
HEALTH CONSULTATION

**Ackey's Ballfield Site
Norristown, Montgomery County, Pennsylvania**

September 7, 2005



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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Executive Summary

At the request of the United States Environmental Protection Agency, working under a cooperative agreement with the Agency for Toxic Substances and Disease Registry, the Pennsylvania Department of Health prepared this Health Consultation for the Ackey's Ballfield Site. The Environmental Protection Agency requested that the Pennsylvania Department of Health review the recent Environmental Protection Agency soil sample results from the site and determine whether the site currently poses a public health hazard. Arsenic was detected on-site and the levels were evaluated by the Agency for Toxic Substances and Disease Registry and the Pennsylvania Department of Health regarding exposure pathways and health concerns.

The site is a ballfield and playground, possibly located near the periphery of old municipal dumps and junkyards. According to the Environmental Protection Agency, a possible dumping area active in 1945, was located southeast of Forrest Avenue. This is now a residential area. In addition, historic aerial maps dated 1942 to 1950 show junkyards within a block of Ackey's Ballfield to the southeast and southwest. During a site visit it was also noted that a recycling and container business is in operation within one block of Ackey's field to the east. This coincides with one of the junkyards on the 1940's maps. Previous dumping is a possible source of the arsenic, but arsenic may also be released from a number of man-made sources including treated lumber, pesticides and herbicides, and industrial products. It occurs naturally at levels that depend on the location within the United States.

In March 2005, Pennsylvania Department of Health staff visited Ackey's Ballfield to view the sampling locations. The highest sample results were found to occur along the southeastern side of the ballfield. At that time it was noted that fencing containing treated lumber existed on two sides of the ballfield. Additionally, the Pennsylvania Department of Health staff observed that there was a large amount of dog feces, most likely accumulated over the winter and thawed out with the snow, along the southern edge of the ballfield and at least 25 feet into the ballfield. The Agency for Toxic Substances and Disease Registry and the Pennsylvania Department of Health conclude that there is currently *no public health hazard* related to the detection of arsenic, though the accumulation of dog feces at the site could become a health problem for children. The Pennsylvania Department of Health contacted the Borough of Norristown about the dog feces and recommended cleanup of the ballfield.

Background and Statement of Issues

Introduction

The Pennsylvania Department of Health (PADOH), working under cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), was requested by the U.S. Environmental Protection Agency (EPA) to review sampling data taken from the Ackey's Ballfield in Norristown, Pennsylvania. Ackey's Ballfield is a baseball diamond and public playground located in the 1300 Block of West James Street in Norristown, PA (see Figures 1 and 2). This ballfield is close to the intersection of Forrest Avenue and West James Street. In February 2004, ATSDR published the *Western Norristown Study Site Health Consultation* that was completed for a residential area about one block southwest of Ackey's Ballfield as shown in Figure 3 [1]. The *Western Norristown Study Site* was south of Beech Street (Beech Street is one block southwest of West James Street) and southeast of Forrest Avenue. In the process of completing the sampling for this site, two (2) background samples were taken from Ackey's Ballfield for comparison to the samples taken at the *Western Norristown Study Site*. Arsenic levels higher than the expected range were found in the background samples from Ackey's Ballfield. This resulted in some concern that there might be contamination from the old dumping area in and around this area. This health consultation is part of a follow up investigation of these elevated arsenic results.

Site Layout and Description

The geographic area of concern focuses on the ballfield and playground between West James and Stergiere Streets as shown in Figure 3. There are numerous residential properties in this area of the Borough of Norristown and in the adjacent city blocks surrounding the site. Ackey's Ballfield is 2-3 acres in size and is adjacent to, but separated by metal and wood fences from residential areas on both sides of the ballfield. According to EPA, historical aerial photographs and anecdotal information show that a municipal dump might have existed southwest of this general area of Western Norristown. Another map, dated from 1942 to 1950, shows junkyards to the southeast, adjacent to Ackey's Ballfield and to the southwest as shown in Figure 4.

