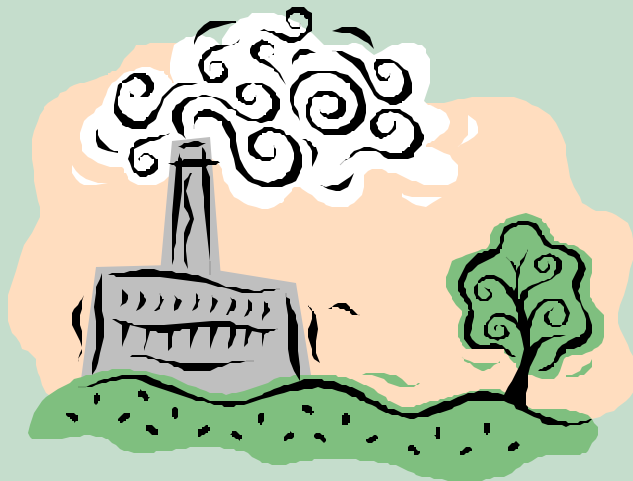


South and Southwest Philadelphia
Bucket Brigade Report:

What's in Our Air?



Produced by:
Clean Water Action
Clean Water Fund
Community Labor Refinery Tracking
Committee

ACKNOWLEDGEMENTS

Communities for a Better Environment's National Refinery Network project and the Beldon Fund, for their training, assistance and support in setting up the Bucket Brigade.

The Environmental Protection Agency, City of Philadelphia's Air Management Services, Bread & Roses Community Fund and the Philadelphia Foundation for their financial support of Clean Water Fund and the Community Labor Refinery Tracking Committee.

Stanley L. Laskowski and Mark H. Hermanson, Ph.D. of the University of Pennsylvania for technical assistance and guidance.

Denny Larson, Coordinator of the Refinery Reform Campaign, a project of the Texas SEED Coalition for on-going technical assistance.

For more information on Bucket Brigades see : www.refineryreform.org and www.bucketbrigade.net

CLEAN WATER ACTION AND CLEAN WATER FUND

Clean Water Action (CWA) is a national citizen's organization working for clean, safe, affordable water, prevention of health threatening pollution, creation of environmentally safe jobs and businesses, and empowerment of people to make democracy work.

Clean Water Fund (CWF) is a national research and education organization which promotes the public interest on issues relating to water, waste, and toxics.

The Community Labor Refinery Tracking Committee (CLRTC) was formed in 1993 in order to bring together residents living in South and Southwest Philadelphia who are concerned about pollution coming from the Sunoco refinery. Since then, the Community Labor Refinery Tracking Committee has educated the public about pollution problems in the area, fought for lower emissions from the refinery, ensured citizen notification of a real refinery emergency, and worked to see that environmental laws are enforced.

For more information please contact:

**Clean Water Action
1201 Chestnut St. Suite 602
Philadelphia, PA 19107
(215) 640-8800
phillycwa@cleanwater.org**

HISTORY OF THE SOUTH AND SOUTHWEST PHILADELPHIA BUCKET BRIGADE

The residents of South and Southwest Philadelphia live in close proximity not just to the large Sunoco refinery, but also to another 250 facilities listed in federal and state environmental regulatory databases. Included among these facilities are trash transfer stations, auto body shops, dry cleaners, a sewage treatment facility, soil remediation sites, junkyards, chemical plants, an airport, two large highways, and 12 Superfund sites. There are currently no ambient air quality standards to protect the health of the approximately 250,000 residents who must breathe questionable air everyday.

According to publicly available data, the Sunoco refinery emits at least 32 different toxic chemicals, and it is likely that dozens more are emitted by other facilities in the area. Despite the large number of industries in South and Southwest Philadelphia, only two of the 15 city air monitors are in South and Southwest Philadelphia where they might detect the emissions from the Sunoco refinery. Only one monitor is downwind from the refinery, and it is located 3.5 miles away from the refinery.

