Health Consultation

Public Comment Release

ARCO NEIGHBORHOOD 2004 SOIL SAMPLES
LCP CHEMICALS SITE
BRUNSWICK, GEORGIA

EPA FACILITY ID: GAD099303182

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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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Prepared by:

Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Site Superfund and Assessment Branch

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Statement of Issues

The Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia, is a federal agency within the U.S. Department of Health and Human Services. It is investigating environmental contamination that might be associated with the LCP Chemicals Superfund Site (LCP site) in Brunswick, Georgia. As part of its investigation, ATSDR is working with the U.S. Environmental Protection Agency (EPA), the Glynn County Health Department, the Georgia Division of Public Health, and the Glynn Environmental Coalition. This investigation will eventually result in a public health assessment for the LCP site. Until then, ATSDR is releasing this health consultation so that residents will be aware of the public health significance of soil samples from the Arco neighborhood.

During a public availability session, held in the Arco neighborhood in September 2004, residents expressed concern about possible soil contamination in their neighborhood because of past activities at the LCP site. ATSDR, the Georgia Environmental Protection Division and the Glynn Environmental Coalition provided comments to EPA. EPA worked with the potentially responsible parties for the LCP site, who developed a sampling plan for off-site areas near the LCP site.

Background

A. Site Description and Demographics

The LCP site occupies approximately 550 acres of tidal marsh and dry land northwest of Brunswick, Georgia, along the Turtle River (see Figure 1, Appendix). Adjacent to the site is the historic Arco neighborhood. Using information from the 2000 Census, ATSDR has estimated that about 280 people live in the Arco neighborhood in 109 households. Table 1 in the appendix shows more detailed information about the residents.

Table 1. Demographic information about the Arco neighborhood, Brunswick, Georgia

Total population	**283**
White alone	123
Black alone	150
American Indian and Alaska Native alone	2
Asian alone	4
Native Hawaiian and Other Pacific Islander alone	0
Some other race alone	0
Two or more races	4
Children aged 6 years and younger	39
Adults aged 65 years and older	13
Females aged 15 to 44 years	74
Hispanic or Latino	16
Total Housing Units	**109**

B. Previous Soil Sampling of the Arco Neighborhood

In 1995, EPA collected surface soil samples (the top 3 inches) from five residences in the Arco neighborhood. One composite sample was collected from each front yard and another composite sample was collected from each back yard. Each composite sample consisted of 5 discrete soil samples that were mixed together. The concentration of lead, mercury, and a polychlorinated biphenyl (specifically Aroclor 1268) were measured in each sample. The following concentrations of each chemical were detected:

- mercury concentrations ranged from nondetectable to 2.2 ppm[1],
- Aroclor 1268 ranged from 0.12 to 2.2 ppm, and
- lead ranged from 36 to 300 ppm.

C. Current Soil Samples From the Arco Neighborhood

Because a relatively small number of yards were sampled, residents are concerned that other properties in the neighborhood might be contaminated with waste from the LCP site. Therefore, with EPA's supervision, the companies responsible for cleanup of the LCP site agreed to resample the Arco neighborhood. With input from the Glynn Environmental Coalition, their technical advisor, local residents, Georgia Environmental Protection Division, and ATSDR, EPA and the companies responsible for cleanup developed a sampling plan for the Arco neighborhood. Following several revisions, the final sampling plan consisted of dividing the Arco neighborhood into 36 grids. Soil samples would initially be collected from grids 1 to 16 and 33 to 36 because these grids are closer to the LCP site boundary (see Figure 2 in the appendix for the layout of the grids). Depending upon the results of these initial samples, EPA and the companies responsible for the LCP cleanup would decide if the other grids should be sampled. For the grids sampled in phase 1 (i.e., grids 1 to 16 and 33 to 36), two composite soil samples were collected from each grid. One composite sample consisted of five discrete soil samples from a depth of 0 to 3 inches. The other composite soil sample from the same grid consisted of five discrete soil samples from a depth of 0 to 12 inches. ATSDR requested the 0 to 3 inch soil samples because this depth provides more useful information about what contaminants people are coming in contact with as they work, play, and garden outside. The other composite sample of 0 to 12 inches was collected to be consistent with the sample design that was used to characterize contamination on the LCP site. The soil samples were measured for mercury, lead, arsenic, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated

[1] ppm = parts per million. Parts per million is one of several ways to indicate the concentration of a chemical in soil. Specifically, ppm refers to the parts of chemical per million parts of soil. For example, if a chemical has a concentration of 10 ppm in soil, then every million parts of soil has 10 parts of the chemical.

biphenyls (PCBs), which include Aroclor 1268. Figure 3 in the appendix shows the approximate discrete sampling locations for each grid. More details about the sampling plan can be found in the "Work Plan for Off-Site Soil Sampling" prepared for EPA (GeoSyntec Consultants 2004).

D. Results of Current Soil Samples From the Arco Neighborhood

The results of the 0 to 3 inch soil samples from the Arco neighborhood that were collected in November 2004 showed the following chemical concentrations in surface soils:

- PCBs ranged from not detected to 0.45 ppm for Aroclor 1268,
- PAHs ranged from not detected to 100 ppm for the 2-methylnaphthalene (and 96 ppm for 1-methylnaphthalene),
- mercury concentrations ranged from 0.085 ppm to 1.34 ppm,
- arsenic concentrations ranged from 0.63 ppm to 4.25 ppm, and
- lead ranged from 12 ppm to 935 ppm.

Table 1 in the appendix shows the specific concentration of each chemical from the individual grids for the 0 to 3 inch composite soil sample. For the 0 to 12 inches soil samples, the concentration of the same chemicals were lower. The specific concentrations are available in the "Draft Data Report of Off-Site Soil Sampling" (GeoSyntec and MWH Americas, Inc. 2005).

Discussion

When children and adults work and play outside, they will, through hand-to-mouth contact, swallow small amounts of dirt and dust that cling to their hands. This activity can result in children and adults being exposed to harmful chemicals that are present in soil. The following section evaluates the public health significance of chemicals present in soils from the Arco neighborhood.

A. Lead in Soil From the Arco Neighborhood

The concentration of lead in soils from the Arco neighborhood ranged from 12 ppm to 935 ppm, which can be compared to the average concentration of 17 ppm for soils from the eastern United States. While many of the grids contain lead levels well above the average soil concentration, the levels are typical for soils from urban levels. Urban soil often has lead levels of several hundred parts per million because of fallout from the historical use of leaded gasoline and because of past use of lead-based paint for homes. Therefore, it is not unusual to find 100 ppm to 300 ppm lead in soil from urban and suburban areas. However, one grid showed a composite soil lead concentration of 935 ppm, which means that some of the discrete soil samples that made up the

composite had higher lead levels. Therefore, EPA required the companies responsible for testing the soil to retrieve the archived discrete soil samples that went into making the composite sample for grid 15. The five discrete soil samples showed the following lead concentrations: 21 ppm, 23 ppm, 29 ppm, 211 ppm, and 2,050 ppm. The discrete lead levels in soils from grid 15 are acceptable except for the residence with 2,050 ppm lead. The lead concentration in soil from this property indicates that other soils from this property are likely to be contaminated from lead. EPA has informed ATSDR that no one currently lives at this residence. If soil lead contamination at this level is widespread at this property, it could result in elevated blood lead levels in preschool children who play frequently at this property or who live at this residence in the future.

The Centers for Disease Control and Prevention (CDC) reports that blood lead levels generally rise 3 to 7 micrograms per deciliter (μg/dL) for every increase of 1,000 ppm of lead in soil or dust (CDC 1991; Bornschein et al. 1986; ATSDR 1988)[2]. CDC has established a blood lead level of 10 μg/dL (10 micrograms of lead per deciliter of blood) as a level of concern.[3] CDC established this value after evaluating a large number of rigorous epidemiologic and experimental studies. In particular, recent human studies have provided new evidence about the association between low-level lead exposure and child development (CDC 1991). CDC states that blood lead levels that exceed 10 μg/dL are associated with decreased intelligence and impaired neurobehavioral development. Many other effects, including decreased stature or growth, decreased hearing, and decreased ability to maintain a steady posture, begin at these low blood lead levels and become more pronounced at higher blood lead levels. Lead's impairment of the synthesis of vitamin D is detectable at blood lead levels of 10 to 15 μg/dL.