Site Contamination and Environmental Sampling History

EPA was not aware of contamination of this area of Western Norristown prior to September 2002. During the investigation at the Western Norristown Site in 2003 described above, an EPA contractor collected and analyzed two surface soil samples (0-3 inches deep) from Ackey's Ballfield as background samples. These original samples contained elevated levels of arsenic. The samples were taken approximately 50 feet apart and near some 40 to 50 year old trees on the southeastern edge of the ballfield. In August 2004, an EPA contractor collected and analyzed twenty (20) follow-up surface (0 to 3 inch depth) and nine (9) follow-up sub-surface (18 to 24 inch depth) soil samples at locations at Ackey's Ballfield as shown in Figure 5.

Site Visits

On August 17, 2004, ATSDR staff visited the Ackey's Ballfield Site with staff from the Montgomery County Health Department and EPA staff to view the sampling and the sample locations. EPA Contractors completed sampling on the ballfield and playground on that day (see Figure 5) [2].

On March 29, 2005, two PADOH staff persons visited the Ackey's Ballfield Site to view the sampling locations. The surface soil samples with results above 20 parts per million (ppm - also referred to as milligrams per kilogram or mg/kg) had been taken along the southeastern edge of the ballfield. Fencing containing treated lumber was located on the northwestern and southeastern edges of the ballfield. During the site visit it was also noted that a recycling and container business is in operation within one block of Ackey's field to the east. This operation coincides with one of the junkyard on the 1940's maps (see Figure 3). Additionally, PADOH staff noted that the southern end of the ballfield contained a large amount of dog feces continuous along the edge of the ballfield and at least 25 feet into the ballfield (especially along the sidewalk at James Street). It was difficult to walk through this area without accumulating droppings on shoes.

Demographics

Ackey's Ballfield Site is located close to the junction of the western end of the Borough of Norristown and West Norriton Township, but just within the Borough of Norristown, Pennsylvania. According to year 2000 census records, the Borough of Norristown had a total population of 31,282 persons. About 49 percent of the population is male and 51 percent is female. Twenty-five percent of the population is children under 18 years and about 7 percent is under the age of 5. About twenty-three percent of the population is 65 years or over; the median age is 45 years. The percentage of owner-occupied housing is about 48 percent, and renter-occupied housing is about 51 percent [3].

Discussion

The contaminant of potential concern at Ackey's Ballfield was arsenic. Arsenic may be released from a number of man-made sources. Man-made sources include pressure treated lumber, pesticide/herbicide uses, combustion by-products from burning fossil fuels, animal feeds/waste byproducts especially chicken feed and manure, historic wood preserving sites, industrial products, medicinal uses, fertilizer use, landfill leachate, glass production, old graves and tanneries. It also occurs naturally. In general, the concentrations of arsenic in soil vary widely across the United States, usually ranging from about 1 mg/kg to 40 mg/kg, with an average value of about 5 mg/kg. Background levels occurring naturally depend on the geology of the local area. There are two forms of arsenic in the environment, organic and inorganic. Inorganic arsenic is generally more toxic than organic arsenic. The standard environmental analytical methods for arsenic do

not distinguish the specific form of arsenic [6]. Because of the constraints of analytical methods and to ensure a conservative or protective public health assessment, PADOH assumed that the arsenic detected at this site was the inorganic form of arsenic.

Pathway Analysis

PADOH evaluated the environmental and human components (or exposure pathways) that *could* lead to human exposure and a public health hazard. Exposure pathways are descriptions of the ways that a chemical moves from its source (where it began) to where and how people can come into contact with (or become exposed to) the chemical. For a chemical-specific adverse health effect to occur, ATSDR recognizes that five components of a completed exposure pathway must first occur: a source of the contaminant; the fate and transport of the contaminant into a media (water, soil, air, or food); an exposure point (drinking water, soil contact, air, or other); an exposure route (ingestion, dermal contact, inhalation); and a receptor population.