Residents living near the Sunoco refinery complain about odors and unusual smoke coming from the plant on an almost daily basis. Those who keep “Sniffer logs” document events ranging from strong petroleum odors to clouds of smoke. Although these odors occur regularly, residents receive no information about what chemicals they may be exposed to when they call the City of Philadelphia’s Air Management Services (AMS).

The National Refinery Network project of Communities for a Better Environment (CBE), an environmental organization based in California, popularized the bucket air sampling device in 1995 as a low cost way for residents living near air pollution sources to take air samples and get them analyzed for various air toxics. With the help of a grant from the Beldon fund, the Refinery Network trained members of Clean Water Action and the CLRTC on how to construct and use the bucket sampling devices. Over two dozen communities around the US have established similar projects, and EPA Region 9 has determined that the buckets provide accurate, reliable results, similar to equipment used by environmental agencies. EPA issued a Quality Control/Quality Assurance document on the sampling method, which is available on the web at www.bucketbrigade.net.

Currently, there are five air sampling buckets in use by residents of South and Southwest Philadelphia. The samples are collected in a tedlar bag inside the air sampling bucket for three to four minutes. The tedlar bags are mailed overnight to a certified lab in California that analyzes the samples within 24 to 48 hours. Tests are done for 43 volatile organic compounds (VOCs) using EPA test method TO-15. A library scan is also done to tentatively identify other compounds present in the samples.

While it is clearly the responsibility of environmental agencies to protect public health, CWA and the CLRTC formed the Bucket Brigade to investigate the toxic chemicals that residents may be breathing and to monitor for themselves the major polluters in their community.

From June of 2002 to March of 2003, nine air pollution samples were taken using the air sampling buckets in South and Southwest Philadelphia. Please see the attached map for exact locations. In these nine samples combined, 54 different toxic chemicals were detected. Among these chemicals were many VOCs, including solvents, herbicides, insecticides, and other industrial chemicals. Many of these VOCs are carcinogens, respiratory irritants and neurotoxins. Some can cause birth defects or developmental disorders. Only five of the chemicals (benzene, ethylbenzene, toluene, xylene, and MTBE) are monitored by the City of Philadelphia's Air Management Services. There is currently only one ambient air standard for any toxic in Pennsylvania State or Philadelphia County, which is for hydrogen fluoride. Some states, including Texas, Louisiana and North Carolina have already set maximum ambient standards for many other potentially harmful air toxics.

SOUTH AND SOUTHWEST PHILADELPHIA AIR SAMPLING RESULTS

In the nine air samples taken around the Sunoco refinery, 54 VOCs and other chemical compounds were detected (*see Chart A and B*). A significant number of these chemicals have the potential to cause serious harm or have the potential to aggravate existing medical conditions (*See Chart C*).

- 7 are known or suspected carcinogens
- 12 are known or suspected to cause reproductive or developmental disorders
- 16 are respiratory irritants
- 21 have neurotoxic effects

While neither Philadelphia County nor Pennsylvania have set standards for ambient levels of these chemicals, results from the South and Southwest Philadelphia samples can be compared to both EPA regional standards and standards set for air toxics by other states. Six of these VOCs were detected several times at levels well above the EPA Region 3 Risk-Based Concentrations, the Texas Short-Term Effects Screening Level (ESL), the Texas Long-Term ESL, and the North Carolina Annual Ambient Air Standard (*see Charts A and D*). These standards represent a variety of health based standards, both for acute and chronic exposure in the community. **The six chemicals detected above one or more air quality standards are benzene, carbon disulfide, chloromethane, ethylbenzene, MTBE, and tetrachloroethene.** Once again, these VOCs pose a wide range of potential health effects on people, on animals, and on the environment.

