Health Consultation

AMERICAN STREET TANNERY SITE

CITY OF PHILADELPHIA, PHILADELPHIA COUNTY, PENNSYLVANIA

EPA FACILITY ID: PAD981939267

SEPTEMBER 20, 2007

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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CITY OF PHILADELPHIA, PHILADELPHIA COUNTY, PENNSYLVANIA

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Prepared By:

Pennsylvania Department of Health
Division of Environmental Health Epidemiology
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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TABLE OF CONTENTS

Executive Summary

As a result of a petitioned concern that was brought to the attention of the Agency for Toxic Substances and Disease Registry (ATSDR), the Pennsylvania Department of Health (PADOH) prepared this health consultation to determine if residents near the American Street Tannery Site are being exposed to contamination in environmental media at levels that would harm their health. The PADOH worked under a cooperative agreement with the ATSDR to complete this health consultation document.

Exposures to the assessed concentrations of polychlorobiphenyls (PCBs), arsenic, chromium, lead, polycyclic aromatic hydrocarbons (PAHs), and other detected compounds in surface soils, currently pose *no apparent public health hazard* to area residents that may visit the vacant lot area of the American Street Tannery site.

Exposures to volatile organic compounds (VOCs) in indoor air in residential locations at or near the site represent an *indeterminate health hazard* because sub-slab vapor (air) sampling or indoor air sampling data are not currently available. However, the levels of VOCs in soil gas, groundwater, sump water, and subsurface soil do not suggest that there would be an eminent indoor air issue at this site.

Frequent exposures to the levels of contamination detected in the surface soil at the Liberty Lands Community Park, adjacent to the American Street Tannery Site, represent *no apparent public health hazard*. The levels of inorganic compounds, PCBs, semi-volatile organic compounds (SVOCs), and PAHs are all below concentrations that would be considered a health threat. The levels of contamination that were detected in the composite soil samples at this community park property adjacent to the American Street Tannery Site do not indicate that the surface soil was impacted as a result of the alleged mismanagement of the excavated soils during the recent redevelopment at the American Street Tannery Site.

The interpretation, conclusions, and recommendations regarding the American Street Tannery Site for this health consultation are site-specific and do not necessarily apply to any other site.

Background and Statement of Issues

Site Description and History

The American Street Tannery Site (the site) is located in the City of Philadelphia, Philadelphia County, Pennsylvania, in a section called Northern Liberties (Figures 1- 4). The approximately 1.3 acre site is located within a city block of West George (to the north), North Bodine (to the west), North American (to the east) and West Wildey Streets (to the south). An approximately 1.0 acre portion to the north of the site includes a former tannery and residential property. In 2005, the north portion of the site was redeveloped into apartment units, retail shops, and a paved parking lot under the PA Act 2 Program. This part of the site was identified as the Liberty Homes Site under PA Act 2. The Pennsylvania Department of Environmental Protection (PADEP) concluded that the site meets Special Industrial Area Standards based on pathway elimination with institutional (i.e. deed notices) and engineering controls (i.e. paved parking lot) in place. PADOH supports PADEP's methodology and conclusion in deciding that this portion of the site met their standards based on eliminating pathways with the aforementioned controls in place. The smaller, remaining southern portion of the site is comprised of older (pre-1900) row homes and vacant lots. This health consultation evaluates environmental data that were collected from the study area (areas where samples were collected in Figure 4) on the southern portion of the site that was not subject to redevelopment. The site is located in a mixed, residential/commercial, urban area of Philadelphia. Residents near the site are connected to the public water supply that serves this area of Philadelphia.

The American Street Tannery Site has been developed since before 1895 with several manufacturing plants, which included a leather factory and an iron works facility. By 1951, the entire northern portion of the site was utilized as a leather factory (tannery), which continued operations through the 1970's in a complex comprised of five buildings. These buildings housed different tanneries until 1986, when operations ceased on the northern portion of the site. The tannery site was abandoned until 1987, when a variety of chemicals that included acids, base/neutral, corrosives, toxic, and others were stabilized at the facility through an EPA Removal Action. In 1990, a fire damaged the buildings. After the fire, trespassers entered the buildings and spilled PCBs that had been left on the site. PCBs were spilled on the site and the surrounding neighborhood. The City of Philadelphia demolished the damaged buildings, and a second EPA removal action took place to clean up the PCBs that contaminated the soil. The northern portion of the American Street Tannery Site remained vacant until it was redeveloped under a consent order and agreement (dated November 2002) with PADEP (PA Act 2 Program) in 2005.

Another property, adjacent to the American Street Tannery Site and currently known as Liberty Lands Community Park (Figures 2-4), was also formerly utilized by another tannery called the Burk Brothers Leather Factory. The Northern Liberties Neighborhood Association (NLNA) currently owns this site. In an effort to assist the NLNA and in combination with Brownfields redevelopment, EPA decided to conduct a site assessment in November 1996. As part of the EPA study, surface and subsurface soil samples were collected and analyzed to determine if concentrations of arsenic, lead, and PCBs were at levels that would pose a health

threat for area residents that anticipated to utilize the park for gardening, recreational purposes, or for children to play. In error, the Liberty Lands Community Park site was referred to as the American Street Tannery Site at this time. EPA requested that ATSDR evaluate the soil data collected at the park. ATSDR responded to EPA's request through a health consultation that was published in February 1997. ATSDR concluded that the levels of arsenic, lead, and PCBs detected in the subsurface and surface soils at the site (referred to as the American Street Tannery Site in the 1997 document, but in actuality was Liberty Lands Community Park) do not represent a public health threat, and the consumption of vegetables grown in the soils does not represent a health threat [1].

Although the previous health consultation concluded that the site does not represent a public health threat, residents living near the site recently expressed concerns about the potential for the mismanagement of contaminated soils that were excavated and stockpiled during the recent (2004-2005) redevelopment and the associated potential for contamination on the adjacent vacant lots on the site, possible migration of on-site contamination through fugitive dust migration and flooding (sediment deposition) on to the adjacent Liberty Lands Community Park, and contaminants left behind in the groundwater at the site. Due to these concerns, residents petitioned ATSDR to prepare a health consultation that evaluated the exposures to contamination left behind on the vacant lots at the American Street Tannery Site that were not redeveloped in 2005, as well as possible migration of contamination to the adjacent Liberty Lands Community Park. This health consultation responds to that request and addresses the concerns expressed by the community.

Site Visits

In February 2006, representatives of the PADOH Health Assessment Program viewed the site with the EPA On-scene Coordinator (OSC). The location of the site and the Liberty Lands Community Park were discussed, as well as the chemicals of concern at the site. PADOH staff took notes, photographs, and discussed site background information with the EPA OSC. During this visit, PADOH and EPA staff met, individually, with residents near the site.

Sample Events

In response to concerns raised by area residents, EPA contractors collected surface soil samples from several of the residential properties and vacant lots adjacent to the former American Street Tannery portion of the site in December 2006 (Figure 4). Four composite surface soil samples were also collected at the Liberty Lands Community Park and Playground to determine if redevelopment at the American Street Tannery Site has contaminated the surface soil on the adjacent property. In addition, subsurface soil, soil gas, and groundwater samples were collected from residential properties near the former tannery portion of the site. Water from a sump in one of the residential basements was also collected to determine if contamination (vapors) are entering the home via shallow groundwater.

The subsurface soil, soil gas, and groundwater samples that were collected for VOC analysis during the December 2006 sampling event did not meet quality control measures, and were

not analyzed. The temperature of the shipment of the samples to the laboratory was above the temperature required to preserve the samples for analysis of VOC compounds in these samples. The surface soils samples were not analyzed for VOCs, and met quality control parameters for the other analysis. EPA contractors returned to the site in January 2007 for another sampling event, to recollect the unusable samples and submit them to the laboratory for VOC analysis.

All the samples collected by EPA contractors during this January 2007 sampling event were sent and analyzed by laboratories that received accreditation through EPA's Contract Laboratory Program. The surface soil samples collected during the December 2006 sampling event were analyzed for semi-volatile organic compounds (SVOCs), pesticides, PCBs, metals, and cyanide. Subsurface soil, soil gas, and groundwater samples, recollected during the January 2007 sampling event, were analyzed for volatile organic compounds (VOCs).

Sample Results

Surface Soil Samples

In the December 2006 removal assessment, the EPA contractor collected surface soil samples from zero to three inches (0" to 3") at approximately 11 discrete locations on the American Street Tannery Site, and four composite samples were collected at the adjacent Liberty Lands Community Park and Playground property. In this health consultation, PADOH evaluated these surface soil sampling data in the following sections and provided information on the public health significance of the results in the 'Discussion' section. All surface soil samples met quality control procedures for laboratory analysis.

Inorganic Compounds (Metals)

Lead, arsenic, chromium, and other metals were detected in the surface soil samples collected in residential areas and vacant lots at the American Street Tannery Site (Table 1) [2]. The mean (average) level of lead in the 12 surface soil samples collected at the site was 369 ppm. Lead was detected at a maximum concentration of 1,320 parts per million (ppm) in one discrete location at the site. Arsenic was detected at a maximum concentration of 16.5 ppm in another location. The maximum detectable concentrations of some other inorganic compounds in surface soil at the site were as follows: chromium 652 ppm, antimony 14.6 ppm, mercury 2.3 ppm, and iron 39,600 ppm.

Semi-Volatile Organic Compounds (SVOCs)

Several SVOCs, specifically polycyclic aromatic hydrocarbons (PAHs), were detected in the surface soil samples at the site (Table 2). The maximum detected levels of some of the specific PAHs in the surface soil samples at the American Street Tannery Site were as follows: benzo(a)anthracence - 8,800 ppb; benzo(b)fluoranthene - 9,600 ppb; benzo(k)fluoranthene - 2,700 ppb; benzo(a)pyrene - 6,800 ppb; ideno(1,2,3,-cd)pyrene - 4,200 ppb; dibenzo(a,h)anthracene - 1,100 ppb. Napthalene was also detected in the surface soil samples with a maximum detection of 1,300 ppb [3].