These lead-related effects are documented in several population studies that investigated the harmful effects of lead (ATSDR 1999; CDC 1991; etc.). The effects are difficult to identify in individuals with blood lead levels of 10 to 20 μg/dL because the changes are subtle. The effects can be detected, however, when large groups of children are studied.

In evaluating public health issues concerning children and lead, it is important to remember that children can become exposed to lead from many sources, in addition to lead coming from soils.

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[2] μg/dL = microgram per deciliter. The concentration of lead in blood is usually reported as micrograms of lead per deciliter of blood. A deciliter of blood is 100 milliliters of blood. Most human studies that evaluate the effects of lead on children now measure blood lead levels as micrograms per deciliter; therefore, health guidelines for blood lead are based on micrograms per deciliter.

[3] A deciliter equals 100 milliliters (mL) or about 3 ounces.

Here are a few examples of items that can be sources of lead:

- paint chips,
- food and candy,
- drinking water,
- lead-glazed cookware,
- jewelry, and
- toys.

The source of lead in soils from the Arco neighborhood has not been determined. At least two possible sources are fallout from past use of leaded gasoline and weathering of outdoor leaded paint. Whether or not lead-containing material from the LCP site was disposed of in the neighborhood at some time in the past has not been determined. ATSDR encourages residents and others who know of improper disposal of material from the LCP site to contact the authors of this report.

B. Other Chemicals in Soil From the Arco Neighborhood

The levels of arsenic in soil from the Arco neighborhood are typical for soils in the eastern United States, that is, the concentrations detected are at background levels for soil. Specifically, the levels of arsenic in soil from the Arco neighborhood ranged from 0.6 to 4.2 ppm, which can be compared to the average concentration of arsenic in eastern U.S. soils of 4.8 ppm. The levels of mercury in soil from the Arco neighborhood ranged from 0.08 to 1.3 ppm, which can be compared to the estimated average concentration of mercury in eastern U.S. soils of 0.12 ppm (ATSDR 1992).

When children and adults work and play outside, they can swallow small amounts of dirt and dust that cling to their hands. The estimated intake of mercury and arsenic in children and adults through such hand-to-mouth contact is far below levels that might cause harmful effects. Therefore, arsenic and mercury levels in soil from the Arco neighborhood are not a public health hazard.

Small amounts of Aroclor 1268 were detected in soils from the Arco neighborhood; most of the other forms of PCBs were not detected. The estimated intake of Aroclor 1268 in children and adults from hand-to-mouth contact is far below levels that might cause harmful effects. Therefore, PCBs in soils from the Arco neighborhood are not a public health hazard.

While most of the soils from the Arco neighborhood contains very low concentrations of PAHs, two PAHs were found at significantly higher levels, specifically 96 ppm for 1-methyl-

naphthalene and 100 ppm for 2-methylnaphthalene. The estimated amount of exposure to PAHs (including 1-methylnaphthalene and 2-methylnaphthalene) from ingesting soil is far below levels that might cause harmful effects. Therefore, PAHs in soil from the Arco neighborhood are not a public health hazard.

Conclusions

Lead contamination at one property in the Arco neighborhood is a public health hazard because exposure to elevated levels of lead in soil could cause harmful effects in preschool children who frequently play there. Lead in soil at this property also could cause harmful effects in preschool children should a family move into this property in the future.

If children's blood lead levels exceed CDC's level of concern of 10 µg/dL, children might experience the following harmful effects:

- neurobehavioral effects, such as decreased intelligence or delays in development,
- impaired growth (decreased stature),
- altered vitamin D metabolism,
- blood effects, such as changes in blood enzyme levels, and
- decreased performance on hearing tests.