Assumptions

For this health consultation it is assumed that a child, one to eleven years in age, might have been exposed to the soil contaminants through playing at this site (older children might also play on this ballfield but this age child is chosen as the most conservative scenario). The child is assumed to play 5 days a week for 12 weeks during summer months and assumed to also have been playing about an additional 24 hours per week for the rest of the school year or 40 weeks. This assumption results in a total of 100 days per year of exposure. The soil ingestion rate (residential) for children is 200 milligrams of soil per day (mg/day) and the soil ingestion rate for adults is 100 mg/day. Studies show that people ingest certain amounts of soil particles during all kinds of outdoor activities (and indoor depending on how much soil is tracked into the home and the ages of the occupants, especially children). Children are more likely to ingest larger amounts of soil than adults due the fact that they are more likely to be in contact with soil during play and due to greater hand to mouth activities (See the *Child Health Considerations* section in this document).

The “worst-case” assumption involves a child exposed to the highest detected levels of arsenic. PADOH also evaluated the theoretical cancer risk associated with a lifetime exposure (i.e., 70 years), but adjusted this risk assuming that a person might spend a maximum of 30 years regularly visiting this site. It is not expected that adults would spend as much time as the children playing on this site.

Toxicological Evaluation of the Sampling Data

ATSDR has developed health-based comparison values (CVs) that are chemical-specific concentrations, which help to determine which environmental contaminants are of possible health concern and need further evaluation. If a chemical concentration is found in the environment at levels below the CV, it is not likely to cause an adverse health

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effect, though a chemical that exceeds the CV does not necessarily produce adverse health effects. If a contaminant exceeds its corresponding CV, PADOH examines the toxicology-based values for the contaminant. The maximum level of arsenic detected exceeded this CV. ATSDR and PADOH used Minimum Risk Levels (MRLs) to determine whether the exposures are a public health hazard. ATSDR has developed a chronic oral MRL of 0.0003 milligrams of arsenic per kilograms of a person's body weight per day (mg/kg/day) [5,6].

Arsenic is not readily absorbed through the skin [7]. Arsenic may be transferred to air attached to soil particles and breathed in. Most of the arsenic is then taken up from the lungs into the body [7]. Oral exposures were used in the evaluation for this HC since levels at this site are relatively low and because the ingestion rate of 200 mg/kg (oral) is based on actual data taken from children playing in soil [8].

ATSDR and PADOH reviewed EPA's Ackey's Ballfield sampling data. If a child (about 30 kg for the "worst-case" scenario) was exposed to arsenic, as described, at the maximum soil concentration ("worst-case" scenario), then the estimated exposure dose would be 0.00019 mg/kg/day. This is about 1.5 times lower than ATSDR's chronic oral MRL (for non-cancerous health effects). The maximum level found is most likely an outlier result and not representative of the levels found at Ackey's ballfield. It is extremely unlikely that a person would continuously be exposed at this level. The highest sample result was from a sample taken at the southeastern edge of the ballfield near fencing material. The mean and median of samples were also evaluated for a child's dose and were both about 12 times lower than ATSDR's chronic oral MRL. Therefore, PADOH concludes exposure to arsenic for the scenario described above is not likely to cause any non-cancerous adverse health effects either for children or adults even at the highest levels found.

EPA classifies arsenic as a known human carcinogen. In order to evaluate the possible cancer risk associated with ingestion of arsenic contaminated soil, the theoretical cancer risk or cancer slope factor (CSF) was determined using EPA's CSF of $1.5 \text{ (mg/kg/day)}^{-1}$ for arsenic. PADOH evaluated this risk associated with a maximum exposure of 30 years for an adult, to the maximum, mean (0.000013 mg/kg/day), and median (0.000009 mg/kg/day) arsenic levels found at this site, even though it is unlikely that a person would be in contact with the highest level of arsenic contaminated soil over an entire 30 year period. The median and mean values for the samples at this site - calculated using very conservative assumptions about the frequency and duration of the site - might result in an increase of 1 to 2 lifetime cancers per 10,000 persons. PADOH concluded that the current levels of arsenic do not pose a significant health threat to the people visiting the site and pose a low increased cancer risk to a no apparent increased cancer risk.