Polychlorinated Biphenyls (PCBs)

Mixtures of PCBs, containing a variety of individual chlorinated biphenyl components were also analyzed by the laboratory and detected in the surface soils at the American Street Tannery Site. The PCBs mixtures are known by their industrial name, Arcolor, which varies in form depending on the amount of chlorine in the substance by weight. For example, Arcolor 1254 is indicative of a PCB mixture that contains approximately 54% chlorine, as indicated by the last two digits in the name.

The maximum concentrations of two mixtures of PCBs, which were detected at the American Street Tannery Site, were 160 ppb Arcolor 1254 and 120 ppb Arcolor 1260. The maximum concentration of Arcolor 1260 detected in the Liberty Lands Community Park was 410 ppb. There were no other detectable concentrations of seven other PCB mixtures that were analyzed by the laboratory [4].

Pesticides

The surface soil samples were also analyzed by the laboratory for approximately 21 of the more commonly utilized forms of pesticides. All of the levels of pesticides detected in the surface soils samples were well below health-based comparison values (Table 4). The highest levels of the following pesticide compounds were detected in the surface soil samples at the site: aldrin (3.8 ppb), heptacholor (2.6 ppb), endrin (16 ppb), methoxychlor (210 ppb), and toxaphene (232 ppb) [5]. Since the pesticide levels were detected at concentrations well below ATSDR health-based comparison values, exposure to these chemicals are not expected to result in adverse health effects to anyone that could be exposed, and therefore are not discussed further in this health consultation.

Soil Gas Samples

The January 2007 soil-gas survey results did not indicate evidence of elevated levels of VOCs. Ethanol, isopropyl alcohol, and acetone were detected in three soil gas samples. The likely source of these chemicals is a mixture of isopropyl alcohol and acetone used by the environmental contractor to clean equipment [6]. No compounds, with the exception of tetrachloroethene (PCE), benzene, and 2-butanone, were detected in any of the samples. PCE was detected in one soil gas sample at 2.4 ppb. The benzene detections were not confirmed levels due to limitations of the instruments utilized in the laboratory to analyze the soil gas samples, but were present at levels at or below 0.6 ppb. The maximum level of 2-butanone detected in all the soil gas samples was 4.4 ppb.

At the identified levels of the soil gas samples, vapor intrusion into buildings at or near the site would not be expected to pose a health threat to the residents in the area. It is not known if the residents are actually exposed to these levels of VOCs inside their homes, and PADOH does not use soil gas data to determine the potential for health effects at a site. There are situations where soil gas vapors from VOC contamination in the shallow groundwater or subsurface soil could accumulate beneath building foundations. Sub-slab air (vapor) sampling was not conducted as part of this environmental study. To rule out the possibility of VOC vapors accumulating below building foundations, these types of data need to be collected from a sufficient number of dwellings in the recently developed

portion of the site and the other row residences at the southern portion of the site that surround the vacant lots.

Groundwater and Sump Water Samples

The groundwater and sump water samples that were collected from the site on January 2007 were analyzed for VOCs to also determine the potential for vapor intrusion into the residences at or near the site. The residents in this area use the public water supply, so they are not exposed to the groundwater via ingestion that was sampled at the site. The distribution of public water is strictly monitored by the municipality under the PADEP Safe Water Drinking requirements to ensure provision of safe, potable water. The sampling results of this monitoring are required to be shared by the water company with all customers and should be available to residents by contacting the local water company.

Acetone was detected in all of the groundwater samples collected at the site, and MTBE was detected in all but one groundwater sample. Acetone was also detected in the blank sample at 3.0 ppb. The highest level of acetone detected in groundwater samples was 4.1 ppb. The maximum detection of MTBE was 5.9 ppb. An unconfirmed concentration of 0.38 ppb cis-1,2-dichlorethene was detected in one sample, which was well below the reporting limits (5 ppb) of the instrument utilized in the laboratory analysis of the sample.

These levels of VOCs detected in the groundwater and sump water samples were relatively low [7], and would not be expected to pose a health threat to the residents in the area through possible vapor intrusion into the homes.

Subsurface Soil Samples

In January 2007 subsurface soil samples were also collected from the American Street Tannery site to determine if VOCs were detected at concentrations that could indicate a potential vapor intrusion problem into the residences at the site. Four subsurface soil samples (plus one duplicate sample) were collected from depth intervals ranging from 4 to 6 feet below ground surface (bgs) and 10 to 11 feet bgs.

All the detections of VOCs in the subsurface soil samples collected at the site were not detected substantially above the reportable level by the laboratory. One exception to that was two subsurface soils that contained levels of 40 ppb acetone and 58 ppb acetone. Acetone was used to clean the sampling equipment and was detected in the investigation derived-waste sample (aqueous) at 680 ppb, as well as the trip blank sample (aqueous).

The maximum detectable levels of VOCs in the subsurface soil samples were as follows: trichlorofluoromethane (1.9 ppb), carbon disulfide (22 ppb), 2-butanone (16 ppb), toluene (2.5 ppb), ethylbenzene (0.82 ppb), xylenes (3.29 ppb) [7]. Direct contact with these subsurface soils is highly unlikely. The detected levels of all VOCs in the subsurface soils are relatively low, and highly unlikely to contribute to an indoor air vapor intrusion problem within the residences at the site.

Quality Assurance and Quality Control

In preparing this health consultation, ATSDR and PADOH relied on the information provided in the referenced documents. ATSDR and PADOH reviewed the quality assurance and quality control measures that were followed regarding data gathering, chain-of-custody, laboratory procedures, and data reporting. ATSDR and PADOH expected and presumed that to ensure the accuracy of the data, extreme care was taken during all aspects of sample collection. ATSDR and PADOH also assumed that the laboratory only used certified, clean-sample collection devices. Once samples were collected, ATSDR and PADOH expected they were stored according to the method protocol and were delivered to the analytical laboratory as soon as possible. Finally, ATSDR and PADOH presumed that laboratory Standard Operating Procedures and other procedures and guidance for sample analysis, reporting, and chains of custody were followed. The analyses, conclusions, and recommendations in this health consultation are valid only if the referenced documents are complete and reliable.

It is important to note that subsurface soil, groundwater, and soil-gas samples that were collected for VOC analysis in December 2006 failed quality assurance/quality control measures. These samples were not analyzed by the laboratory due to improper temperature of the samples upon arrival to the laboratory. Another issue with the quality assurance and quality control procedures was that ethanol, isopropyl alcohol, and acetone, which were used to clean the sampling equipment, were also detected in the blanks and the samples.

Discussion

In this section, PADOH evaluates the surface soil data to determine if the residents are being exposed to harmful levels of the inorganic compounds, SVOCs, PCB compounds, and pesticides at the American Street Tannery Site, as well as Liberty Lands Community Park. PADOH considers how the residents came into contact with the VOCs as well as the frequency of exposure. PADOH also considers whether the contaminants were present at harmful levels.

To determine the likelihood of possible health effects of site-specific chemicals, ATSDR has developed health-based comparison values (CVs). These CVs include Minimal Risk Levels (MRLs) for non-cancerous health effects, Cancer Risk Evaluation Guides (CREGs) for cancerous health effects, and Reference Dose Media Evaluation Guides (RMEGs) and Environmental Media Evaluation Guides (EMEGs). CREGs are comparison values based on EPA's chemical-specific cancer slope factors and an estimated lifetime cancer risk of one cancer in one million people.

ATSDR established MRLs based upon an evaluation of the toxicological literature for a given substance. MRLs are not established as thresholds of toxicity, but were developed as screening tools, below which non-cancer adverse health effects are unlikely. In that framework, a lifetime of exposure below a chronic MRL would not be expected to result in adverse health effects. However, exposure to levels above the MRL may not necessarily lead to adverse health effects. There is a wide range of uncertainty between levels known to cause adverse health effects and the MRLs. Therefore, the MRL does not establish the maximum "safe" level, nor is it intended to imply that exposure is not likely to be harmful. If environmental exposures occur at

concentrations exceeding the MRL then further evaluation is necessary to determine the health risks of those exposures.

Exposure pathways to the soil gas, groundwater, and subsurface soil at the American Street Tannery Site are not completed. For an exposure pathway to be completed, all the following elements must be present:

1) a source of contamination;
2) transport through an environmental medium;
3) a point of exposure;
4) a route of human exposure, and;
5) a receptor population.

A point of exposure is what is missing for an exposure pathway to be completed for soil gas, groundwater, and subsurface soil. Although there is a completed exposure pathway for residential exposure to sump water, PADOH determined that the levels of VOCs detected in the sump water sample are too low to be considered an indoor air or direct contact threat.

Contaminant Evaluation

Community members could be exposed to the surface soils that were sampled on the vacant lots at the American Street Tannery Site. This area is accessible to residents even though some fencing is placed around the area that was sampled and currently undeveloped. Surface soil sample data at an adjacent community park, known as Liberty Lands Community Park, were also evaluated to determine if the American Street Tannery Site redevelopment could have any impacts on this adjacent property.

In the following sections, PADOH describes which contaminants "screened-in" for further evaluation. These contaminants exceeded ATSDR CVs or CVs used from other agencies, which necessitated further evaluation by the health assessor. It should be noted that chemicals that were detected at levels that might exceed the CVs do not necessarily imply that exposure to these levels would result in adverse health effects. Other contaminants that were detected at the site were below the CVs and exposure to these chemicals would not be expected to result in adverse health effects. Please refer to Tables 1-4 in Appendix A for a listing of some of the other chemicals that were detected in the surface soil, along with the average detected level, maximum detected level, and corresponding CV, if available for each chemical.

Arsenic

Arsenic occurs naturally in soils and rocks. Some commercial products containing arsenic include wood preservatives, pesticides, paints, and leaded gasoline. Other industrial processes that could release arsenic are desulfuring of gases and/or fossil fuels, burning preserved wood, and metal alloy production. Arsenic was also used historically in certain medicines such as anti-syphilis drugs.