The levels of lead in other soil samples from the Arco neighborhood are not a public health hazard. The levels of other chemicals (arsenic, mercury, PCBs, and PAHs) in soils from the Arco neighborhood are not a public health hazard.

Recommendations

ATSDR makes the following recommendations, on the basis of results from the recent soil sampling of the Arco neighborhood.

1. All preschool children, regardless of where they live, should have their blood lead levels determined.

2. ATSDR should provide information about ways to reduce exposure to lead in soil.

3. Residents with homes that were built before 1978 should have the interior and exterior of their homes tested for lead-based paint.

Public Health Action Plan

1. Residents who want to have blood lead levels determined in their children should contact the Glynn County Health Department, 2747 4th Street, Brunswick, GA 31520. Telephone: 912-264-3961.

2. ATSDR will conduct community education during an upcoming public meeting to educate residents about ways to reduce exposure to lead in soil.

3. Residents in the Arco neighborhood who want to have their homes tested for lead-based paint should consult with Gary Hummel with the Glynn County Health Department, 1803 Gloucester Street, Brunswick, GA 31520. Telephone: 912-264-3931; e-mail: gahummel@gdph.state.ga.us.

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Appendix


LCP Chemicals Site
Marsh
Upland
Arco neighborhood
303
Community Rd
Evelyn Pl
Picker Run
Watson Cir
Picker Landing Dr
Lazurus Ln
Hawkins Ln
Live Oak Cir
Allen & Graham Blvd
Elizabeth Rd
Jenkins Ln
Williams Dr
Butts Av
Track St
Southern Rd
Hickory Av
Roberts St
Kingsland Av
Austin St
Lakewood St
Broadway St
Norwich St
Whitlock St
Fader Ln
De Loach St
Manning St
Jones Green Rd
Courson St
Bliss St
Cedar St
Martin Luther King Jr Blvd
Knight St
Ross Rd
Griffith St
Tupelo St
Teeth St
Pine St
Hill St
Dudley St
Ninth St
Ogg Av
West Ash St
West Oak St
Sycamore St
Cypress Av
Palmetto Av
Eighth St
Seventh St
Sixth St
Atlantic Av
Lighthouse Island Rd
Bonds Bluff Rd
Fremont Street Ln
Franklin Av
Monon St
Treville Av
Rhodes Av
Third St
Second St
First St
Selden Park Rd
Treville Cir
Broilsford Av
GA Pacific
TURTLE RIVER