Community Health Concerns

During the public availability meeting that was held for the Western Norristown Study site, some community members expressed concern about the “high” background sample found at Ackey’s ballfield and asked that ATSDR and PADOH, the Montgomery County Health Department (MCHD), and EPA review the data and address this issue.

Health Outcome Data

It was determined that there was no public health hazard related to the detection of arsenic, so no further investigation is warranted.

Child Health Considerations

ATSDR and PADOH recognize that children are especially sensitive when exposed to many contaminants. This sensitivity may be a result of the following factors: (1) children are more likely to be exposed to certain media (e.g., soil, sediment, air, surface water) because they play outdoors and have more of a tendency to put their fingers and objects in their mouths than adults; (2) children are shorter than adults, which means they can breath dust, soil, and vapors close to the ground; and (3) children are smaller, therefore childhood exposure results in higher doses of chemicals per body weight than adults. ATSDR and PADOH evaluated the likelihood that children living near and playing on the site might have been or might be exposed to contaminants at levels of health concern in the soil. Since arsenic is a known human carcinogen, exposure to it should be eliminated or reduced to the lowest level possible. For example, allowing children to continuously play in soil in areas around treated lumber might not be a good practice.

Additional Health Considerations

Additionally, PADOH took a comprehensive approach and considered the exposure of children to the dog feces, which could potentially contain contagious parasites (hookworms, roundworms, whipworms, and tapeworms). If canine parasites, eggs, and larvae such as these are allowed to accumulate in the soil, they could be transmitted to children playing in and walking barefoot on the soil in this area [9]. Pet owners should be reminded to cleanup after their animals and the dog feces at the site should be cleaned up.

Conclusions

ATSDR and PADOH conclude that there is currently no public health hazard related to the detection of arsenic on Ackey's Ballfield.

Recommendations

PADOH and ATSDR conclude that there is currently no public health hazard related to the detection of arsenic at this site, so there are no recommendations.

Public Health Action Plan

Completed Actions

1. Data and information obtained from EPA has been evaluated by the ATSDR and PADOH to determine the public health implications of human exposure pathways at the site.
2. PADOH notified the MCHD and the Borough of Norristown's Administrative Office and Parks and Recreation Office that there was a large amount of dog droppings on Ackey's Ballfield. The situation of dog feces needing to be cleaned-up at the park and the potential health problem for children was discussed with the Borough of Norristown.

Ongoing or Planned Actions

PADOH and ATSDR will make this HC available to the MCHD, Borough of Norristown, and the public. No other actions are planned.

References

1. Agency of Toxic Substance and Disease Registry (ATSDR). 2002. *Western Norristown Public Health Assessment*, published June 5, 2002. Available from the Pennsylvania Department of Health, P.O. Box 90, Harrisburg, PA 17108 or from ATSDR, 1650 Arch Street (3HS00), Philadelphia, PA 19103 or call ATSDR at (215) 814-3140.
2. The U.S. Environmental Protection Agency sampling data for Ackey's Ballfield – March 2003 and August 2004.
3. The 2000 Census, demographics of Borough of Norristown is available at: http://pasdc.hbg.psu.edu/pasdc/census_2000/Data/SF3/DP1-DP4/1604254656.pdf, last accessed 2005 May.
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6. Agency for Toxic Substance and Disease Registry (ATSDR). Soil/Water/Air Comparison Values and Health Guideline Comparison Values, version 03/31/2005.
7. Agency for Toxic Substances and Disease Registry. Public health statement for arsenic. Available at: <http://www.atsdr.cdc.gov/toxprofiles/phs2.html>, last accessed 2005 May. This is also available by writing to ATSDR, Division of Toxicology, 1600 Clifton Road NE, Mailstop E-29, Atlanta, GA 30333 or by calling ATSDR toll-free at (888) 422-8737.
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9. Chin, James (ed.). *Control of Communicable Diseases Manual, 17th Edition*. Washington, DC: An official report of the American Public Health Association, 2000.

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Certification

This health consultation for the Ackey's Ballfield 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.