There are two forms of arsenic in the environment: organic and inorganic forms. The inorganic forms are usually more toxic than the organic ones. The standard analytical method to detect arsenic in varying environmental media does not distinguish the specific form of arsenic [8]. To ensure a conservative or protective toxicological/public health

estimate, PADOH assumes that all the arsenic detected in this evaluation is inorganic arsenic.

Health-based studies show that doses as low as 0.050 mg/kg/day of inorganic arsenic may cause edema of the face, and gastrointestinal and upper respiratory symptoms initially, followed in some patients by skin lesions and neuropathy [8]. Other symptoms included the lack of blood cell production, which may cause fatigue, abnormal heart rhythm, blood vessel damage resulting in bruising, and impaired nerve function causing a "pins and needles" sensation in the hands and feet. Chronic exposure to levels as low as 0.014 mg/kg/day may lead to "Blackfoot Disease", a condition in which blood circulation is lost and ultimately results in necrosis (cell death) in the hands and feet [8]. The most characteristic effect of chronic oral exposure to arsenic is a pattern of skin changes. These include darkening of the skin and appearance of warts on the palms, soles, and upper-body. Some of the warts may also result in skin cancer. EPA classifies inorganic arsenic as a "known human carcinogen". Exposure to arsenic may increase the risk of liver, bladder, kidney, prostate, and lung cancers.

People can be exposed to arsenic from the environment by eating food, drinking water, or breathing air. Young children may be exposed to arsenic from eating dirt because of their tendency to place their hands in their mouths. Dermal contact with soil or water that contains arsenic may be another exposure route, but absorption of arsenic through skin is so minimal that it is not considered a risk factor. As described earlier in this health consultation, arsenic levels were detected in surface soil (zero to three inches) at a maximum level of 16.5 ppm (parts per million).

The human body absorbs various forms of arsenic differently depending on the environmental media in which it is contained. Arsenic in soil is more difficult to absorb than the soluble arsenic forms found in groundwater on some sites. Health studies demonstrated that the bioavailability of arsenic in soil might be quite small in some soil types. These studies suggested that arsenic in soil may be imbedded in minerals or occur as insoluble compounds and therefore not taken up by the body from the gastrointestinal tract [8]. This is important for estimating human doses. The current CREG for arsenic in surface soil is 0.5 ppm [or milligram per kilogram (mg/kg), which is equivalent to ppm for chemical concentrations in soil] that PADOH uses as a screening tool to identify contaminants of concern. The CREG is a theoretical calculation that assumes a consumption of 100 mg of soil per day by a 70 kg person over a lifetime without consideration of absorption rate or the bioavailability of arsenic from soil. This scenario is far more conservative than what we would expect in reality. The CREG also falls well below background levels of arsenic in soil.

Based on health studies, PADOH considered the bioavailability of arsenic from ingestion of soil, which is typically quite small in most cases. One study recognized bioavailable arsenic in contaminated soils to range from 4.5% to 25% (+/- 0.8% to 9%) [8]. Another study (Roberts, Munson, et.al.) determined that the bioavailability of arsenic-contaminated soil from 14 soil samples from 12 different sites to be 5% to 31%, with most percentages of bioavailability of arsenic in soil found to be in the 10% - 20% range. To take a conservative approach, for this public health assessment PADOH considered the bioavailability of arsenic to be 50% for all exposure dose calculations. Age-adjusted soil ingestion rates were used to calculate lifetime arsenic exposure doses. The estimated

average lifetime daily exposure for people living on or near the American Street Tannery Site for 30 years is 1.2E-05 mg/kg/day. This value is lower than the chronic MRL of 3E-04 mg/kg/day. A young child playing in the vacant lot daily would have an estimated exposure dose of 1.0E-04 mg/kg/day over the course of a year. The shorter-term (within a year) exposure should be more appropriately compared to the intermediate or acute MRL. The ATSDR provisional acute MRL for arsenic is 0.005 mg/kg/day. A young child exhibiting soil pica behavior would have an estimated exposure dose of 0.0026 mg/kg/day, over the course of one year. Even the pica behavior, which is not known to exist for any of the children in this area, would not result in a dose that exceeds ATSDR's acute MRL for arsenic. The dose and end point used in the study to calculate the acute MRL was based on a LOAEL of 0.05 mg/kg/day. This study performed by Mizuta et al. (1956) summarized findings from 220 poisoning cases associated with an episode of arsenic contamination of soy sauce in Japan. The clinical symptoms recorded were edema of the face, and gastrointestinal and upper respiratory symptoms initially, followed in some patients by skin lesions and neuropathy. Other effects included mild anemia and leukopenia, mild degenerative liver lesions and hepatic dysfunction, abnormal electrocardiogram, and ocular lesions. For derivation of the MRL, facial edema and gastrointestinal symptoms (nausea, vomiting, diarrhea), which were characteristic of the initial poisoning and then subsided, were considered to be the critical effects [8].

The MRL for acute exposure to arsenic is supported by the case of a man and woman in upstate New York who experienced gastrointestinal symptoms starting almost immediately after being intermittently exposed to arsenic-contaminated drinking water at an estimated dose of 0.05 mg/kg/day [8]. Gastrointestinal symptoms have been widely reported in other acute arsenic poisoning studies as well, although in some cases, the doses were higher and effects were more severe, and in other cases, the dose information was not available. The MRL is actually considered provisional because the gastrointestinal effects are serious and because serious neurological and cardiovascular effects also occurred at the same dose. ATSDR prefers to base an MRL on a No Observable Adverse Affect Level (NOAEL) or less serious LOAEL, if the data are available. However, in this case public health concerns regarding arsenic suggested that a provisional value derived from these data would still be useful for the general public [8].

The estimated cancer risk from the average lifetime daily exposure to the highest arsenic concentration (16.5 mg/kg) detected in surface soils at the site would be approximately eight cancers per 1,000,000 people or a "no apparent increased cancer risk". After reviewing numerous human studies, as reported in ATSDR's Toxicological Profile for arsenic, the lowest arsenic Cancer Effect Level (CEL) for lung cancer is 0.0011 mg/kg/day; for bladder cancer is 0.0033 mg/kg/day; and for skin cancer is 0.0075 mg/kg/day. The average lifetime exposure dose (1.2E-05 mg/kg/day) is significantly less than the lowest CELs for arsenic. PADOH does not expect elevated cancer risk from exposure to the maximum levels of arsenic detected in surface soils at the American Street Tannery Site or the Liberty Lands Community Park (15 ppm arsenic was highest detection at the park).

Chromium

Chromium is a naturally occurring element found in rocks, animals, plants, and soil. No known taste or odor is associated with chromium compounds. Chromium is present in the environment in several different forms that include: trivalent chromium (or chromium III) and hexavalent chromium (or chromium VI). Chromium (III) is an essential nutrient required by the human body to promote the action of insulin in body tissues so that sugar, protein, and fat can be used by the body. Chromium (III) occurs naturally in many fresh vegetables, fruits, meat, yeast, and grain. The National Research Council has identified an estimated safe and adequate daily dietary intake for chromium (III) of 50-200 µg/d, corresponding to 0.71-2.9 µg/kg/day for a 70-kg adult. The Food and Drug Adminstration has selected a Reference Daily Intake for chromium (III) of 120 µg/d [9]. Chromium (VI) forms are generally produced in the industrial process such as: chrome plating, manufacturing of dyes and pigments, *leather tanning* (however, mainly chromium (III) was used), and wood preserving [10]. Doses of chromium (VI) are not known to be beneficial to the humans. However, at high enough doses, it has been documented to result in adverse health effects, depending on the concentration and duration of the exposure.

Since the maximum level of chromium (652 ppm) detected at the American Street Tannery Site exceeded the RMEG (200 ppm) for child exposure to hexavalent chromium (chromium VI), this exposure scenario was further evaluated in this health consultation. The levels of chromium for this environmental study were reported as total chromium and the form of chromium, such as hexavalent (VI) or trivalent (III), was not distinguished (or speciated) by the laboratory. Since chromium speciation was not performed in these laboratory analysis, PADOH took a conservative approach in evaluating the potential exposures to chromium and assumed all the chromium detected was the more toxic chromium VI. A young child that would have frequent (daily) exposure to the maximum level (652 ppm) of chromium (theoretically hexavalent) detected at the site would result in an exposure dose of 0.00815 mg/kg/day. This child exposure dose exceeded EPA's oral reference dose (RfD) for exposure to hexavalent chromium, which is 0.003 mg/kg/day. This RfD is based on a No-Observable-Adverse-Effect-Level (NOAEL) of 2.5 mg/kg/day (adjusted for weight of rats used in study) and a high degree of uncertainty factored in to establish the RfD.

Although chronically inhaling hexavalent chromium particulates at high enough levels is known to cause cancer, incidental ingestion of surface soil contaminated with hexavalent chromium is not classified as being carcinogenic. In general, hexavalent chromium is more easily absorbed by the body than trivalent chromium, but once ingested, hexavalent chromium is converted to the less toxic trivalent form. The bioavailablity of chromium may be the single most important factor for determining the toxicity of a specific chromium source. For this reason, there is a great deal of variation in the exposure studies identified for ingestion of hexavalent chromium. Ingestion of smaller amounts of hexavalent chromium (0.012 – 0.30 mg/kg/day), did not result in observable adverse health effects [9, 10]; however, ingestion of larger doses (0.036 mg/kg/day – 4.1 mg/kg/day) has caused dermatitis, stomach upsets and ulcers, convulsions, kidney and liver damage, and even death [10]. The levels of hexavalent chromium that caused these health effects were far greater (almost 5 times) than those that children might be exposed

to in the surface soil at the American Street Tannery Site, thus exposure to the highest levels of chromium would not be expected to result in adverse health effects.

It is important to note that the chromium detected in the surface soil at the American Street Tannery Site is highly unlikely to be present exclusively in the hexavalent form, and that trivalent chromium has nutritional benefits at smaller doses.