Figure 1

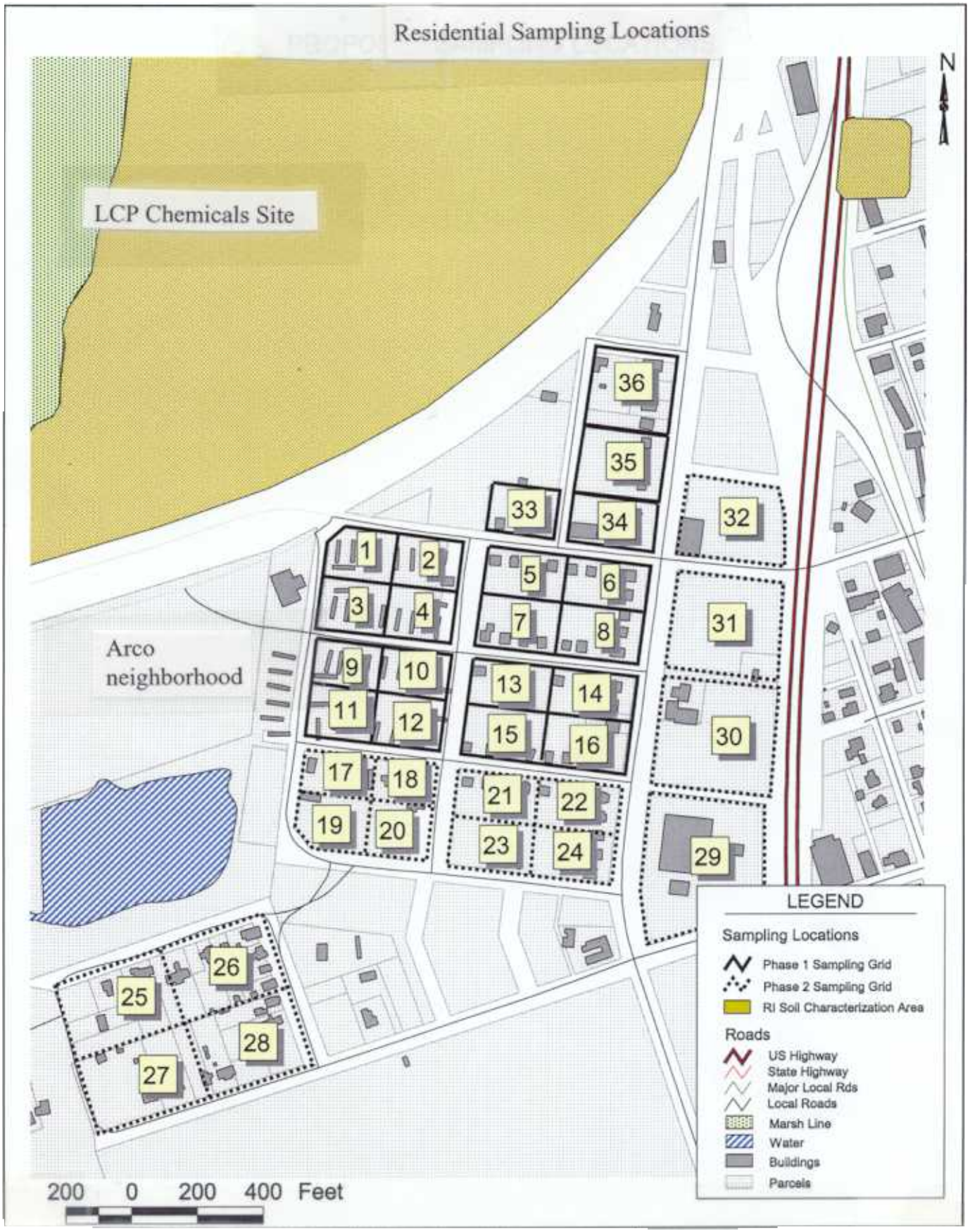
Residential Sampling Locations
LCP Chemicals Site
Arco neighborhood
N
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
LEGEND
Sampling Locations
Phase 1 Sampling Grid
Phase 2 Sampling Grid
RI Soil Characterization Area
Roads
US Highway
State Highway
Major Local Rds
Local Roads
Marsh Line
Water
Buildings
Parcels
200 0 200 400 Feet