In addition, seven out of the nine analyzed samples detected at least one chemical that exceeded one or more of the EPA Risk Based Concentration, the Texas Short Term ESL,

the Texas Long-Term ESL or the North Carolina Annual Ambient Air Standard. **This means that 78% of the time, the buckets detected air that was potentially unhealthy to breathe according to at least one standard.**

SOURCES OF TOXIC CHEMICALS IN SOUTH AND SOUTHWEST PHILADELPHIA

As discussed previously, the Sunoco refinery and other industries in South and Southwest Philadelphia represent a potential source of the air toxics in our samples. Of the chemicals detected, 6 different chemicals, benzene, ethylbenzene, toluene, hexane, xylene, and MTBE, are known to be emitted from the Sunoco refinery. The Sunoco refinery releases the largest source of toxic air pollutants in Philadelphia County. According to the Scorecard ranking system developed by Environmental Defense, the refinery ranks among the dirtiest/worst facilities in the country for air pollution known to cause cancer, developmental and reproductive harm. Sunoco reported to the US EPA in 2000 that it released over 136,000 pounds of the chemicals detected by the Bucket Brigade.

However, it is likely that other chemicals detected by community sampling are used, stored or emitted by the refinery and have the potential to be released into the air. For example, carbon disulfide has been found to be released by refineries in other states and is not required to be reported to the Toxic Release Inventory (TRI).

Other area sites and sources that contribute to air pollution are the Trigen Energy Corporation, the Grays Ferry Co-generation plant, metal industry and other activities at the former US Naval Yard, the Philadelphia International Airport, Sea Gull Lighting Productions, Amerada Hess Corporation, Ashland Specialty Chemical Company, and many other smaller facilities.

MTBE, which can also be a tail pipe emission, was detected in high amounts in 6 of the 9 samples. However, Sample #6 was taken on Interstate 76, a major highway in Philadelphia and lab analysis of this bucket sample did not detect MTBE even though the highway, and dozens of cars, were only a few feet from the sample location. This suggests that tail pipe emissions are not a major source of MTBE.

RECOMMENDATIONS

The results of the Clean Water Fund Bucket Brigade are not conclusive. However, they represent a step forward in our knowledge of what residents living in South and Southwest Philadelphia are actually breathing in their air. Based on these results, we make the following recommendations for action:

- 1) **Expand community monitoring.** We recommend that the City of Philadelphia's Air Management Services (AMS) expand its air toxics monitoring in order to more fully

analyze air in South and Southwest Philadelphia. In 2003, the South and Southwest Philadelphia Bucket Brigade will continue taking samples around the Sunoco refinery. In addition, CWA and the Community Labor Refinery Tracking Committee wish to see environmental agencies provide increased resources to help residents continue community air monitoring in their neighborhoods.

- 2) **Enact in-plant and fence-line monitoring.** Philadelphia's Air Management Services, Pennsylvania DEP, and US EPA should take air samples when visiting a plant, whether for a regular inspection or in response to resident complaints to the AMS hotline. AMS should monitor for more chemicals, particularly those known to be emitted from local industry. Results of sampling by environmental agencies should be promptly reported to the public. AMS should establish fence-line monitors for plants determined to have the most compliance problems or who are the largest sources of air toxics in South and Southwest Philadelphia. AMS should improve the monitoring requirements in Title V operating permits. These permits should require greater actual measurement of emissions, rather than simply using emission estimates to show compliance.
- 3) **Improve enforcement.** AMS should increase its responsiveness to resident complaints and especially ensure that inspectors go out to plants when complaints are called in during non-business hours. Once violations are found, companies should be fined in order to deter future violations. AMS should adopt a 'bad actor provision' so that companies must operate in compliance prior to getting permits to expand.
- 4) **Reform air pollution permitting.** AMS should stop permitting increased air pollution from the Sunoco refinery and other area industries. They should also consider the cumulative impact of many air pollution sources in South and Southwest Philadelphia when issuing permits. The Bucket Brigade sampling results clearly indicate the need for the cumulative impact of multiple sources of air toxics to be considered in permitting. Factors such as total amount of air toxics already present in a neighborhood, geography, and common weather conditions, such as inversion, should all be considered before new pollution sources are sited.
- 5) **Set ambient standards for air toxics.** Environmental agencies should develop ambient air quality standards for toxics to protect the public, especially from chemicals known to cause serious harm, such as cancer. Currently, air toxics are mostly regulated facility by facility, controlling emissions to a certain level from each one. Unfortunately in areas like South and Southwest Philadelphia, where there are dozens of industries in a small area, this approach is inadequate. Standards must be developed to evaluate when the cumulative impact of many plants reaches a point that threatens the public's health.