Lead

People residing on or near the American Street Tannery Site could be exposed to lead in surface soil, drinking water, and/or lead-based paint. These people are potentially exposed to lead through incidental ingestion of contaminated soil and inhalation of airborne particulates. Frequent hand to mouth behaviors by younger children also increases the ingestion rates of possible lead contaminants. At low levels, lead occurs naturally in the environment. However, most high levels found throughout the environment come from human activities. Lead-based paint was utilized in homes up to 1978. Leaded gasoline was utilized in vehicles into the early 1980's, and since lead does not dissipate (or go away), we still find the surface soil to contain detectable concentrations of lead attributed to use of lead in gasoline, especially in urban environments such as the American Street Tannery Site.

Studies conducted in Maryland and Minnesota have indicated that within urban settings such as Baltimore, the highest soil lead levels occur near inner city areas, especially where high traffic flows have occurred and that the concentration of lead in the soil is correlated with the size of the city [11]. In 1981, soil levels in the Minneapolis/St. Paul inner city area were 60 times greater (423 ppm) than levels found in rural Minnesota (6.7 ppm), with 95% of all the contamination being contributed to leaded gasoline. Soil samples collected near foundations of homes with painted exteriors had the highest lead levels on average with 522 ppm lead. Levels of lead in surface soil were identified as high as 20,136 ppm near homes that had exteriors painted with lead-based paint [11].

In another study it was determined that lead concentrations in surface soil in old communities of large cities is 10 to 100 greater than comparable neighborhoods of smaller cities. In addition, soil-lead concentrations demonstrated a decrease in concentration with an increase in distance from the center of the city [12].

Lead affects primarily the peripheral and central nervous systems, the blood cells, and metabolism of vitamin D. Lead also causes reproductive toxicity and is classified by the EPA as a possible human carcinogen. The most sensitive target of lead poisoning is in the nervous system. In children, neurological effects have been documented at exposure levels once thought to cause no harmful effects [11].

Neurological deficits, as well as other effects caused by lead poisoning, may be irreversible. Effects in children generally occur at lower blood levels than adults. The developing nervous system in children can be affected adversely at blood lead levels as low as 10 micrograms per deciliter (µg/dL) and perhaps lower. Lead inhibits several enzymes that are critical to the synthesis of heme. However, low-level lead poisoning in children rarely results in anemia. Lead poisoning also interferes with the hormonal form of vitamin D, which affects multiple processes in the body, including cell maturation and skeletal growth. Lead-induced chronic renal insufficiency may result in gout.

Furthermore, maternal lead stores readily across the placenta, placing the fetus at a serious risk.

Some persons with lead poisoning may not be overtly symptomatic. Because of the differences in individual susceptibility, symptoms of lead intoxication and their onset may vary. With increasing exposure, the severity of symptoms can be expected to increase. In the early stages of symptomatic lead intoxication or mild toxicity, blood lead levels generally range from 35 to 50 µg/dL in children and 40 to 60 µg/dL in adults. Mild toxicity may result in muscle pain and irritability. Moderate toxicity may result in bone pain, general fatigue, difficulty concentrating, headache, diffuse abdominal pain, and weight loss. Severe lead toxicity may result in encephalopathy, which may lead to seizures. A purplish line on the gums, known as a lead line, is rarely seen today, but if present, usually indicates severe and prolonged lead poisoning.

Lead was detected in all 12 surface soil samples collected at the vacant lots with an average concentration of 369 ppm. Lead was detected in surface soil in two of the 12 sampling locations at concentrations of 734 ppm and 1,320 ppm from surface soil samples collected in the vacant lot, which are above the EPA screening level for lead (400 ppm). The identified "hot spots" of lead contamination in surface soils are isolated areas that would limit exposure, and it would be highly unlikely that children and/or recreators frequented these discrete locations on a regular basis. ATSDR has not established any MRLs for lead in soils or sediments, nor has EPA established an RfD. There is evidence that lead poses a human health threat as concentrations approach 500 ppm in the soil. Studies have shown that blood lead levels in children may increase 2-to-3 µg/dL for every 1,000 mg/kg in the soil. Clean-up actions on residential properties are typically initiated as soil lead concentrations approach 400 to 500 mg/kg on average [11].

Since it is not likely that exposure to surface soils could occur on a frequent basis and average concentrations of lead in surface soil are below 400 ppm in the vacant lot at the American Street Tannery site, exposure to lead detected in the surface soils on these properties would not be expected to pose a health threat to the public. The highest level of lead detected at the Liberty Lands Community Park was 181 ppm, and therefore, exposure to this level would not be expected to result in an elevated blood lead level (≥10 ug/dL).

A blood lead test is the most useful screening and diagnostic test for evaluating a possible exposure to lead. Therefore, as a prudent public health practice, blood lead tests are recommended for children (five years of age and younger). In addition, the possibility of exposure to lead-based paint in homes constructed prior to 1978 and/or other sources of lead could also contribute to the overall dose of lead that is taken into the body. For this reason PADOH recommends that all children under the age of six should have their blood tested for lead, if they have not recently been tested, regardless of their exposure to the surface soil on the vacant lot. The screening recommendations for Pennsylvania recommend a blood lead test for all children at ages one and two years for all children and for all children ages three to six without a confirmed prior lead blood test.

Based on sufficient animal studies, EPA classifies lead as a probable human carcinogen. No cancer slope factor has been developed for lead to evaluate possible cancer risks to people exposed to lead in the study area.

Polycyclic Aromatic Hydrocarbons (PAHs)
PAHs comprise a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil, gas, garbage, and other organic substances such as tobacco or charbroiled meat. PAHs are usually found as a mixture containing two or more of these compounds. Because of the complexity of these mixtures, the most active compound, benzo(a)pyrene, is used as the indicator compound. While not all PAHs are considered carcinogenic (e.g., pyrene), the EPA has determined that benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene are probable human carcinogens [13].

From an environmental perspective, PAHs can usually be found at very low concentrations everywhere in the environment and are ubiquitous in surface soil. The PAH levels that exist in surface soils throughout the American Street Tannery Site are above ATSDR and EPA CVs (Table 2). However, these levels are lower than the background levels of PAHs that are documented in surface soils in urban areas. The following urban area background levels were measured for the these PAH's: 169 – 59,000 ppb benzo(a)anthracene; 165 – 220 ppb benzo(a)pyrene ; 15,000 – 62,000 ppb benzo(b)fluoranthene; 300 – 26,000 ppb benzo(k)fluoranthene; 251 – 640 ppb chrysene; and 8,000 – 61,000 ppb indeno(1,2,3-c,d)pyrene [13].

From these comparisons, it is possible to conclude that the levels of PAHs in the soil measured at the site compared to background levels identified in urban areas. Using the maximum level (6.8 ppm) of benzo(a)pyrene as the most active and indicator compound for PAHs detected in the surface soil at the American Street Tannery Site to calculate cancer risk for a 30 year exposure period, the cancer risk would be estimated to be three additional cancers per 100,000 people. This cancer risk would equate to no apparent increased excess lifetime cancer risk, assuming no safe level of exposure to a carcinogenic compound. This estimation also tends to overestimate the risk with the assumption that these levels of exposure are persistent at these maximum environmental levels over the course of an unlikely extended period of time. Exposure to these levels of PAHs in the surface soil at the American Street Tannery site are not expected to pose a hazard to visitors of the property.

Child Health Considerations

PADOH and ATSDR recognize that infants and children are more vulnerable to chemical exposure than adults. As part of their child health considerations, PADOH and ATSDR are committed to evaluating exposure scenarios that potentially involve children. Considering exposure to surface soil on the vacant lot at the American Street Tannery Site, children may have an increased vulnerability due to many factors including:

1) children weigh less than adults, resulting in higher doses of chemical exposure relative to body weight;
2) children have higher rates of ingestion;

3) metabolism and detoxification mechanisms differ in both the very young and very old and may increase or decrease susceptibility, and;
4) the developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages.

Studies show that adverse reproductive and developmental effects are possible after exposures to significant doses of lead. Therefore, fetuses, infants, and children are more susceptible to the effects of lead. We estimate that younger children who regularly eat non-food items and frequently contact site contaminants and/or have other exposures to lead, such as lead-based paint, may have exposures that would result in an elevated blood lead level. Residents that have young children at home should take precautions to not track possible contaminated soil into their home. PADOH's suggestions are summarized in the *Recommendations* section.

PADOH and ATSDR considered child-specific doses in the analysis for this health consultation document.

Conclusions

PADOH and ATSDR conclude that:

1. Exposures to the assessed concentrations of lead, PCBs, arsenic, chromium, PAHs, and other compounds detected in surface soils, pose *no apparent public health hazard* to area residents that may visit the vacant lot area of the American Street Tannery site.

2. Exposures to VOCs in indoor air in residential locations at or near the site represent an *indeterminate health hazard* because sub-slab vapor (air) sampling or indoor air sampling data are not currently available. However, the levels of VOCs in soil gas, groundwater, sump water, and subsurface soil do not suggest that there would be an indoor air issue at this site.

3. Exposures to the levels of contamination detected in the surface soil at the Liberty Lands Community Park, adjacent to the American Street Tannery Site, represent *no apparent public health hazard*. The levels of inorganic compounds, PCBs, SVOC's, and pesticides are all well below concentrations that would be considered a health threat. The levels of contamination that were detected in the composite soil samples at this property adjacent to the American Street Tannery Site do not indicate that the surface soil was impacted as a result of the alleged mismanagement of the excavated soils during the recent redevelopment at the American Street Tannery Site.

Please refer to *Appendix C* for the definitions of the ATSDR Public Health Hazard Categories.