Figure 2

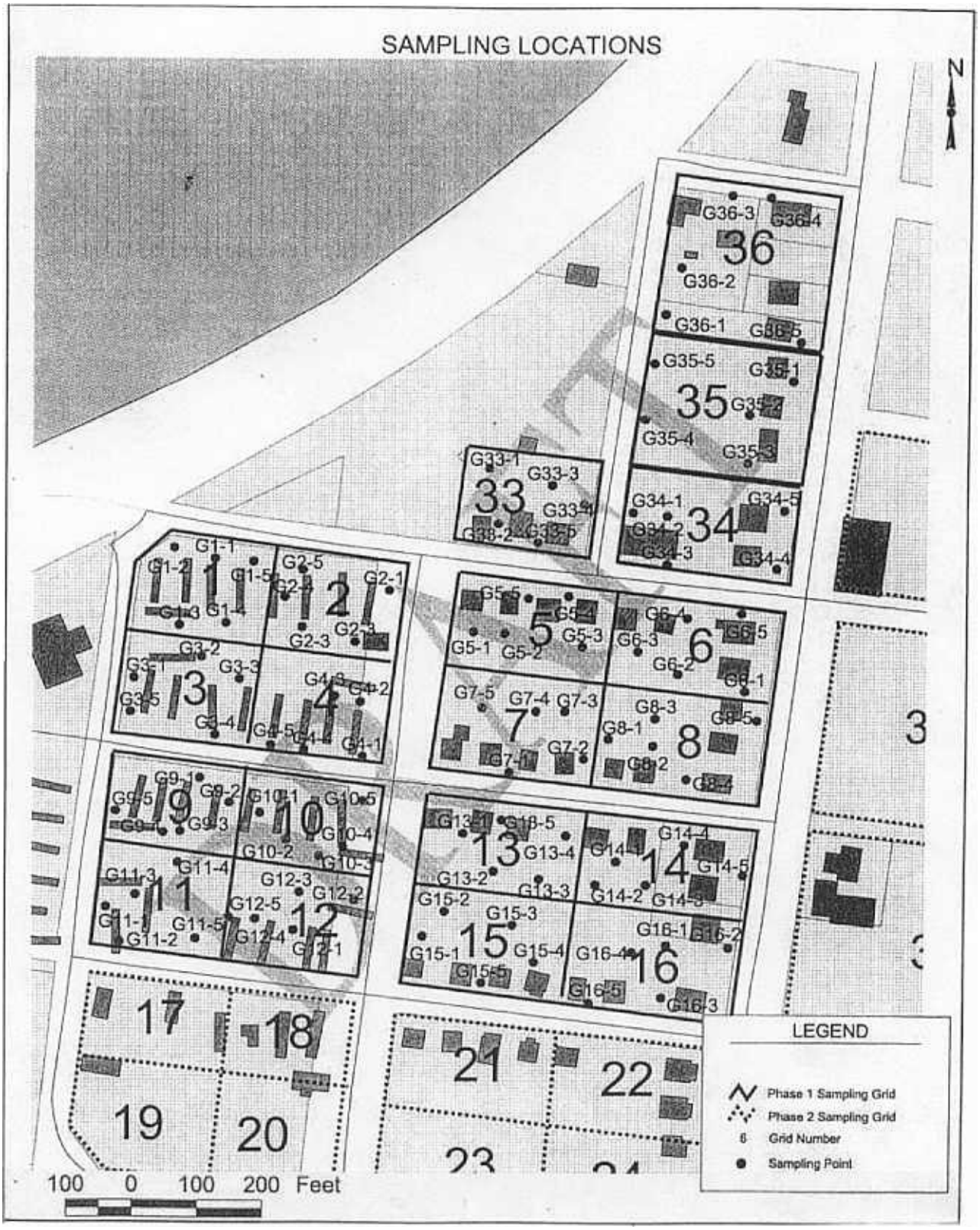
SAMPLING LOCATIONS
N
LEGEND
Phase 1 Sampling Grid
Phase 2 Sampling Grid
6 Grid Number
Sampling Point
100 0 100 200 Feet