**Clean Water Fund Bucket Brigade Air Sampling Results
Chart A- Volatile Organic Compounds (VOC's)**

Sample #	#1	#2	#3	#4	#5	#6	#7
	6/26/02	8/29/02	11/22/02	1/18/03	2/22/03	2/25/03	3/12/03
	Passyunk Ave	61st and	61st and	61st and	26th and	I-76 below	Fort Mifflin
	Bridge	Passyunk	Passyunk	Passyunk	Penrose	Penrose	Hog Island
Chemical							
acetone	18	16	63				
benzene					13		37
2-Butanone		8.4	6.6	9.8			7.6
carbon disulfide		5.5					
chloromethane							15
ethanol	10		900			40	
ethylbenzene							6.9
isopropyl alcohol	35						
MTBE	5.6	8.7	15		9.6		
styrene							6.2
tetrachloroethene							31
toluene	14	28	31	26	8	6	27
trichlorofluoromethane					11		
xylenes		5.9	7.5				5.1

~ all figures are in micrograms per cubic meter (ug/m3)

~ shaded boxes indicate a result that exceeded either the EPA RBC, a North Carolina AAA or a Texas ESL (see appendix and Chart C for more information)

Clean Water Fund Bucket Brigade Air Sampling Results
Chart B- Tentatively Identified Compounds

Sample #	#1	#2	#3	#4	#5	#6	#7	#8	#9
	6/26/02	8/29/02	11/22/02	1/18/03	2/22/03	2/25/03	3/12/03	3/25/03	3/28/03
Chemical									
2,3 Dimethylbutane						20			
2-Ethyl-1-hexanol	20								
2-Methylbutane					50	90		40	
2-Methylhexane						20			
2-Methylpentane			20			50			
2-Methylpentane								10	
3-Methylhexane						30			
3-Methylpentane						30			
3 Methylheptane							20		
Butane			60		70	20	20	20	
C10H22 Branched Alkane	10	40		60			30		
C12H26 Branched Alkane	20	20					20		
C15H24 Sesquiterpene			20						
C4H8					10				
C4H8 Alkene							20		
C7H14 Compound						30			
C8H18 Branched Alkane	20	50		200					
C9H20 Branched Alkane	20	70		100					
C9H20 Branched Alkane+ Hexamethylcyclotrisiloxane				50					
Decane	20	60		70			40		
Dodecane		40		50	10		40		
Ethanol			900			40		10	
Heptane						30			
Hexamethyltrisiloxane							20		
Hexane						30			
Isobutane					40			10	
Isobutane+Acetaldehyde			40						

yde									
Isopropanol			70			50		30	
Methylcyclohexane						40			
Methylcyclopentane						30			
Octane	50	100		100			50		
Pentane			50		20	50	20	20	
Propane					20				
Propane+Propene+Chlorofluoromethane			20						
Propene + Propane							40		
Trimethylhexane							30		
Trimethylpentane		70					30		
Unidentified Compound			30						
Unidentified Sesquiterpene								10	
Unidentified siloxane		40	50	40	20		30	10	

~ all figures are approximate and in micrograms per cubic meter (ug/m3)