Recommendations

1. PADOH and ATSDR, as a general recommendation and prudent public health practice, recommend that all children under the age of six, should have their blood tested for lead, if they have not recently been tested within the past year, regardless of their exposure

history. The screening recommendations for Pennsylvania recommend a blood lead test for all children at ages one and two years for all children and for all children ages three to six without a confirmed prior lead blood test. The possibility for exposure to lead-based paint and other sources of lead in the home (i.e., old plumbing) or an urban environment (i.e., surface soil contaminated from leaded gasoline or former lead smelters), although not site related, make this public health recommendation appropriate in this situation. PADOH and ATSDR also recommend that women who are pregnant or who may become pregnant should also discuss their possible lead exposures with their personal physician.

2. PADOH and ATSDR recommend that USEPA Region 3 collect sub-slab soil vapor samples and determine if there are elevated levels of VOCs accumulating beneath building foundations at the American Street Tannery Site. If VOCs levels are determined by USEPA Region 3 to be high enough to result in an indoor air vapor intrusion issue, then indoor air samples should be collected and analyzed to determine the levels of VOCs that residents may be exposed in their indoor air at the American Street Tannery Site.
3. PADOH and ATSDR recommend that residents take the following steps to reduce their exposure to lead from exposure to surface soil, as much as possible:
    - Establish a clean hands policy – children should wash their hands when coming in from playing outside and before eating.
    - Provide children with a covered sand box and discourage them from playing in the soil.
    - Maintain a healthy grass or sod on play areas. Bare play areas, such as those under a swing set, can also be covered with woodchips, mulch, or clean sand.
    - Do not eat or smoke in areas with contaminated soil.
    - Avoid tracking soil into the house on your shoes and clothing and by household pets. Ask family members to remove their shoes by the door, and frequently bathe your pets as they could also track contaminated soil into your home.
    - Regularly conduct damp mopping and damp dusting of surfaces. Dry sweeping and dusting could increase the amount of lead-contaminated dust in the air.
    - If you have carpets, use a vacuum with a High Efficiency Particulate Air (HEPA) filter. Vacuuming without this type of filter can increase the amount of lead-contaminated dust in the air.

Public Health Actions Completed

1. PADEP/EPA initiated the characterization at the site with special emphasis on defining the groundwater and subsurface soil contamination plume to determine if VOCs or other contaminants are present in groundwater and subsurface soils. However, further characterization of the site is needed to determine if there is the potential for vapor intrusion into the homes.

2. PADOH , PADEP, and ATSDR contacted some of the residents who had concerns and discussed the public health significance of their exposure to contamination, as well as their involvement with the site. PADOH will continue to be available to answer residents' health questions as they pertain to the American Street Tannery Site.

3. ATSDR published a health consultation for the proposed Liberty Lands Community Park (in a planned phase at this time) in February 1997, which was erroneously entitled American Street Tannery Health Consultation. In that 1997 health consultation, ATSDR concluded that the levels of arsenic, lead, and PCBs detected in the surface and subsurface soils at the vacant site (proposed Liberty Lands Community Park) did not represent a public health threat, and consumption of vegetables grown in these soils does not represent a health threat. ATSDR's response to this community concern and evaluation of environmental data allowed this project to move forward and alleviated the community members' health concerns for gardening, recreating, and children playing at this site. Site conditions have not significantly changed for the Liberty Lands Community Park. The environmental data collected for this current (2007) health consultation at the community park did not indicate that levels of lead, arsenic, PCBs, etc., have increased as a result of the transportation of contaminants from redevelopment activities, flooding events, and fugitive dust migration at the American Street Tannery Site.

Public Health Actions Planned

1. ATSDR and PADOH will make this health consultation available to the area residents near the American Street Tannery Site, and give the public the opportunity to comment and raise their concerns regarding this health consultation document.

2. PADOH will review and evaluate potential future environmental data requested at this site.

3. PADOH will develop and distribute a site-specific fact sheet to area residents that outlines the findings and recommendations

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Certification

This health consultation for the American Street Tannery Site was prepared by the PADOH under a cooperative agreement with the ATSDR. It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated. Editorial review was completed by the cooperative agreement partner.

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The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

Alan W. Yarbrough, MS

Team Leader, CAT, CAPEB, DHAC, ATSDR

Appendix A

Tables

Table 1a. American Street Tannery Site surface soil sample results – Inorganics (Metals) [All values in ppm]					
CHEMICAL	MIN	MAX	MEAN	CV(s)	Comparison Value Source – Exposure Duration
ALUMINUM	3650	9330	6689.2	50,000	Child EMEG - chronic
ANTIMONY					Child RMEG - Int.
ARSENIC	3	16.5	7.8583	20/0.5	Child EMEG/CREG - chronic
BARIUM	61.9	242	117.58	10,000	Child RMEG – Int.
BERYLLIUM	0.35	1.2	0.5042	100	Child EMEG – Int.
CADMIUM	0.38	5.1	1.0758	10	Child EMEG – Int.
CALCIUM	5880	44800	18282	N/A	N/A
CHROMIUM					Child RMEG – Int.
COBALT	3.9	9.8	6.575	500	Child EMEG – Int.
COPPER	31	255	112.01	500	Child EMEG - Int.
IRON	11500	39600	18800	N/A	N/A
LEAD	62.3	1320	369.44	400	EPA screening level
MAGNESIUM	1800	4630	3410.8	N/A	N/A
MANGANESE	194	321	244.67	3,000	Child RMEG – Int.
MERCURY	0.19	2.3	0.8642	N/A	N/A
NICKEL	8.7	15	12.092	1,000	Child RMEG – Int.
POTASSIUM	762	1200	939.92	N/A	N/A
SELENIUM	0.86	4.2	2.6383	300	Child EMEG – chronic
SILVER	0.35	2.4	1.215	300	Child RMEG – Int.
SODIUM	87.3	431	162.44	N/A	N/A
THALLIUM	0.61	6.1	3.0275	N/A	N/A
VANADIUM	16.5	41.7	23.567	200	Child EMEG – Int.
ZINC	62.6	2440	495.4	20,000	Child EMEG – chronic
CYANIDE	2.9	6.1	3.4417	1,000	Child RMEG – Int.
				=exceeds comparison value	

Table Key on Page 25

Table 1b. Liberty Lands Community Park surface soil sample results surface soil sample results – Inorganics [All values in parts per million (ppm)]					
CHEMICAL	MIN	MAX	MEAN	Comparison Value(s)	Comparison Value Source – Exposure Duration
ALUMINUM	4580	13200	8495	50,000	Child EMEG - chronic
ANTIMONY	7.1	18.4	10.725	20	Child RMEG - Intermediate
ARSENIC					Child EMEG/CREG - chronic
BARIUM	84.2	235	172.55	10,000	Child RMEG – Intermediate
BERYLLIUM	0.49	1.5	0.795	100	Child EMEG – Intermediate
CADMIUM					Child EMEG – Intermediate
CALCIUM	5730	16900	11483	N/A	N/A
CHROMIUM	21.9	73.7	54.125	200	Child RMEG – Intermediate
COBALT					Child EMEG – Intermediate
COPPER	38.1	162	103.35	500	Child EMEG - Intermediate
IRON	11900	26600	19975	N/A	N/A
LEAD					EPA screening level
MAGNESIUM	2130	6410	3807.5	N/A	N/A
MANGANESE	312	845	549.25	3,000	Child RMEG – Intermediate
MERCURY					N/A
NICKEL	7.6	24.6	15.6	1,000	Child RMEG – Intermediate
POTASSIUM	945	3600	1758.5	N/A	N/A
SELENIUM					Child EMEG – chronic
SILVER	1	7.5	5.3	300	Child RMEG – Intermediate
SODIUM	59.7	114	80.65	N/A	N/A
THALLIUM					N/A
VANADIUM	20.4	55.6	41.15	200	Child EMEG – Intermediate
ZINC	120	423	305.5	20,000	Child EMEG – Intermediate
CYANIDE					Child RMEG – Intermediate
				=exceeds comparison value	

Table Key on Page 25

Table 2. Semi-Volatile Organic Compound (SVOC) levels in Surface Soil (ug/kg or ppb).