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Appendix - Figures

Ackey's Ballfield Site, Norristown, Pennsylvania
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Figure 1. Ackey's Ballfield Site Location Map in Pennsylvania



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Figure 2 – Ackey's Ballfield Site Location Map in Western Norristown, Pennsylvania

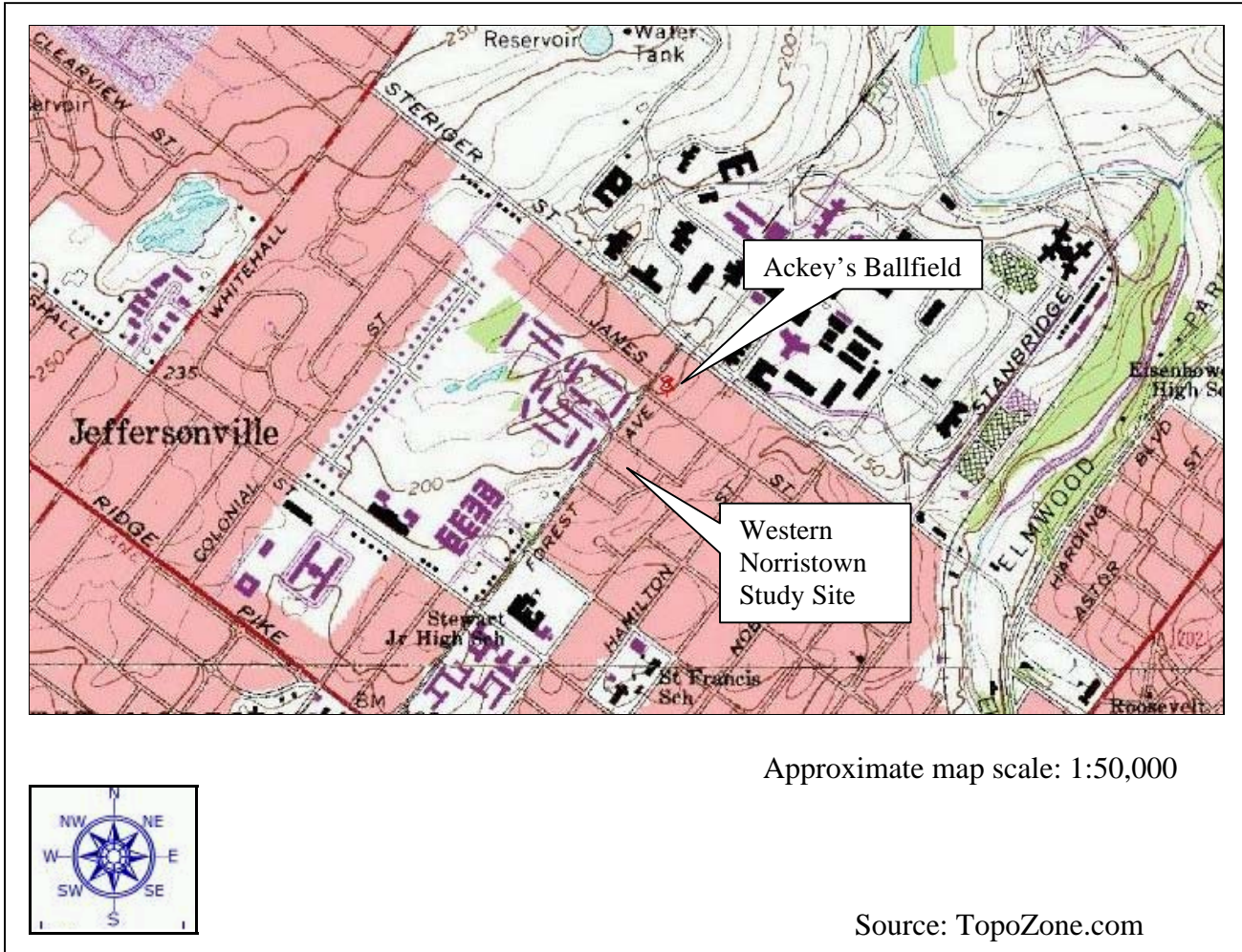
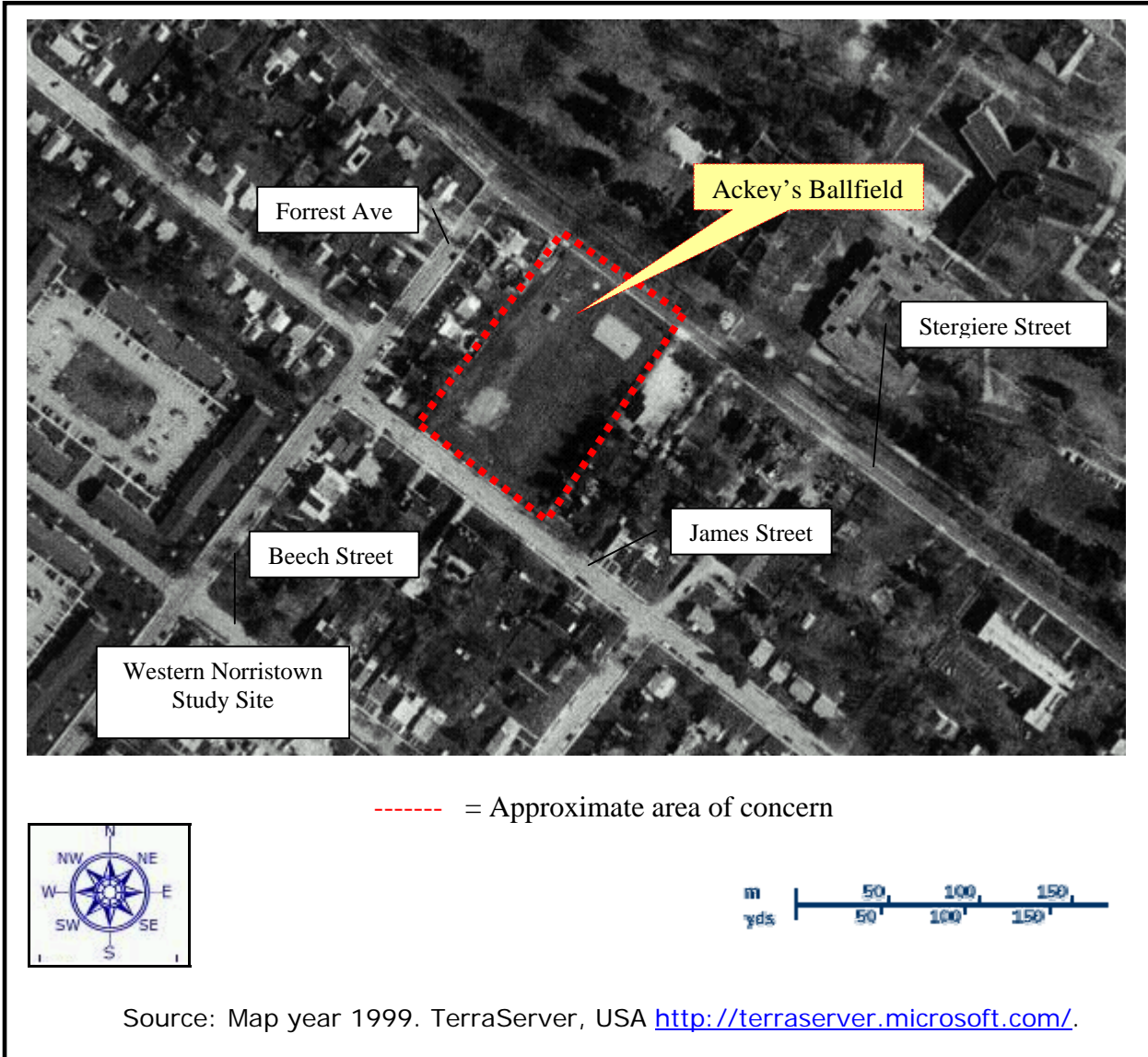
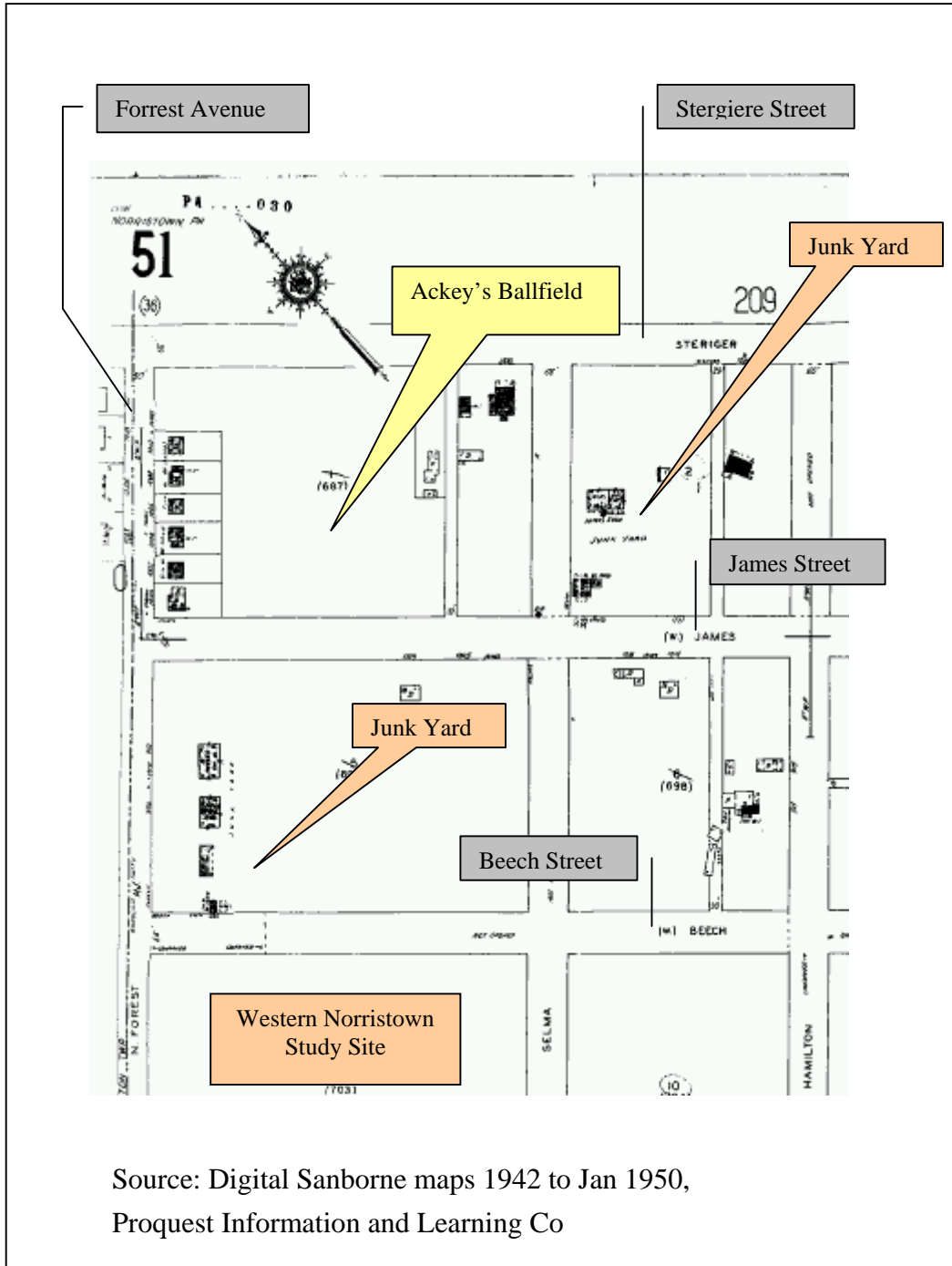


Figure 3 – Site Layout Map of Ackey's Ballfield in Western Norristown, Pennsylvania



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Figure 4 – Junk Yards Adjacent to Ackey's Ballfield as Shown on 1942 to 1950 Maps



Source: Digital Sanborne maps 1942 to Jan 1950,
Proquest Information and Learning Co

Figure 5 – Ackey's Ballfield/Playground - Sample results and approximate locations