Clean Water Fund Bucket Brigade Air Sampling Results Chart C- Health Effects of Detected Chemicals

Chemical Name	Immuno toxicant	Skin/ Sense Organ irritant	Respiratory irritant	Neuro toxic effects	Teratogen (birth defects)	Repro- Ductive/ Develop- mental defects	Carcin- ogen	Mutagen	Cardio-- vascular / Blood disorders
2-butanone		S	S	S		S			S
acetone		S	S	S					S
benzene	S	S	S	S		K	K		S
butane				S					
carbon disulfide		S		S		K			S
chloromethane		S	S	S		K	S		S
ethanol		S	S	S		S	S		S
ethylbenzene		S	S	S		S	S		S
heptane				S					
hexane		S	S	S		S			
isobutane				S					
isopropyl alcohol		S	S	S		S			S
MTBE		S		S		S	S		S
octane			S	S					
pentane				S					
propane			S	S					
styrene	S	S	S	S		S	S		S
tetrachloroethene		S	S	S		S	K		S
toluene	S	S	S	S		K			S
trichlorofluoromethane		S	S	S					S
trimethylpentane		S	S						
xylenes	S	S	S	S		S			S

S= Suspected

K= Known

* As reported in the 2002 Toxic Release

Clean Water Fund Bucket Brigade Air Sampling Results Chart D- Highest Detected Levels Compared to Various Standards

Chemical	Sample Number	Highest Level Detected	EPA Region # Risk-Based Concentrations	Texas Short- Term Effects Screening Level	Texas Long- Term Effects Screening Level	North C Anr Amb Air Sta
2-Butanone	4	9.8	1000	3900	390	
acetone	3	63	370	5900	590	
benzene	7	37	0.25	12	3	0.
butane	5	70		19000	1900	
carbon disulfide	2	5.5	730	30	3	
chloromethane	7	15	1.8	1030	103	
decane	4	70		10000	1000	
ethanol	3	900		18800	1880	
ethylbenzene	7	6.9	1.6	2000	200	
isopropyl alcohol	1	35		7850	785	
MTBE	8	19	1.6	450	45	
octane	2,4	100		3500	350	
pentane	3, 6	50		3500	350	
styrene	7	6.2	100	110	11	
tetrachloroethene	7	31	0.63	340	34	19
toluene	3	31	420	1880	188	
trichlorofluoromethane	5	11	7200			
xylene	3	7.5	7300	3700	370	

~all figures are in ug/m³ (micrograms per cubic meter)

~see appendix for further explanation

* in pounds, as listed in the 2002 Toxic Release
Inventory

Appendix-

Explanation of Screening Levels and Ambient Air Standards

EPA Region 3 Risk Based Concentrations:

- Developed by EPA staff to assist in risk assessments, especially for Superfund sites
- Levels are based on best available health effects studies, including EPA IRIS database
- Levels are set for a one in a million cancer risk, or for an equivalent non-cancer risk (hazard quotient = 1)

North Carolina Annual Ambient Air Standards:

- Legally enforceable standards in North Carolina, developed through North Carolina's regulatory process.
- Based on health effects about the chemicals

Texas Long-Term Effects Screening Levels:

- Based on existing studies of chemicals health effects during an exposure period of *one year*, in most cases. For *benzene* it indicates a *24-hour* exposure period. Below these levels, no adverse health effects are thought likely to occur.
- Reflect the experimentally-determined levels at which the chemicals caused adverse effects in study populations of people or animals, combined with safety factors to account for the differences among human populations and between humans and animals.
- Not legally enforceable

Texas Short-Term Effects Screening Levels:

- Based on existing studies of chemical health effects during an exposure period of *one hour*. Below these levels, no adverse health effects are thought likely to occur.
- Reflect the experimentally-determined levels at which the chemicals caused adverse health effects in study populations of people or animals, combined with safety factors to account for the differences among human populations and between humans and animals.
- Not legally enforceable.