American Street Tannery Site						Liberty Lands Community Park		
CHEMICAL	MIN	MAX	MEAN	Comparison Value (CV)	Source	MIN	MAX	MEAN
Benzaldehyde	34	130	60	N/A	N/A	64	83	70
Phenol	22	360	165	N/A	N/A	39	370	227.25
Bis(2-chloroethyl)ether	190	380	233	N/A	N/A	200	370	267.5
2-Chlorophenol	190	380	233	N/A	N/A	200	370	267.5
2-Methylphenol	16	380	217	N/A	N/A	14	370	221
2,2'-Oxybis(1-chloropropane)	190	380	233	N/A	N/A	200	370	267.5
Acetophenone	13	36	20	N/A	N/A	21	33	26.75
4-Methylphenol	14	380	156	N/A	N/A	14	370	115.25
N-Nitroso-di-n-propylamine	190	380	233	N/A	N/A	200	370	267.5
Hexachloroethane	190	380	233	N/A	N/A	200	370	267.5
Nitrobenzene	190	380	233	N/A	N/A	200	370	267.5
Isophorone	190	380	233	N/A	N/A	200	370	267.5
2-Nitrophenol	190	380	233	N/A	N/A	200	370	267.5
2,4-Dimethylphenol	8.1	380	202	N/A	N/A	200	370	267.5
Bis(2-chloroethoxy)methane	190	380	233	N/A	N/A	200	370	267.5
2,4-Dichlorophenol	190	380	233	N/A	N/A	200	370	267.5
Naphthalene	32	1300	298	1,000,000	EMEG	48	570	251.75
4-Chloroaniline	190	380	233	N/A	N/A	200	370	267.5
Hexachlorobutadiene	190	380	233	N/A	N/A	200	370	267.5
Caprolactam	190	380	233	N/A	N/A	200	370	267.5
4-Chloro-3-methylphenol	190	380	233	N/A	N/A	200	370	267.5
2-Methylnaphthalene	19	520	181	200,000	RMEG	24	270	125.75
Hexachlorocyclopentadiene	190	380	233	N/A	N/A	200	370	267.5
2,4,6-Trichlorophenol	190	380	233	N/A	N/A	200	370	267.5
2,4,5-Trichlorophenol	190	380	233	N/A	N/A	200	370	267.5
1,1'-Biphenyl	9	380	97	N/A	N/A	43	370	189
2-Chloronaphthalene	190	380	233	N/A	N/A	200	370	267.5
2-Nitroaniline	380	730	450	N/A	N/A	400	730	525
Dimethylphthalate	17	380	189	N/A	N/A	200	370	267.5
2,6-Dinitrotoluene	190	380	233	N/A	N/A	200	370	267.5
Acenaphthylene	20	410	126	N/A	N/A	85	240	131.5
3-Nitroaniline	380	730	450	N/A	N/A	400	730	525
Acenaphthene	50	1300	522	4,700	RBC	67	660	302.75
2,4-Dinitrophenol	380	730	450	N/A	N/A	400	730	525
4-Nitrophenol	380	730	450	N/A	N/A	400	730	525
Dibenzofuran	29	1100	386	N/A	N/A	37	410	193.75
2,4-Dinitrotoluene	190	380	233	N/A	N/A	200	370	267.5
Diethylphthalate	190	380	233	N/A	N/A	19	370	214.75
Fluorene	56	2000	628	N/A	N/A	62	580	298
4-Chlorophenyl-phenylether	190	380	233	N/A	N/A	200	370	267.5
4-Nitroaniline	380	730	450	N/A	N/A	400	730	525
4,6-Dinitro-2-methylphenol	380	730	450	N/A	N/A	400	730	525
N-Nitrosodiphenylamine	190	380	233	N/A	N/A	200	370	267.5
1,2,4,5-Tetrachlorobenzene	190	380	233	N/A	N/A	200	370	267.5
4-Bromophenyl-phenylether	190	380	233	N/A	N/A	200	370	267.5
Hexachlorobenzene	190	380	233	N/A	N/A	200	370	267.5
Atrazine	190	380	233	N/A	N/A	200	370	267.5
Pentachlorophenol	380	730	450	N/A	N/A	400	730	525
Phenanthrene	790	17000	6133	N/A	N/A	890	7400	3422.5
Anthracene	170	3800	1253	N/A	N/A	250	1900	917.5
Carbazole	74	1700	487	N/A	N/A	110	760	402.5
Di-n-butylphthalate	14	220	132	N/A	N/A	18	370	174.5
Fluoranthene	1300	20000	7225	800,000	EMEG	2100	11000	5650

Table 2 – continued.

American Street Tannery Site (continued)						Liberty Lands Community Park (cont.)		
CHEMICAL	MIN	MAX	MEAN	CV	Source	MIN	MAX	MEAN
Benzo(b)fluoranthene	790	9600	3618	220	RBC	2600	6800	4450
Benzo(k)fluoranthene	230	2700	1203	2,200	RBC	630	2200	1115
Benzo(a)pyrene	350	6800	2029	100	CREG	1400	4800	2900
Indeno(1,2,3-cd)pyrene	390	4200	1415	220	RBC	1400	2900	2050
Dibenzo(a,h)anthracene	110	1100	446	22	RBC	330	700	492.5
Benzo(g,h,i)perylene	180	1000	360	N/A	N/A	270	1400	827.5
2,3,4,6-Tetrachlorophenol	190	380	233	N/A	N/A	200	370	268
Butylbenzylphthalate	23	220	137	N/A	N/A	200	370	267.5
3,3'-Dichlorobenzidine	190	380	233	N/A	N/A	200	370	267.5
Benzo(a)anthracene	680	8800	3615	220	RBC	1500	6100	3400
Chrysene	590	7600	2958	N/A	N/A	1900	5100	3125
Bis(2-ethylhexyl)phthalate	65	1400	367	N/A	N/A	330	650	495
Di-n-octylphthalate	190	380	233	N/A	N/A	200	370	267.5

Table 3. PCB Levels in Surface Soil (ug/kg or ppb)

American Street Tannery Site						Liberty Lands Community Park		
								MEAN
Aroclor-1016	38	73	45	4,000	RMEG	40	73	53
Aroclor-1221	38	73	45	N/A	N/A	40	73	53
Aroclor-1232	38	73	45	N/A	N/A	40	73	53
Aroclor-1242	38	73	45	N/A	N/A	40	73	53
Aroclor-1248	38	73	45	N/A	N/A	40	73	53
Aroclor-1254	39	160	80	1,000	EMEG	40	73	53
Aroclor-1260	38	120	56	N/A	N/A	71	410	258
Aroclor-1262	38	73	45	N/A	N/A	40	73	53
Aroclor-1268	38	73	45	N/A	N/A	40	73	53

Table Key on Page 25

Table 4. Pesticide Levels in Surface Soil (ug/kg or ppb)

American Street Tannery Site						Liberty Lands Community Park		
Chemical Name	MIN	MAX	MEAN	CV	Source	MIN	MAX	MEAN
alpha-BHC								1.294
beta-BHC	0.041	3.6	1.5198	N/A	N/A	0.45	3.7	2.1125
delta-BHC	0.44	3.8	2.195	N/A	N/A	1.5	4.1	3.15
gamma-BHC (Lindane)	0.32	3.8	2.0375	N/A	N/A	2	3.7	2.675
Heptachlor	0.078	2.6	0.7882	200	CREG	0.31	1.3	0.785
Aldrin	1.9	3.8	2.325	40	CREG	2	3.7	2.675
Heptachlor epoxide	0.17	2.1	0.9475	80	CREG	1.1	5.9	3.65
Endosulfan I	1.9	3.8	2.325	100,000	EMEG	2	3.7	2.675
Dieldrin	1.3	9.2	4.05	40	CREG	6.4	35	22.35
4,4'-DDE	0.75	26	9.2192	2,000	CREG	4.1	38	15.55
Endrin	1.8	16	6.3333	20,000	EMEG	5	9.1	6.725
Endosulfan II	0.71	2.7	1.3892	100,000	EMEG	1	2.6	1.7
4,4'-DDD	3.7	7.3	4.8417	3,000	CREG	0.17	55	15.893
Endosulfan sulfate	3.8	7.3	4.5	N/A	N/A	1.2	7.3	4.875
4,4'-DDT	6.3	190	52.2	2,000	CREG	17	31	24.5
Methoxychlor	1.3	210	27.883	300,000	EMEG	2.4	11	8.05
Endrin ketone	3.5	14	7.175	N/A	N/A	7.3	29	17.075
Endrin aldehyde	0.7	14	5.3133	N/A	N/A	2.9	5.5	4.2
alpha-Chlordane	0.44	4.6	1.8133	2,000	CREG	2.6	11	5.6
gamma-Chlordane	0.41	5.7	2.69	2,000	CREG	2	9.4	5.25
Toxaphene	190	380	232.5	600	CREG	200	370	267.5

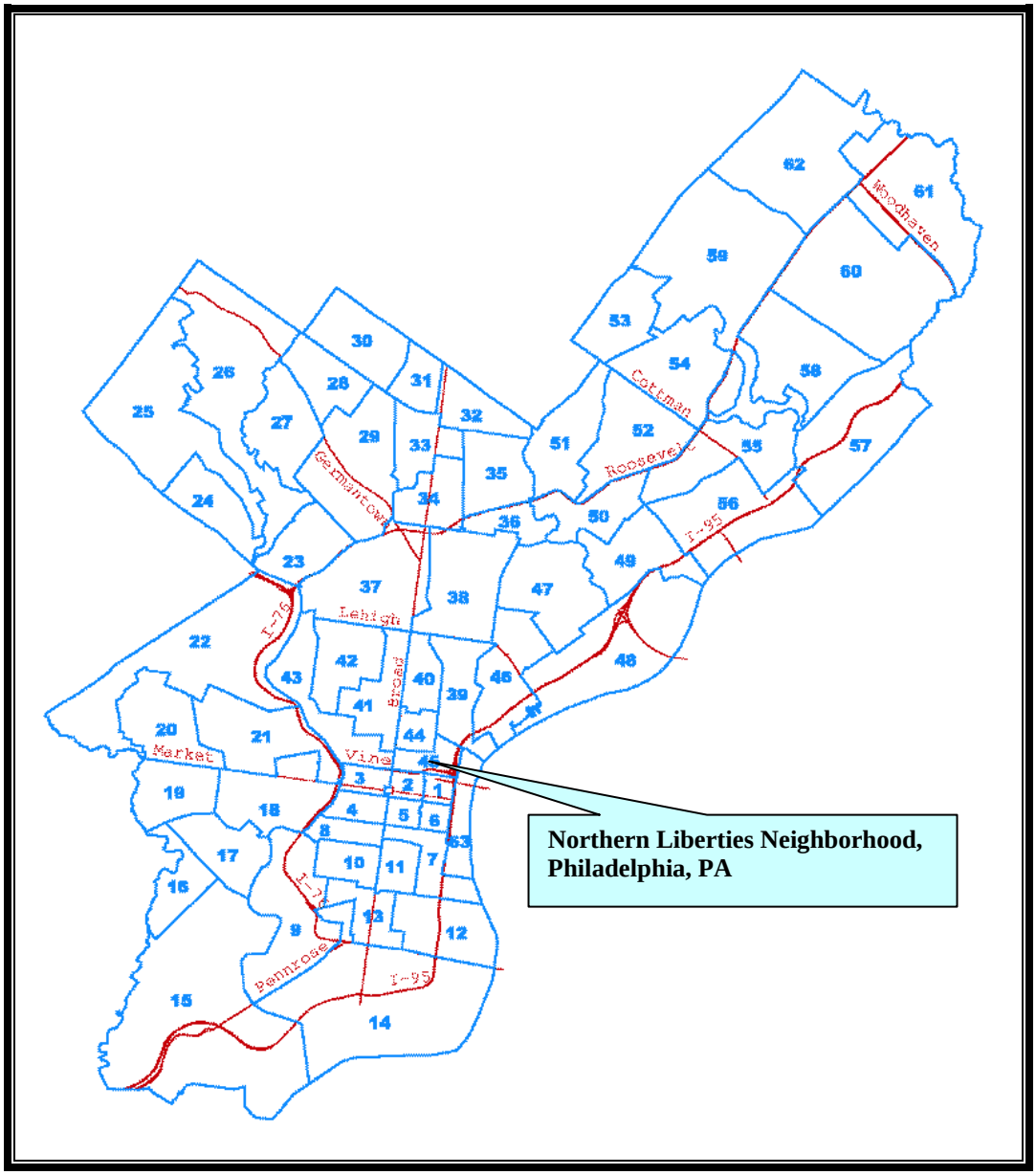
Table Key:

ppm = parts per million
ug/kg = microgram per kilogram = parts per billion = **ppb**
CV = Comparison Value
MIN = minimum detection
MAX = maximum detection
MEAN = average or mean (arithmetic) detection
CREG = Cancer Risk Evaluation Guide (ATSDR)
EMEG = Environmental Media Evaluation Guide (ATSDR)
RMEG = Reference Dose Media Evaluation Guide (USEPA)
RBC = Risk Based Concentration Table (USEPA Region 3)
N/A = Not available

