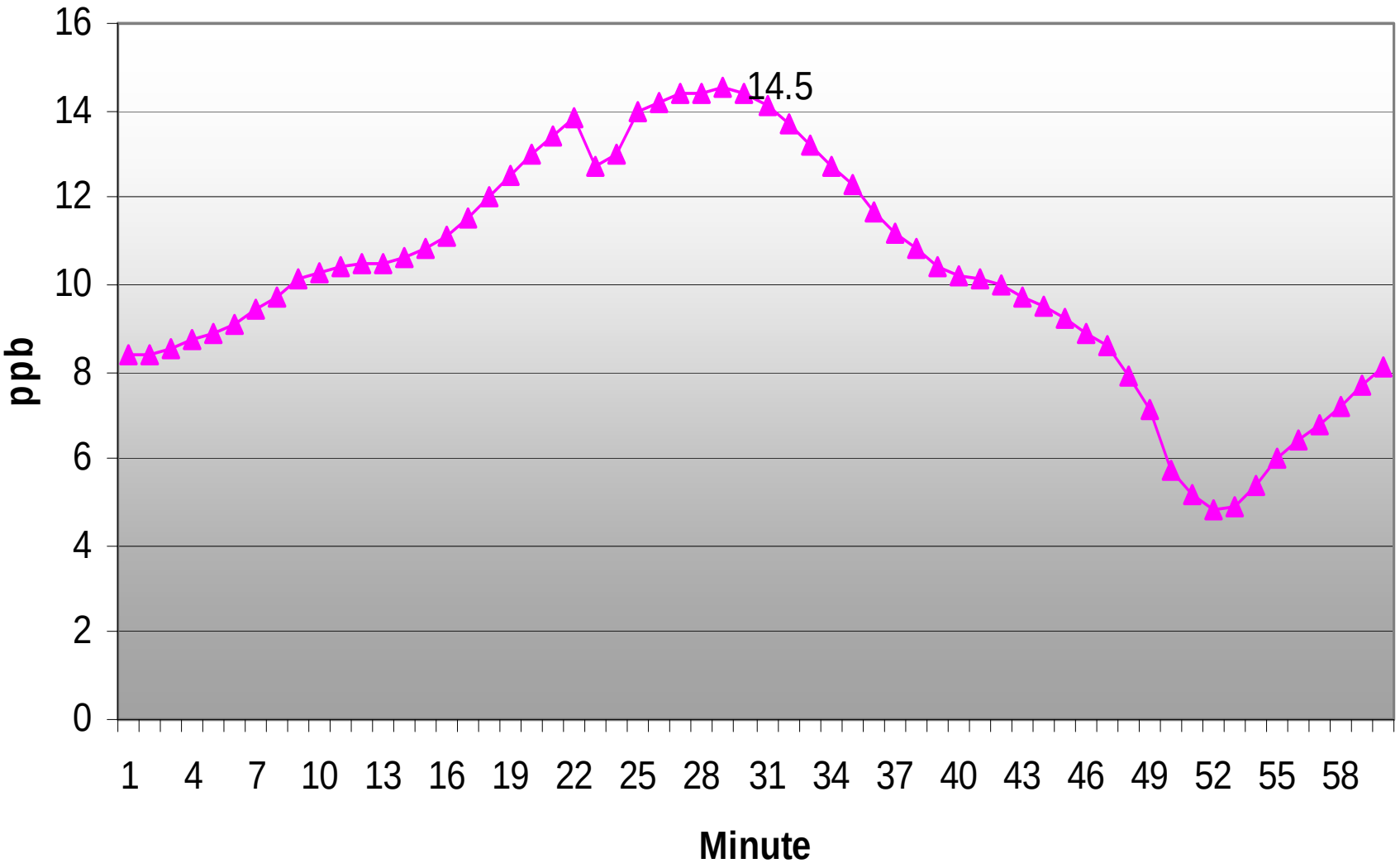
- Hourly averages as high as 10 ppb H2S have been documented.
- Highest levels always occur over night, with levels tapering off by mid morning.
- Highest levels occur with temperature inversions
- Odor complaints correlate with higher H2S monitored levels