Figure 3

Table 1

Results of Surface Soil Samples (0 to 3 inches) from the Arco Neighborhood

Parameter	Grid Identification																			
	G1	G2	G3	G4	G5	G6	G7	G8	G9	G10	G11	G12	G13	G14	G15	G16	G33	G34	G35	G36
Organics (PPM)																				
1-Methylnaphthalene	ND	ND	0.120	ND	ND	96.000	0.220	0.130	ND	ND	0.210	ND	0.150	0.130	0.290	0.130	0.100	ND	ND	ND
2-Methylnaphthalene	0.110	ND	0.110	ND	0.096	0.180	0.290	0.530	0.180	ND	0.110	ND	0.190	0.310	0.130	0.160	0.320	100.000	ND	ND
Acenaphthene	0.074	ND	ND	ND	0.092	ND	ND	ND	ND	ND	ND	ND	0.062	0.100	ND	ND	ND	0.290	ND	ND
Acenaphthylene	ND	ND	ND	ND	ND	0.054	ND	0.140	0.110	0.047	0.009	0.063	0.053	0.120	0.091	ND	0.045	0.063	ND	ND
Anthracene	ND	0.003	0.003	ND	ND	0.004	0.003	0.008	ND	ND	ND	ND	0.004	0.009	0.004	ND	0.007	0.008	0.008	ND
Aroclor-1016	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1221	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1232	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1242	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1248	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1254	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.018	0.039	0.023	ND
Aroclor-1260	0.310	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aroclor-1268	0.230	0.091	0.120	0.065	0.140	0.170	0.180	0.300	0.063	0.034	0.070	0.100	0.210	0.250	0.096	0.080	0.360	0.140	0.450	0.150
Benzo(a)anthracene	0.015	0.015	0.020	0.019	0.033	0.044	0.042	0.093	0.017	0.008	0.010	0.035	0.040	0.130	0.026	0.038	0.320	0.036	0.450	0.014
Benzo(a)pyrene	0.019	0.018	0.026	0.025	0.047	0.047	0.051	0.120	0.020	0.011	0.014	0.047	0.051	0.150	0.038	0.044	0.390	0.048	0.620	0.019
Benzo(b)fluoranthene	0.037	0.026	0.034	0.032	0.068	0.089	0.059	0.100	0.022	0.012	0.015	0.041	0.046	0.120	0.032	0.065	0.560	0.060	0.960	0.023
Benzo(g,h,i)perylene	0.056	0.039	0.050	0.084	0.097	0.120	0.110	0.260	0.048	0.027	0.032	0.078	0.100	0.320	0.087	0.091	0.480	0.130	0.920	0.031
Benzo(k)fluoranthene	0.016	0.011	0.017	0.014	0.024	0.038	0.020	0.029	0.009	0.005	0.006	0.018	0.014	0.037	0.013	0.026	0.260	0.023	0.430	0.010
Chrysene	0.039	0.023	0.034	ND	0.057	0.086	0.070	0.160	0.031	0.015	0.019	0.048	0.070	0.220	0.047	0.064	0.400	0.063	0.590	0.024
Dibenzo(a,h)anthracene	0.008	0.006	0.008	0.015	0.016	ND	0.020	0.050	ND	0.004	0.005	ND	0.022	0.063	ND	0.015	0.085	0.025	0.150	0.006
Fluoranthene	0.110	0.040	0.060	0.036	0.062	0.200	0.067	0.120	0.025	0.014	0.018	0.051	0.051	0.130	0.033	0.064	0.300	0.075	0.410	0.024
Fluorene	0.015	ND	0.006	ND	ND	0.013	0.016	0.008	0.011	0.007	0.009	0.008	0.018	0.009	0.026	0.012	0.014	ND	0.035	ND
Indeno(1,2,3-cd)pyrene	0.014	0.015	0.021	ND	0.032	0.053	0.032	0.093	0.024	0.011	0.012	0.035	0.044	0.140	0.049	0.035	0.260	0.051	0.480	0.014
Naphthalene	ND	0.090	0.065	ND	ND	ND	0.061	0.100	ND	ND	ND	ND	0.059	0.082	ND	0.210	ND	ND	ND	ND
Phenanthrene	0.056	0.016	0.024	ND	0.025	0.071	0.042	0.075	0.013	0.009	0.015	0.021	0.031	0.081	0.021	0.021	0.048	0.034	0.039	0.011
Pyrene	0.080	0.037	0.052	0.042	0.076	0.170	0.085	0.210	0.042	0.018	0.028	0.068	0.087	0.250	0.051	0.083	0.620	0.080	1.100	0.049
Inorganics (PPM)																				
Arsenic	0.776	1.16	0.969	2.2	1.09	1.66	1.41	3.83	0.866	2.22	0.761	3.43	1.16	4.25	1.12	2.43	1.02	0.632	2.28	1
Lead	18.2	20.6	12.2	57.1	104	128	208	157	20.2	16.5	24.2	114	90.3	259	935	119	111	57.7	90.5	40.5
Mercury	0.194	0.26	0.153	0.226	0.324	0.476	0.585	0.579	0.177	0.115	0.103	0.0853	0.171	0.172	0.123	0.279	1.34	0.297	1.03	0.242