Appendix B

Figures

Figure 1. American Street Tannery Site Location Map, Philadelphia County, PA



*Map from Philadelphia City Planning Commission

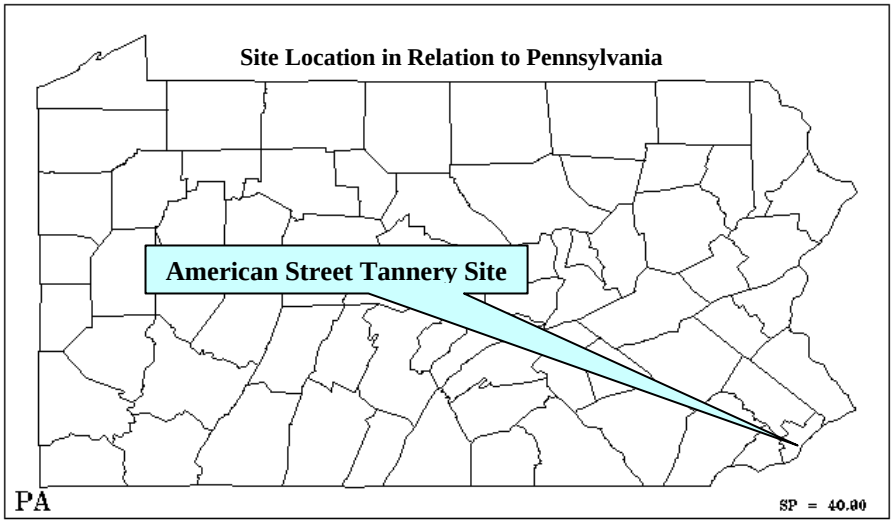
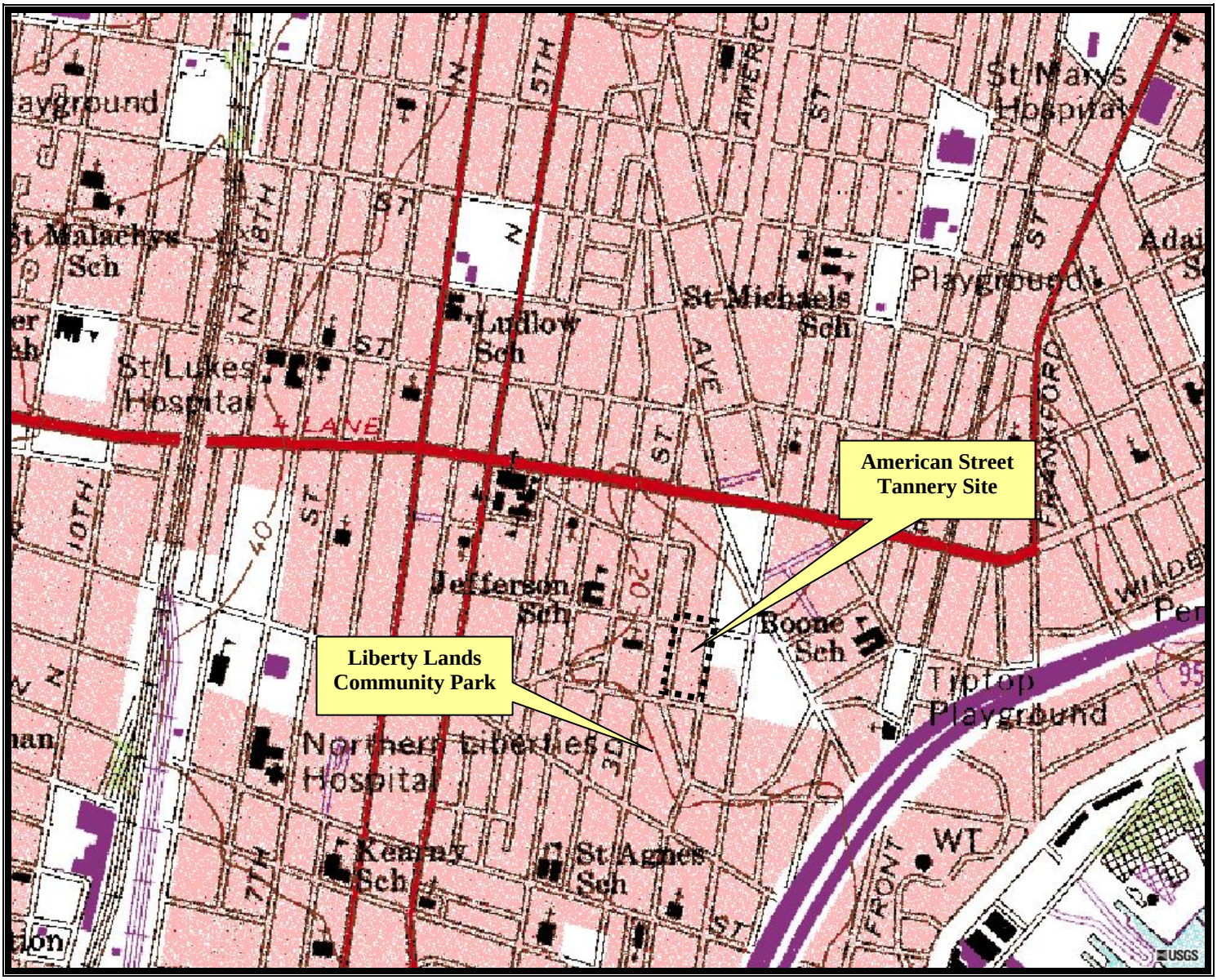
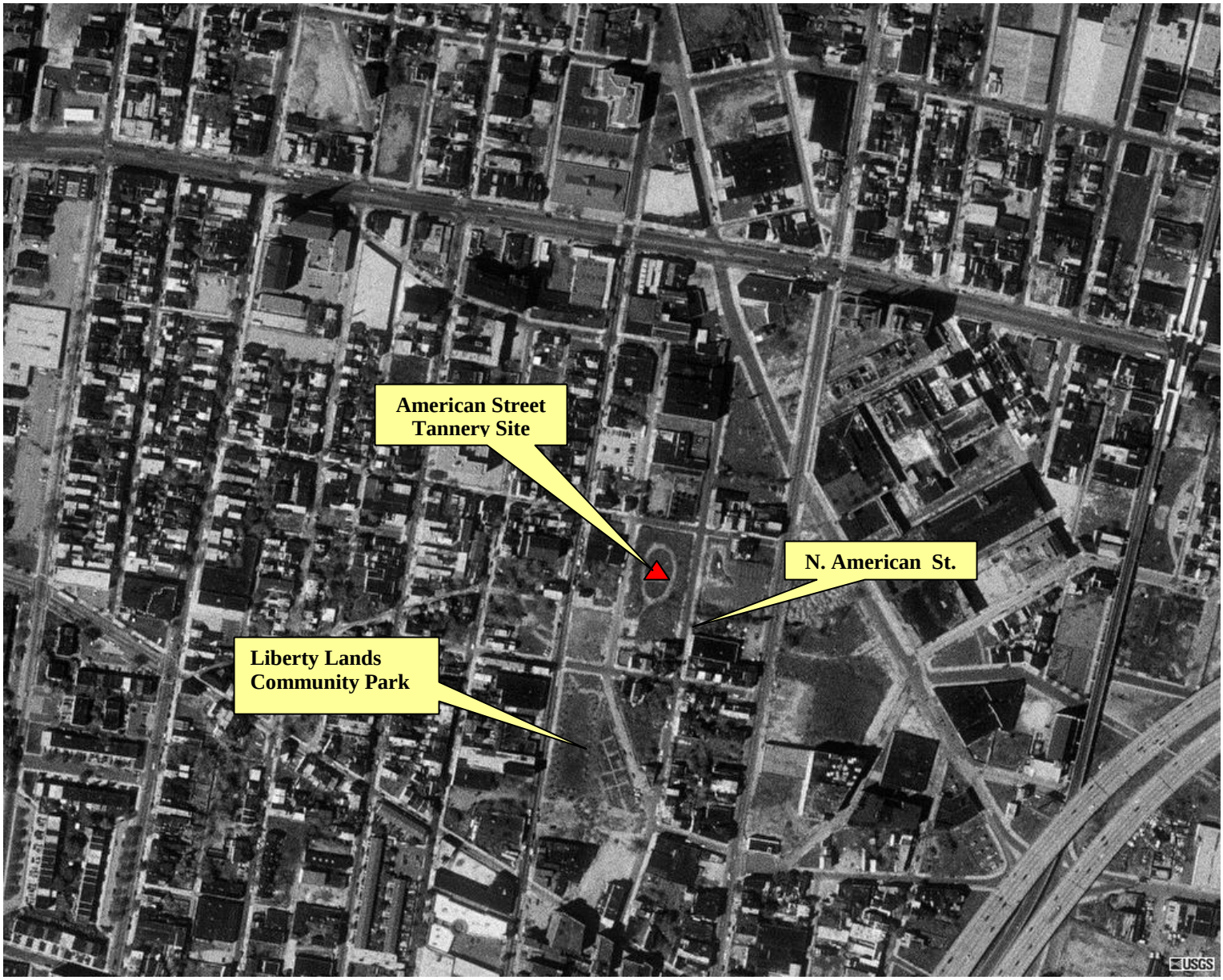