Wilson Elementary H_2S Data 05/08/09 to 10/09/09

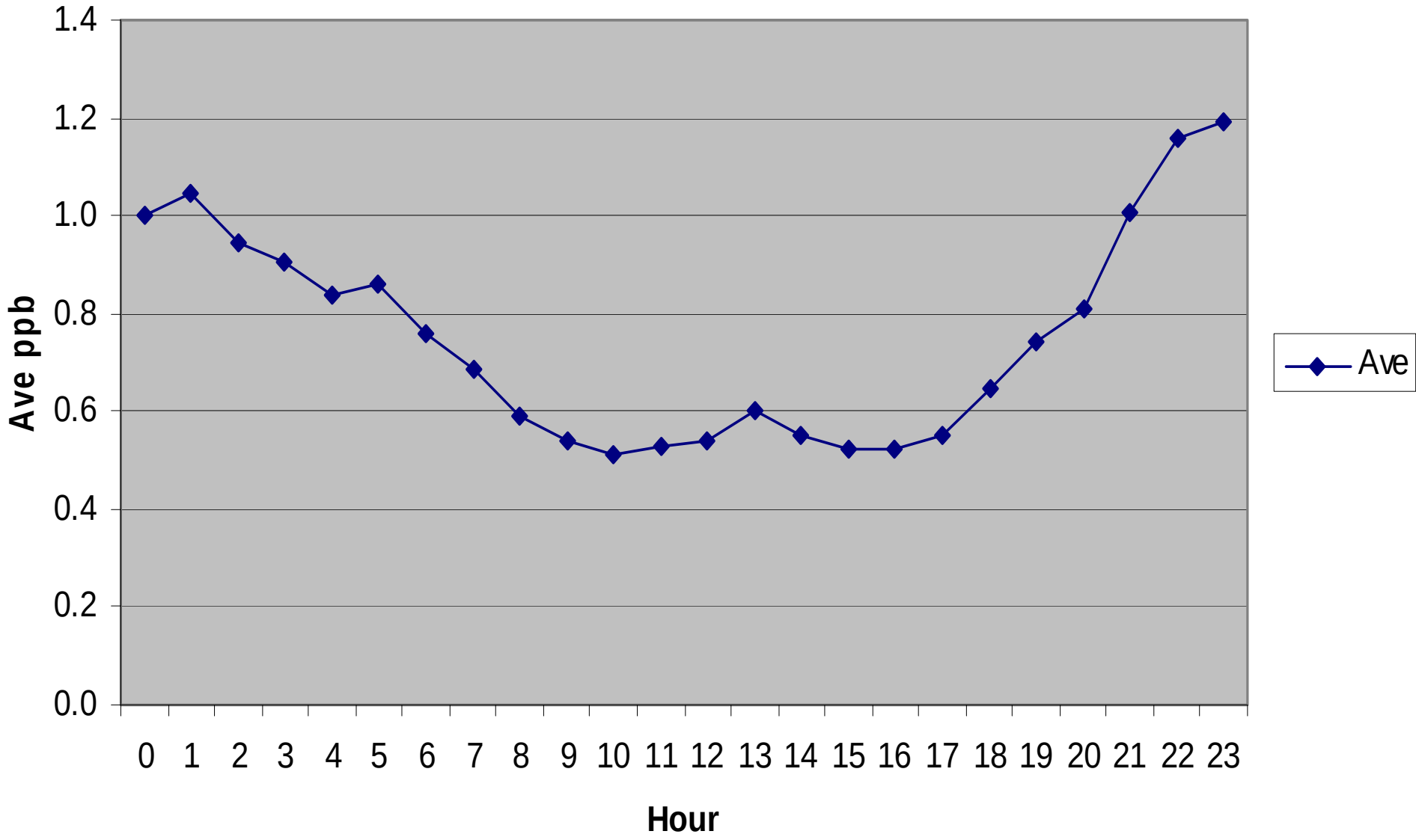
- **1 Hour PA Standard = 100 ppb**
- **24 Hour PA Standard = 5 ppb**

- **Highest 1 hour average at Wilson = 10 ppb (10/03/09, 11:00pm-11:59pm)**
- **Highest 24 hour average at Wilson = 3.1 ppb (08/24/09)**


October H2S
ppb
Hour
0
1
2
3
4
5
6
7
8
9
10
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
10/1/2009
10/2/2009
10/3/2009
10/4/2009
10/5/2009
10/6/2009
10/7/2009
10/8/2009


10/03/09 Minute Readings
11:00pm to 12:00pm
10 ppb Hourly Average
14.5
ppb
Minute
0
2
4
6
8
10
12
14
16
1
4
7
10
13
16
19
22
25
28
31
34
37
40
43
46
49
52
55
58

Diurnal H2S Trend
May through October



Hydrogen Sulfide at Other Sites

- Monitors at Liberty and Avalon, downwind of two Coke production facilities
- Both sites display much higher readings compared to Wilson Elementary

	1 Hr Max ppb	Exceedances	24 Hr Max ppb	Exceedances
Avalon 2008	37	0	24	3
Avalon 2009	80	0	7	1
Liberty 2008	331	1	46	48
Liberty 2009	45	0	11	19

Meeting with ATSDR
Wilson Elementary

- Results of TO-15 and hydrogen sulfide monitoring was presented.
- ATSDR will provide a paper detailing estimated risks based on data.
- PA DEP and ACHD are still considering solutions to the odor problem

Complaint Investigations

- ACHD responds to numerous citizen complaints
- Open burning, odor and deposition complaints are most common.
- Indoor and outdoor investigations are conducted
- During 2009, 72 individual special study samples were analyzed by the County Laboratory

Methods

- Grab Samples- analysis by microscopic ID, AA, GC FID
- Sorbent Tubes (Charcoal)- Quantitative analysis by GC/FID for BTEX and other toxics, GC/MS qualitative analysis substance ID
- 37 mm quartz and Teflon filters – Microsopic ID, AA for metals

Gilian 5000
Power Enter
Set Cal
Clear
Run/Stop
Gilian 5000
Power Enter
Set Cal
Clear
Run/Stop
02/19/2010 1:10 pm