Figure 2. Topographic Map – American Street Tannery Site, Northern Liberties, Philadelphia, PA



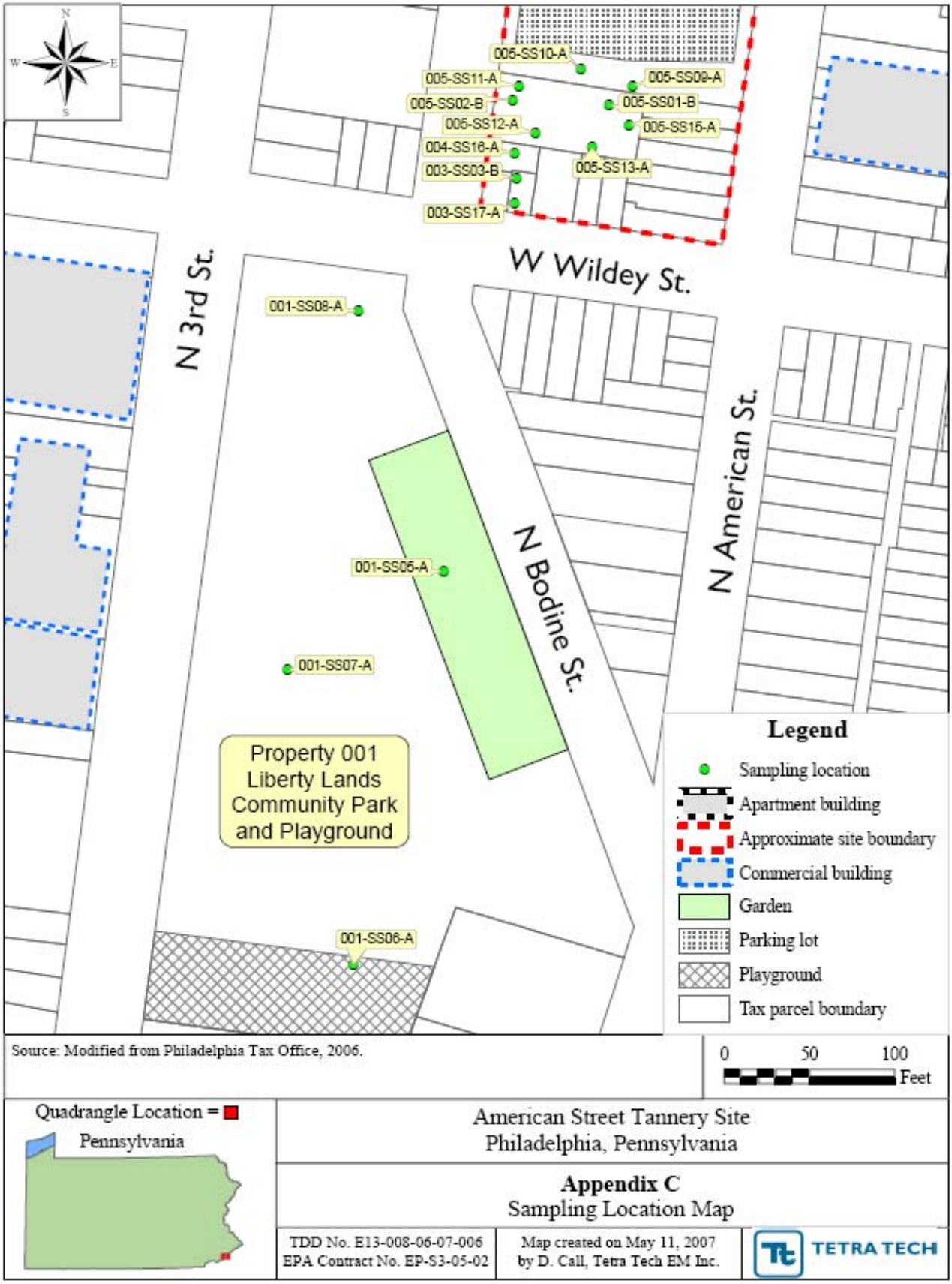
*Topographic Map Courtesy of USGS (July 1998)

Figure 3. Aerial Photograph of the American Street Tannery Site, City of Philadelphia, PA



*Aerial Photograph Courtesy of USGS (April 1999)

Figure 4. American Street Tannery Site Surface Soil Sample Location Map (Tetra Tech EM Inc. 2007)



Appendix C

ATSDR Public Health Hazard Categories

ATSDR Public Health Hazard Categories

Depending on the specific properties of the contaminant, the exposure situations, and the health status of individuals, a public health hazard may occur. Using data from public health assesments, sites are classified using one of the following public health hazard categories:

Category 1: Urgent Public Health Hazard
Sites that pose a serious risk to the public's health as the result of short-term exposures to hazardous substances.

Category 2: Public Health Hazard
Sites that pose a public health hazard as the result of long-term exposures to hazardous substances.

Category 3: Indeterminate Public Health Hazard
Sites for which no conclusions about public health hazard can be made because data are lacking.

Category 4: No Apparent Public Health Hazard
Sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard.

Category 5: No Public Health Hazard
Sites for which data indicate no current or past exposure or no potential for exposure and therefore no health hazard.

Appendix D

Public Comments and Questions

Public Health Related Comments and Questions

Comment 1: How do ATSDR and PADOH get involved in sites?

Response: ATSDR responds to requests from citizens, local governments, other state agencies or the US Environmental Protection Agency. ATSDR and PADOH work with stakeholders to ensure that investigations and cleanups consider and address public health concerns. ATSDR and PADOH can provide recommendations about the redevelopment of contaminated land that includes residential buildings, parks, childcare centers, and schools to ensure that sensitive populations are protected. When Brownfield Sites are in or near residential communities, the ATSDR and PADOH can provide technical assistance to determine if the potential for exposure to contaminated media is occurring at levels that could harm human health. ATSDR and PADOH also provide communities and health care professionals with education about contaminants and exposures.

Comment 2: The vacant lot contained a three-story pile of dirt for a period of more than three years, and dust blew off it into the surrounding neighborhood. ATSDR and PADOH did not look into past exposure.

Response: It is often very difficult or impossible for us to determine past exposure to chemicals associated with a site due to lack of environmental sampling data available at the time of concern. In order to evaluate the potential for a chemical to cause health problems, we need to know the level or amount of the chemical that is present in the environment. If a chemical is present at a level of concern, it must follow a pathway in which it moves through the environment and comes into contact with a person. People are exposed by touching, breathing, or ingesting substances that contain the chemical. Whether the exposure causes disease depends on the dose (how much), the duration (how long you are exposed), the route of exposure (breathing, eating, or through the skin), other chemicals to which you are exposed, and individual characteristics such as age, sex, nutritional status, genetic traits, lifestyle and general health condition. While it is reassuring that the current soil sampling data do not indicate an on-site problem, there is no past air sampling data available in order for us to evaluate past exposure.

ATSDR, PADOH, and EPA have seen pictures of the soil pile at the vacant lot, but the soil is no longer there and, therefore, it cannot be sampled. Instead, EPA sampled the vacant lot on which the soil pile once stood, and neither the soil nor the ground water samples revealed levels of contamination that represent a health threat to members of the community, even in the event that they choose to frequent the lot on a regular basis. The fact that the samples collected in December 2006 and January 2007 did not contain high levels of contamination, suggests that the soil pile may not have been contaminated at elevated levels, as it was previously feared.

It must be noted that no agency or independent scientific researcher can identify contaminant levels that were – or may have been -- present in the past. There may be physical traces of what was, but there is no way to determine how much more there might once have been. Because materials that are long gone cannot be measured, no one can accurately say what risk may have been present in the past. Testing can only be done based on current site conditions, as well as the evaluation of this data for human exposure.

Comment 3: What can we do to determine if our yards or gardens are safe for recreational activities or gardening, especially growing edible produce?

Response: Due to the historical use of lead (especially in paints and gasoline), it is not unusual to find elevated levels of lead in urban soils (often unrelated to Brownfields redevelopment). Outdoor activities such as gardening and playing where soils are contaminated may result in a harmful exposure to lead. Indoor activities can also expose people to lead in dust, especially children. If residents are concerned about high levels of lead in the soils around their homes, they could contact the Philadelphia Childhood Lead Poisoning Prevention Project to discuss lead poisoning prevention and blood lead screening. Depending on residents' activities or land use, they may also be interested in testing their soil, if so they could contact one of the following Soil Testing Laboratories: PA Department of Health, Bureau of Laboratories at 610-280-3464 or the Agricultural Analytical Services Laboratory at the Pennsylvania State University at 814-863-0841. Costs vary (range typically is $14 to $20 per sample).

Other Environmental, Non-health Related Comments and Questions

The community also expressed comments and concerns that would not fall within the scope or purview of PADOH and/or ATSDR, and would be more appropriate for the EPA or an environmental agency to address or answer. ATSDR and PADOH addressed the public health questions and comments received on this document. The following comments and questions, listed below, were also gathered from the community. It is suggested that residents may wish to contact EPA or refer to the site-specific website (http://www.epaosc.net/americanstreettannery) for possible EPA responses to the questions below.

- How does EPA get involved in sites?
- When does a (redevelopment) site reach the level of EPA Review?
- Is there a method to trace where the chemicals came from?
- Can developers be held responsible to cleanup contamination on land they develop?
- Can you test other areas (vacant lots/sites of possible future development) of the city?
- Contaminants in the surface soil were not found at depth. Does that mean they are from another location?
- Are there any other contaminated sites in Northern Liberties?